Sentiment in European Sovereign Bonds

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Case Study: Euro area sovereign bonds

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

Financial crisis becomes Euro area debt crisis. Yield volatilities spike up, yield levels diverge.

Convergence before EUR introduction

ECB measures and EFSF/ESM setup

Greek 2015 elections announced
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

Histogram of corr influence bootstrap Finland -> Greece in 2015

stddev of the bootstrap samples

abs(mean) > 3 * stddev => correlation influence is «significant»
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

Filtered influence network

Bootstrap filter

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

Blue arrows: dominating positive correlations => reinforcing movements

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

19.1.-23.1.
Before Greek elections

26.1.-30.1.
After Syriza won

2.2.-6.2.
Tsipras' tour across Europe

9.2.-13.2.
Tsipras confirms election promises

16.2.-20.2.
Nervousness before Eurogroup Brussels

23.2.-27.2.
Greece commits to programme extension; «Troika» become «Institutions»

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

Ongoing negotiations

Tsipras meets Putin

Many Eurogroup meetings without results

Referendum announced. ECB does not raise ELA. Capital controls.

Referendum against programme, ECB still does not raise ELA limit

Greece commits to third programme

Blue arrows: dominating positive correlations => reinforcing movements

Red arrows: dominating negative correlations => diverging movements
Question: Did the unexpected Brexit decision foster fears about a further dissolution of EU?
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.

Blue arrows: dominating positive correlations => reinforcing movements

Red arrows: dominating negative correlations => diverging movements
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

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.