



School of
Management and Law

Sentiment in European Sovereign Bonds

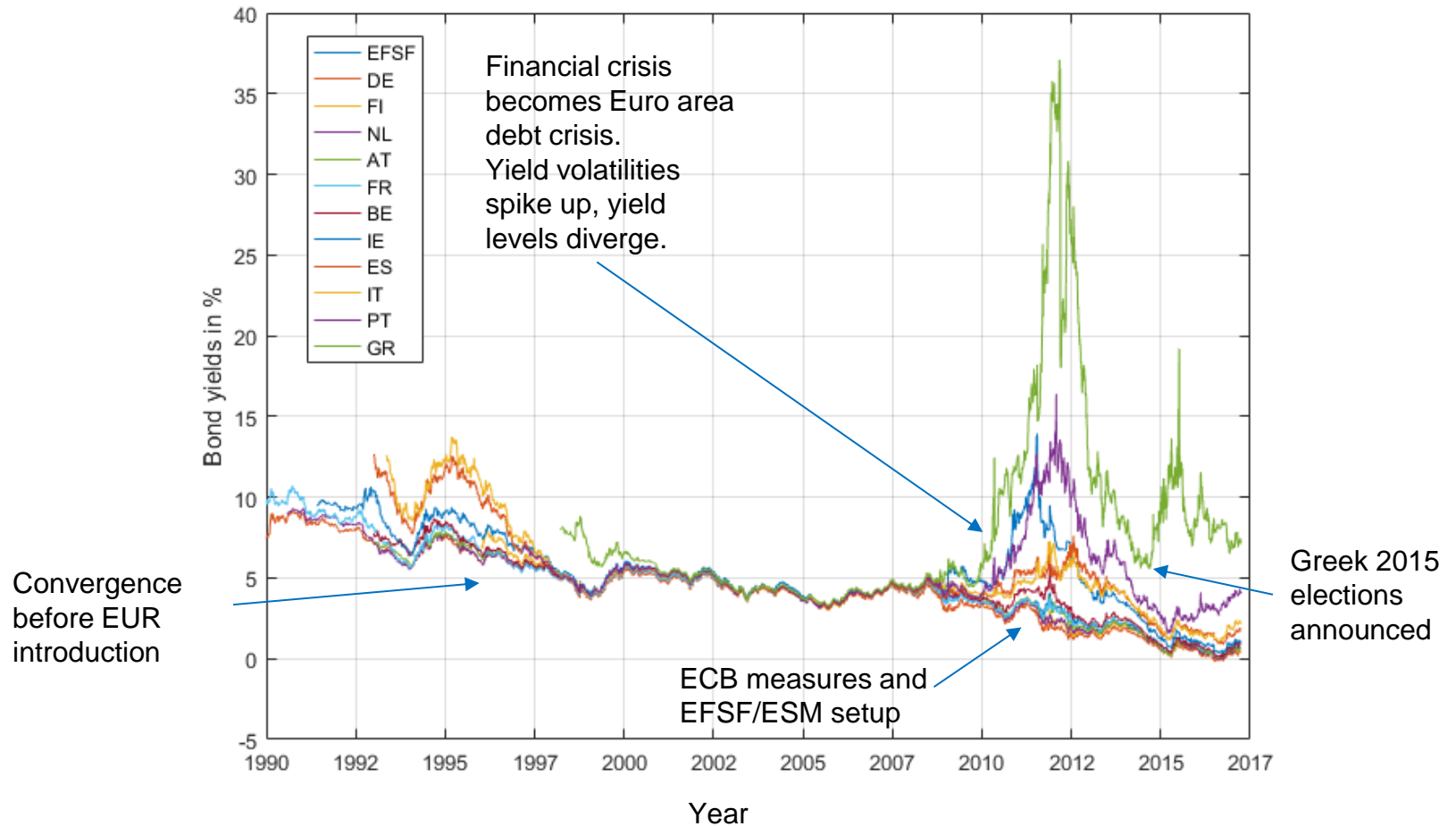
6.9.2018



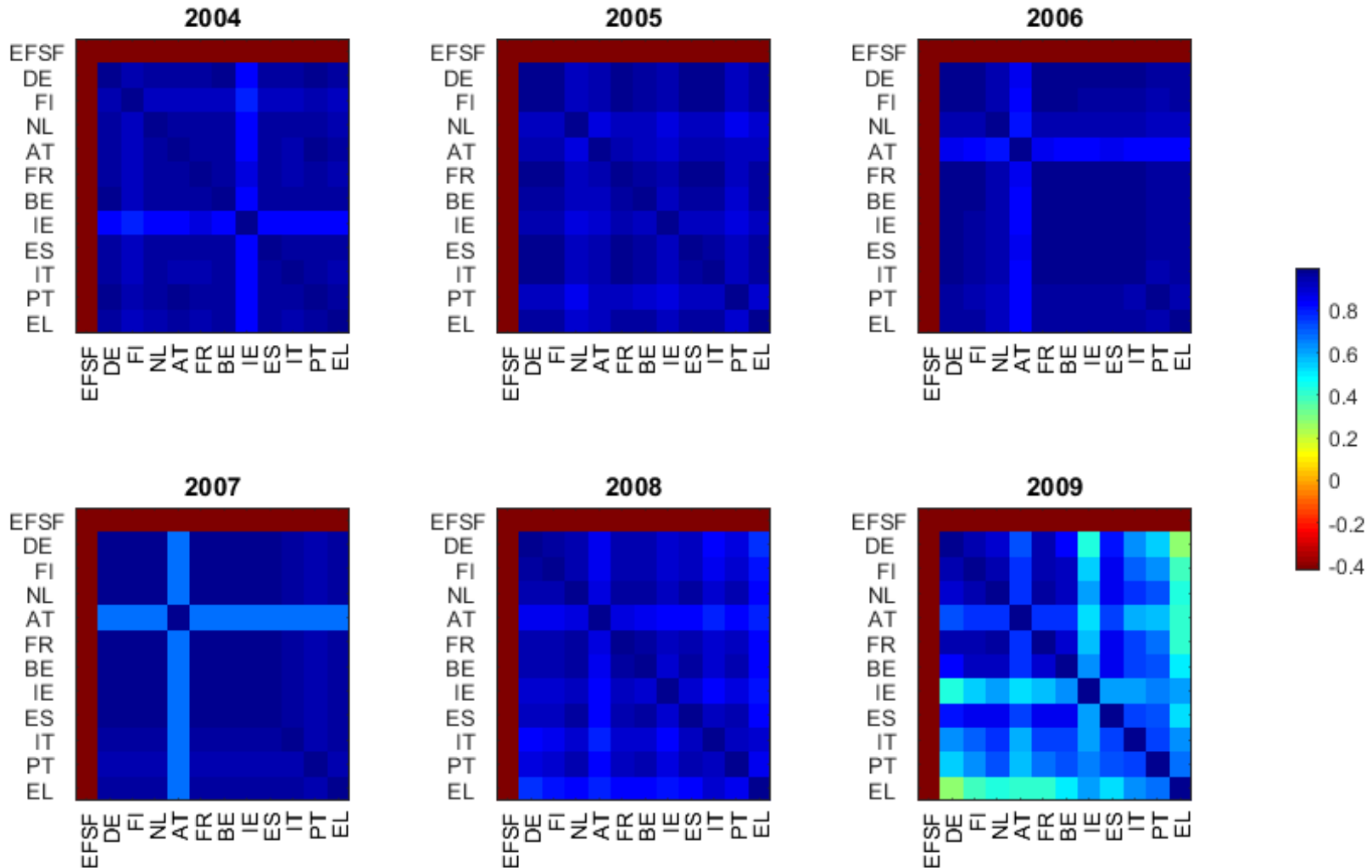
