

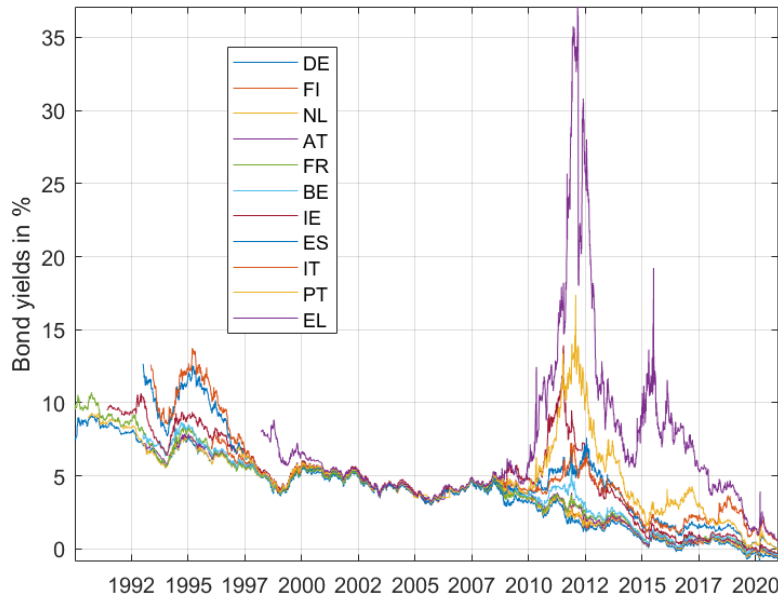
# Convergence and Divergence in European Bond Correlations



Peter Schwendner, Martin Schüle, Martin Hillebrand

18.6.2021

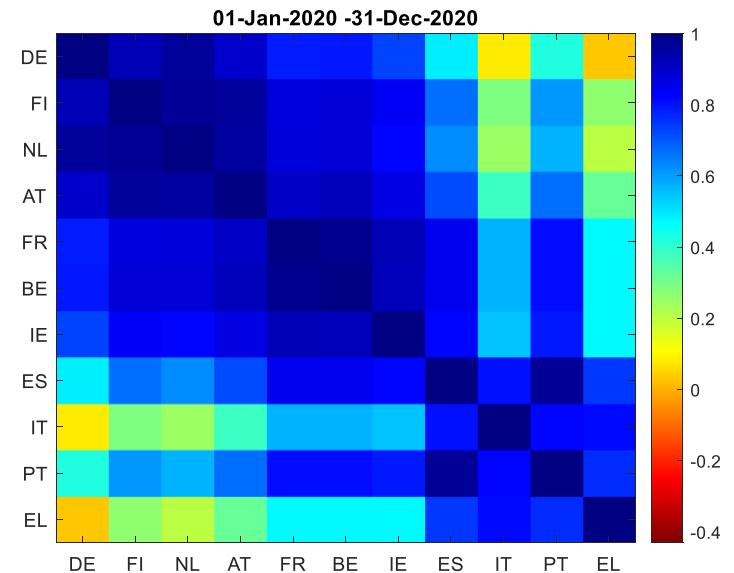
# Convergence and Divergence in European Bond Correlations



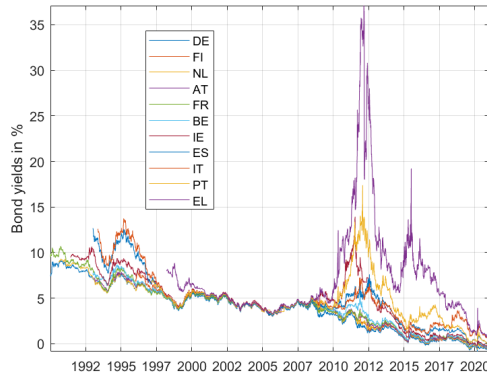
## Research questions:

- Can we extract the current capital market sentiment regarding convergence by considering cross-sectional correlations?
- Is this a useful tool for communicating about capital markets beyond the scientific community?