Peter Schwendner, Martin Schüle, Thomas Ott, Martin Hillebrand

Case Study: Euro area sovereign bonds

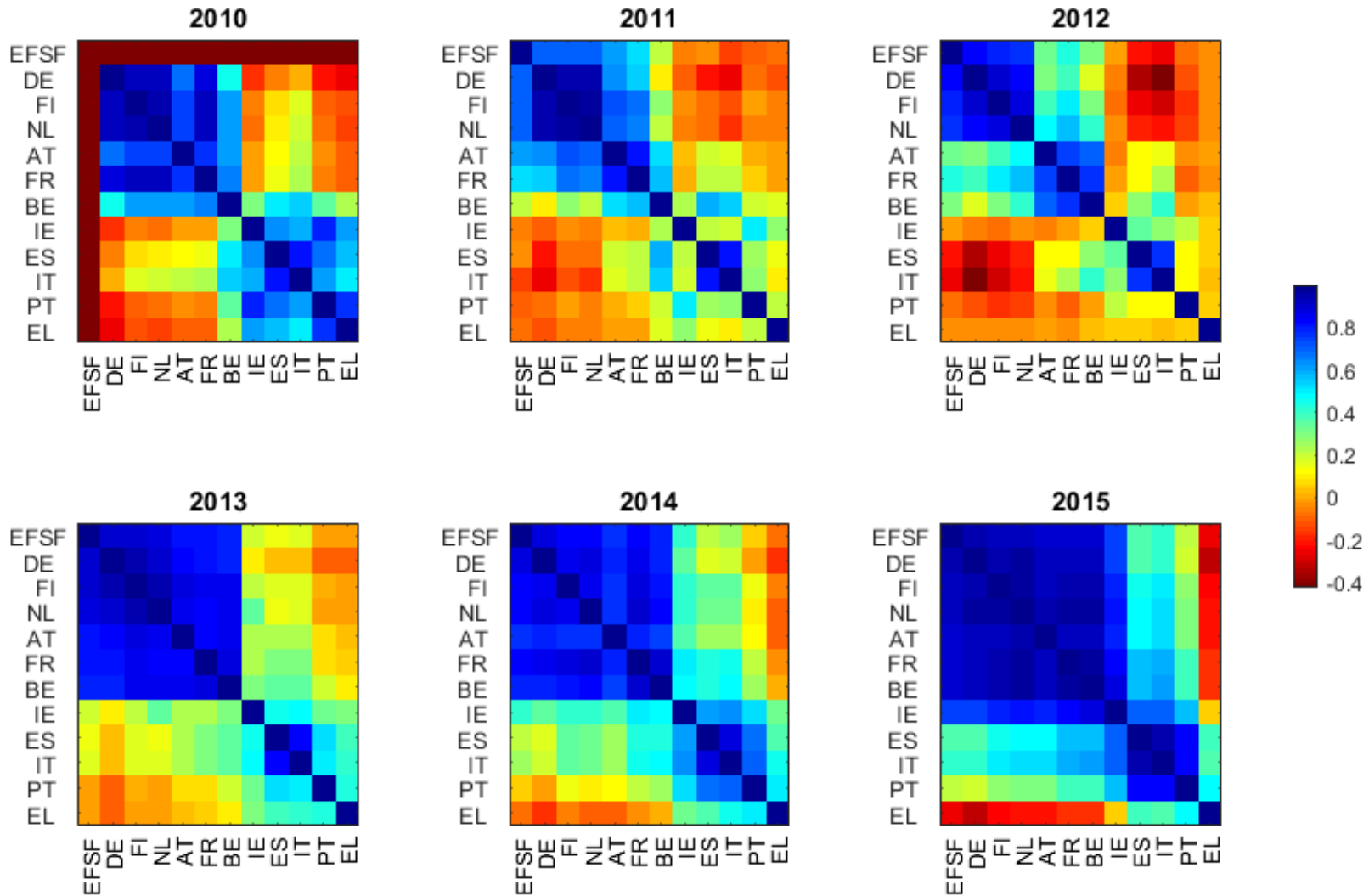
- Generic 10yr bonds
- 12 issuers: EFSF and 11 euro area sovereigns



Correlations of *daily* bond yield changes 2004 - 2009



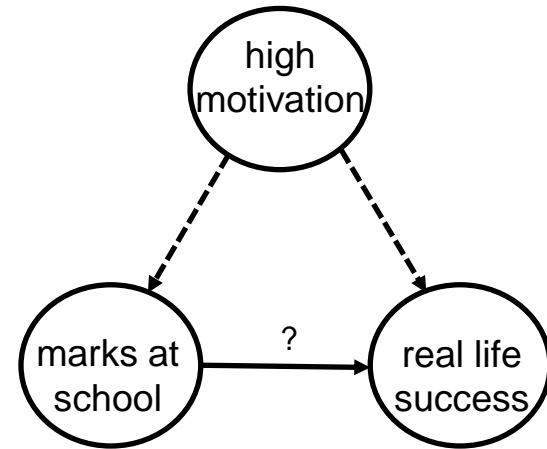
Correlations of *daily* bond yield changes 2010-2015



Yield return correlations

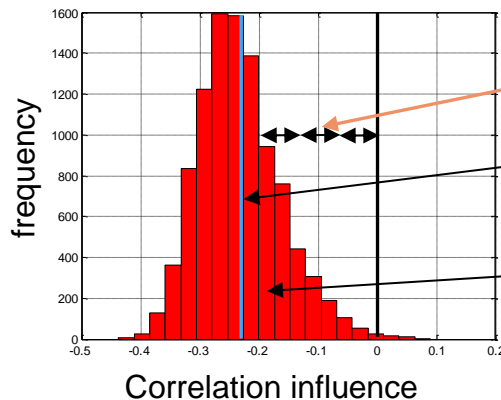
Problem with correlations:

- They are unstable in time
- Common factors may lead to spurious correlations
- Too many links: each market is correlated to any other market. Who is driving what?



Solution:

- „Correlation influence“ based on partial correlations shows driving factors
- Bootstrap filter to reduce unstable links in correlation matrix



stddev of the bootstrap samples

$\text{abs}(\text{mean}) > 3 * \text{stddev} \Rightarrow$ correlation influence is «significant»

Histogram of corr influence bootstrap Finland -> Greece in 2015

Correlation influence

- The partial correlation measure is defined as

$$\rho(X, Y|Z) := \frac{r(X, Y) - r(X, Z) \cdot r(Y, Z)}{\sqrt{1 - r(X, Z)^2} \cdot \sqrt{1 - r(Y, Z)^2}}$$

Small absolute value would mean
„Z strongly affects correlations
between X and Y“

- Correlation influence is defined as

$$d(X, Y|Z) := r(X, Y) - \rho(X, Y|Z)$$

„How much of the correlation
between X and Y is explained by
their correlations to Z?“

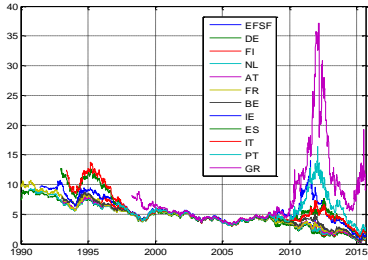
- The average correlation influence is defined as

$$d(X|Z) := \frac{1}{k} \sum_{i=1}^k d(X, Y_i|Z)$$

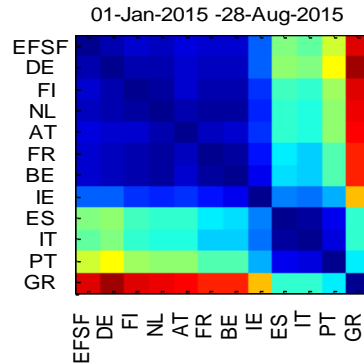
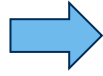
„How much does Z explain
correlations between X and all
other markets?“

This is a **directed** arrow from Z pointing to X.

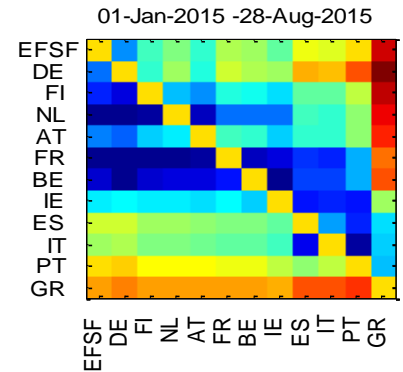
Method overview: from bond yields to influence networks



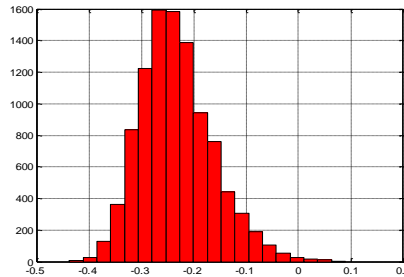
Bond yield time series



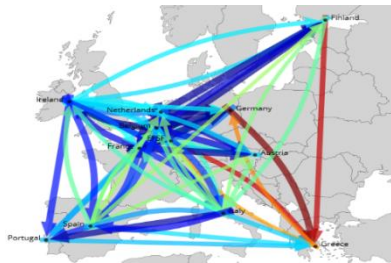
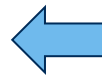
Correlation matrix of yield changes



Correlation influence



Bootstrap filter



Filtered influence network

We use **influence networks** to identify the markets that drive the correlations of other markets.

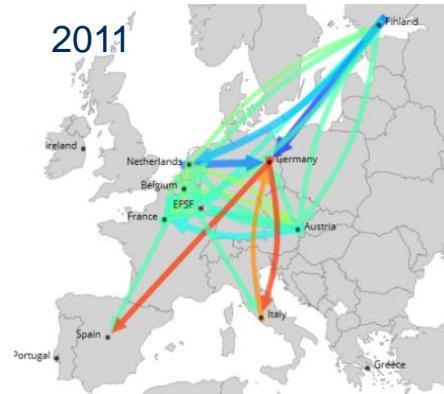
As correlations are very unstable, we use a **bootstrap filter** to reduce noise.

Correlation influence networks of *daily* bond yield changes 2010 - 2015

2010.



2011

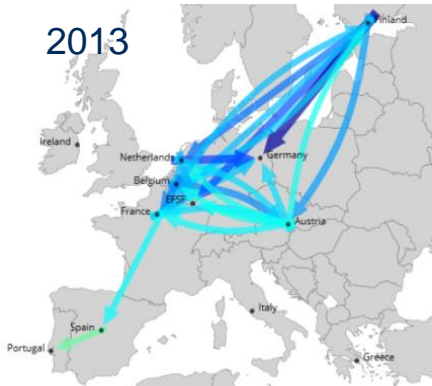


2012

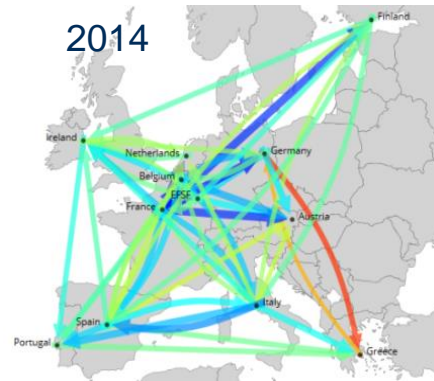


Blue arrows:
dominating positive
correlations =>
reinforcing
movements

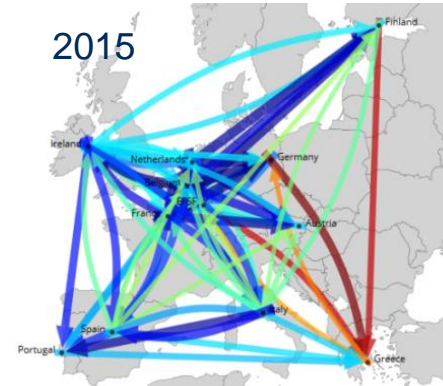
2013



2014

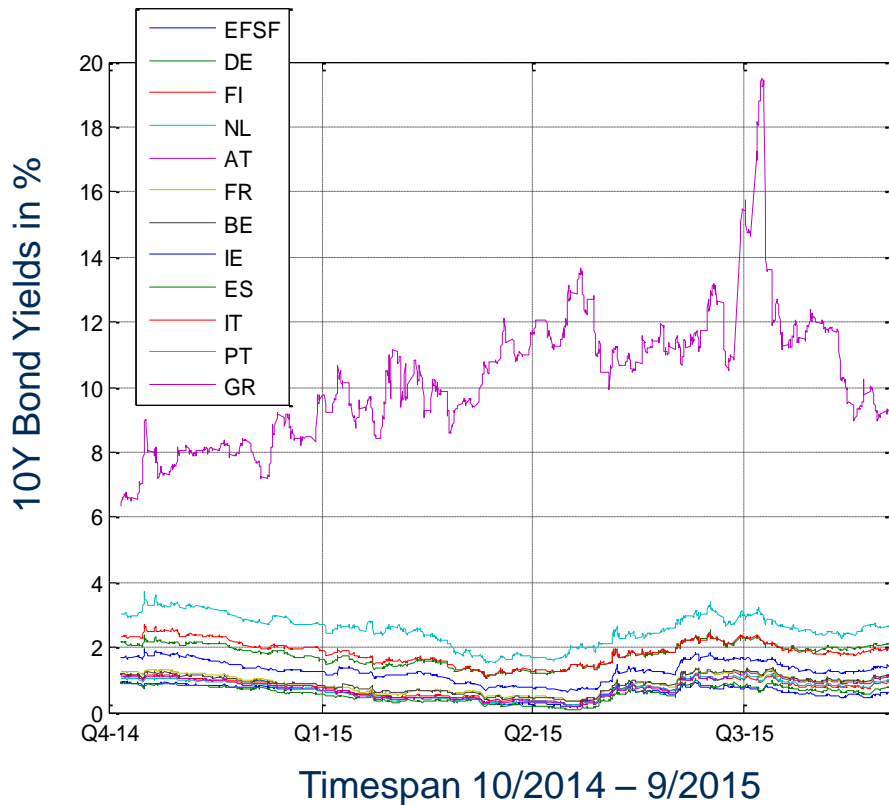


2015



Red arrows:
dominating negative
correlations =>
diverging
movements

Case Study: Negotiations of third Greek Rescue Programme



Question:

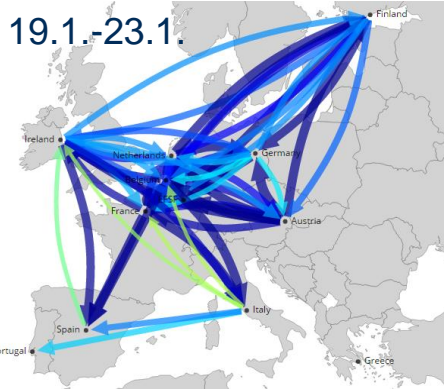
Did the market imply contagion risk to other Euro area countries beyond Greece?

Reuters, 19 April 2015:
“Greece's Varoufakis warns of Grexit contagion”

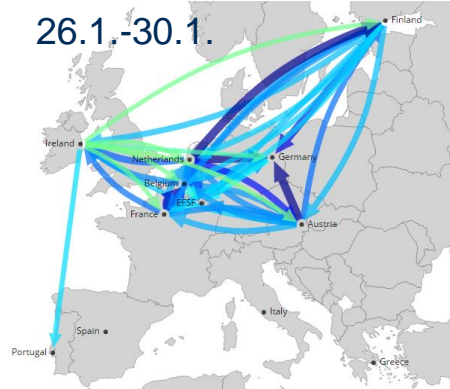
Reuters, 27 June 2015:
“Euro zone prepared to guard against Greek risks – Dijsselbloem”



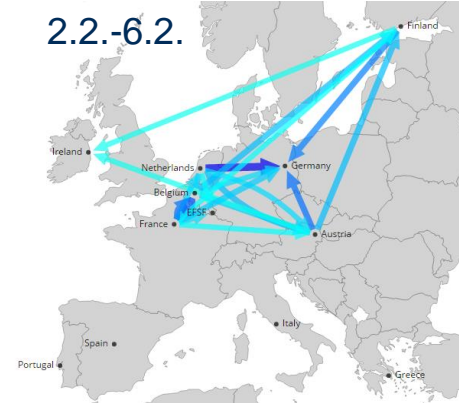
Case Study: Negotiations of third Greek Rescue Programme Jan – Feb 2015



Before Greek elections

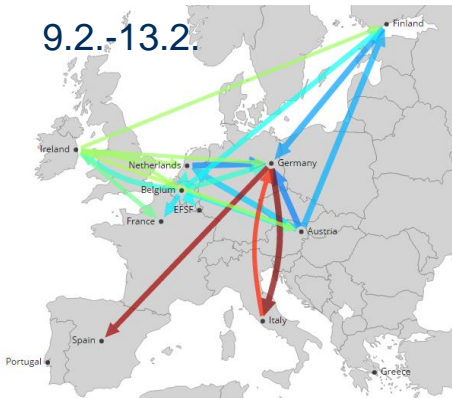


After Syriza won

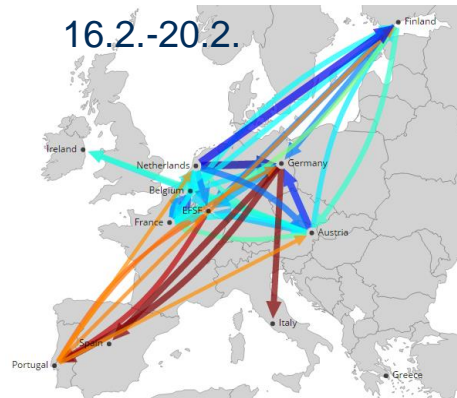


Tsipras' tour across Europe

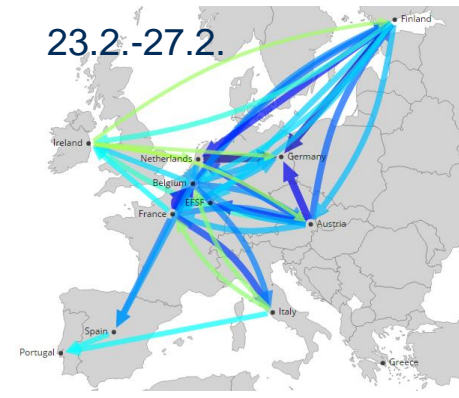
Blue arrows:
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Tsipras confirms election
promises



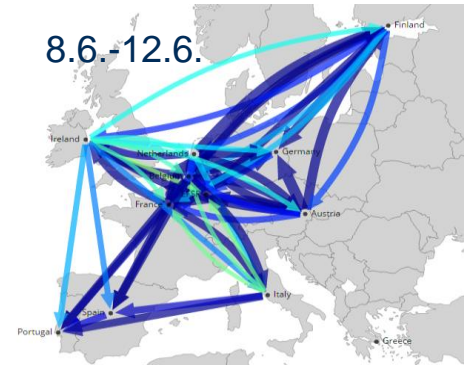
Nervousness before Eurogroup
Brussels



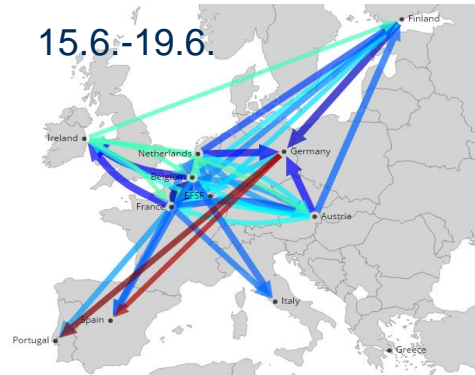
Greece commits to programme
extension;
«Troika» become «Institutions»

Red arrows:
dominating
negative
correlations =>
diverging
movements

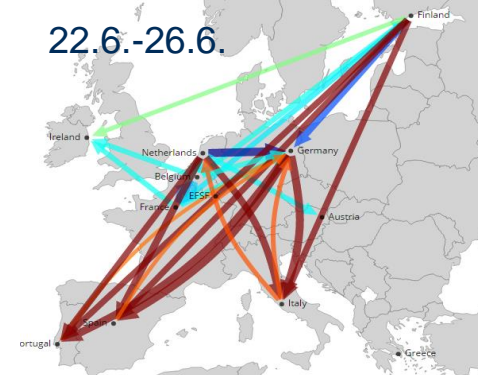
Case Study: Negotiations of third Greek Rescue Programme Jun - Jul 2015



Ongoing negotiations



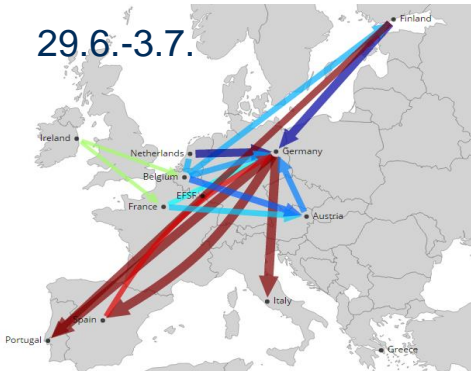
Tsipras meets Putin



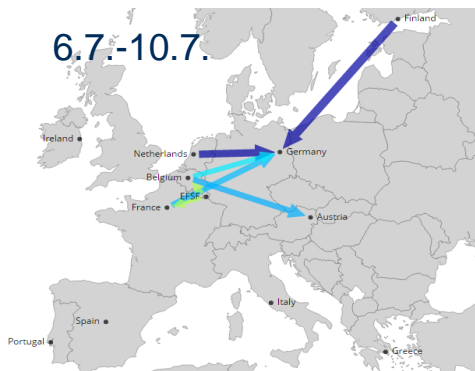
Many Eurogroup meetings without results

Blue arrows:
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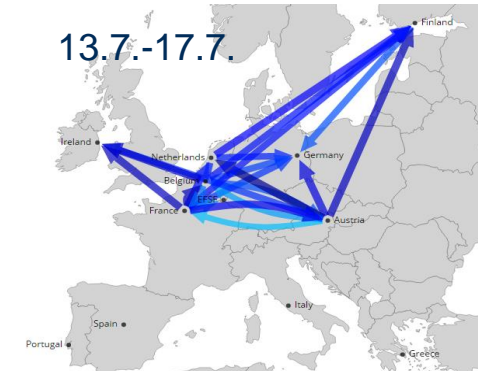
Red arrows:
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Referendum announced.
ECB does not raise ELA. Capital controls.

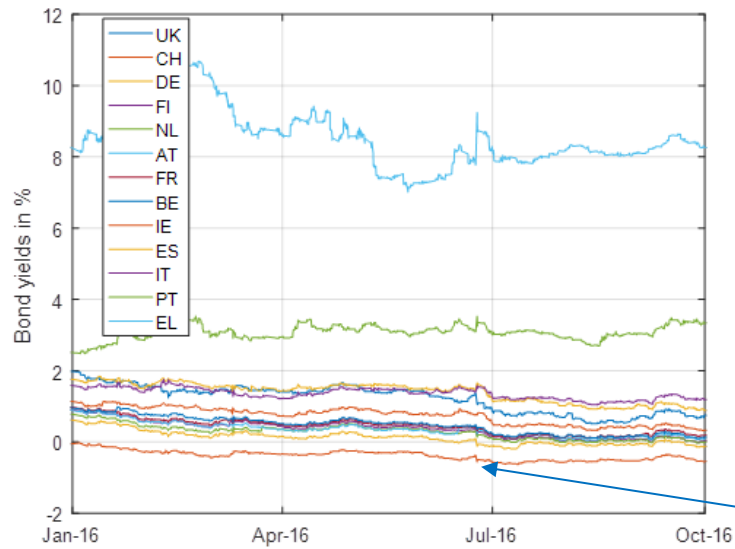


Referendum against programme,
ECB still does not raise ELA limit



Greece commits to third programme

Case Study: Brexit Referendum, June 2016



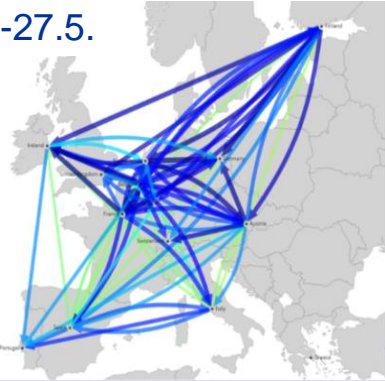
Question: Did the unexpected Brexit decision foster fears about a further dissolution of EU?

Brexit Referendum

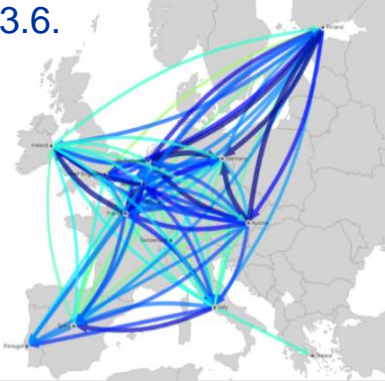


Case Study: Brexit Referendum, June 2016

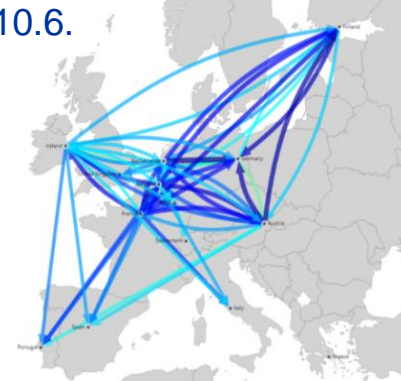
23.5.-27.5.



30.5.-3.6.

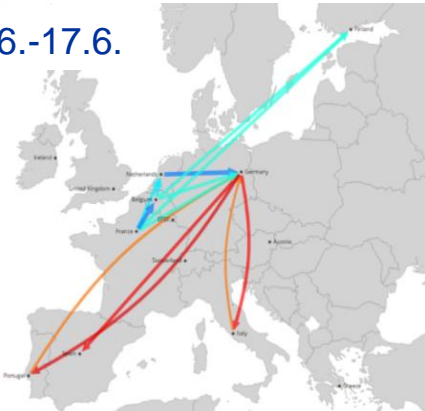


6.6.-10.6.

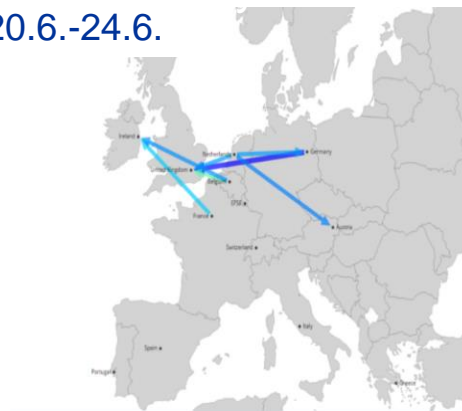


Blue arrows:
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13.6.-17.6.



20.6.-24.6.



27.6.-1.7.



Red arrows:
dominating negative
correlations =>
diverging
movements

In the week before the Brexit referendum (23.6.2016), significant negative correlation influences between core and periphery appeared, but disappeared again quickly.

Negative correlations are already visible when market makers prepare for a further spread widening, before the spread widening actually happens. This makes them a sensitive early warning signal.

Italy's Salvini says bond market's 'lords of the spread' will get the answers they're waiting for

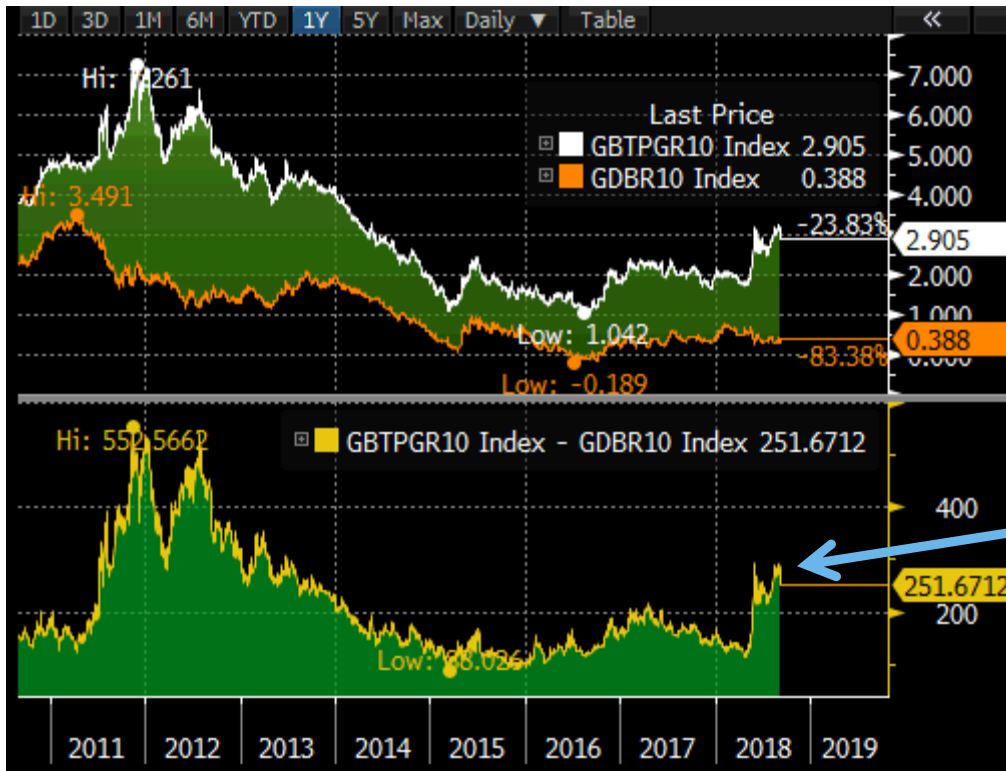
Published: Sept 4, 2018 12:49 p.m. ET

As Italy gets ready for a new budget, some experts are preparing for the worst

- At the moment, there is no clarity on how the right-wing Lega and the leftist Five Star Movement (M5S) will put together a budget that will raise pensions and the available income for households.
- Ahead of the presentation of this crucial budget, the Italian government is embroiled in new controversy after a bridge collapse in the city of Genoa last week.

Silvia Amaro | @Silvia_Amaro

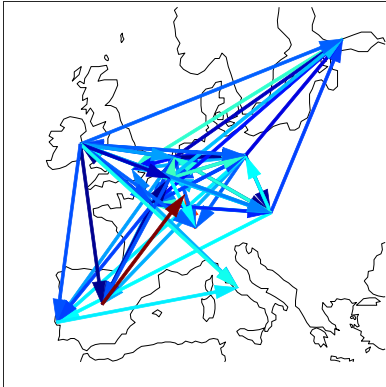
Published 4:12 AM ET Wed, 22 Aug 2018



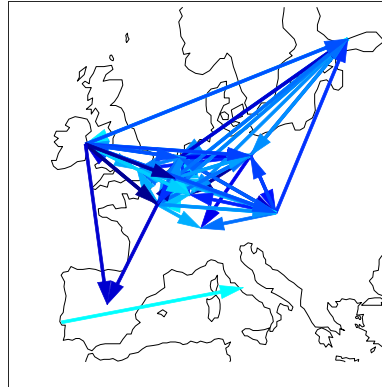
«spread»:
Italy 10Y yield –
Germany 10Y yield

Case Study: New Italian government, budget talks, May 2018 - now

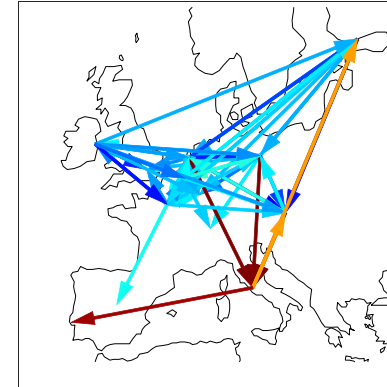
23.7.-27.7.



30.7.-3.8.



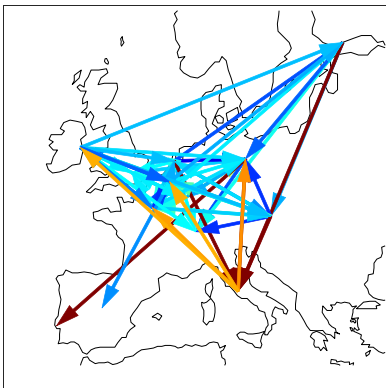
6.8.-10.8.



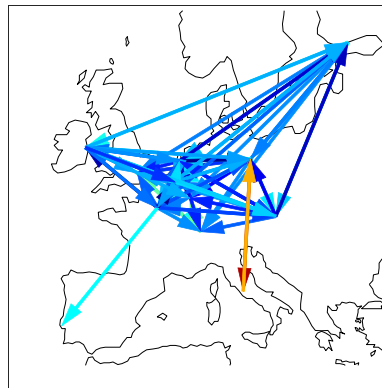
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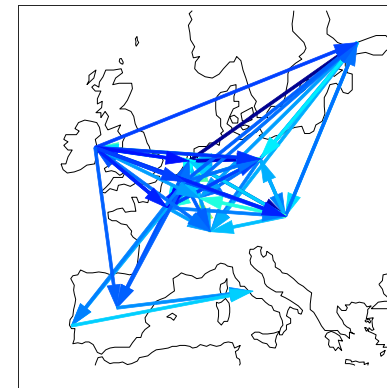
13.8.-17.8.



20.8.-24.8.



27.8.-31.8.



Since May 2018, the Italian spread increased. Italian yields show negative correlations to core European bonds. However, we see less spillover risk than 2015.

Sentiment in European Sovereign Bonds

- Filtered correlation influences show the most relevant correlation drivers in time.
- Since 2010, European bonds cluster into core and periphery groups.
- From 2010-2012, negative correlations between the core and periphery groups signal market players prepare for further spread increases. Since 2013, the situation improved a lot.
- In 2015 during the negotiations between Greece and the Eurogroup, the warning signals of negative correlation reappeared.
- In 2016, warning signals reappeared in the week before the Brexit referendum, but disappeared quickly thereafter.
- In 2018, we see warning signals since the setup of the new Italian government, but less spillover risk than in 2015 with Greece.

Where do negative correlations come from, and what do they mean?

- Market makers use simple factor models for their bond quote systems. The fastest moving market price sources (bond futures, reference bonds) drive less liquid instruments. Betas and correlations reflect the risk expectation of the traders.
- We recover these correlations and thus the sentiment even before large spread moves occur.