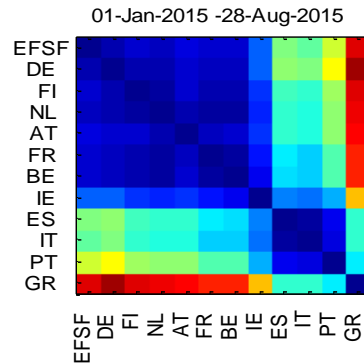
- European convergence is a central goal of EU policies.
- European sovereign bond yields show a capital market assessment of European convergence across countries.
- The European Stability Mechanism (ESM) has been set up to mitigate the divergence during the EU sovereign debt crisis by financial assistance programmes to national states funded by capital market bond issues.



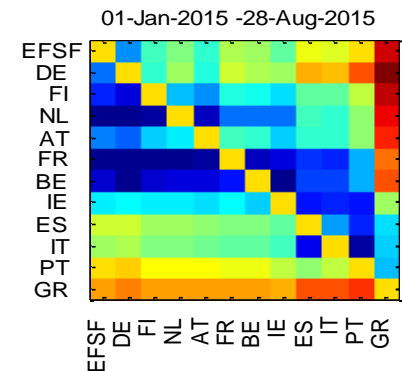
# Method overview: from bond yields to correlation influence networks



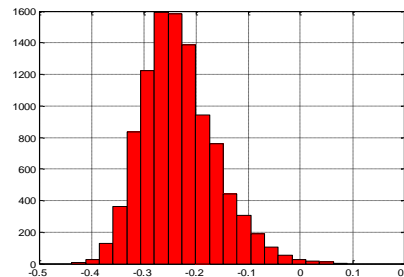
**Bond yield time series**



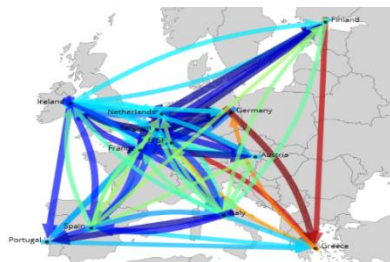
**Correlation matrix of yield changes**



**Correlation influence**



**Bootstrap filter**



**Filtered influence network**

We use **influence networks** as an unsupervised learning tool to identify the markets that drive the correlations of other markets. As correlations are very unstable, we use a **bootstrap filter** to reduce noise.

# Dissemination and impact: European bond market monitoring at ESM



## Independent Evaluation of Financial Assistance to Greece

LESSONS FOR THE FUTURE

### About the evaluation

- Joachim Altmira, the High-Level Independent Evaluator appointed by the ESM Board of Governors, led this independent evaluation, which aimed to:
- draw lessons from the EFSF/ESM financial assistance programmes to Greece to support future informed policy decision-making,
  - further increase the transparency and accountability of the ESM's programme activities, and
  - enhance the ESM's ability to tackle future crises and deliver timely and effective assistance at reasonable cost while addressing the most acute problems.

The report covers the period following the bilateral European Union (EU) loan programme, from 2012 to the first year of post-programme surveillance in 2019.

### Methodology

This evaluation uses a mixed methods approach anchored in a theory of change model and draws on a wide variety of data, surveys, and interviews.



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### ORIGINAL RESEARCH article

Front. Artif. Intell. 15:October 2019 | <https://doi.org/10.3389/frai.2019.00020>

## Sentiment Analysis of European Bonds 2016–2018

Peter Schwendner<sup>1,2</sup>, Martin Schüle<sup>3</sup> and Martin Hillebrand<sup>1</sup>

<sup>1</sup>School of Management and Law, Center for Asset Management, Zurich University of Applied Sciences, Winterthur, Switzerland

<sup>2</sup>School of Life Sciences and Faculty Management, Institute for Applied Simulation, Zurich University of Applied Sciences, Wädenswil, Switzerland

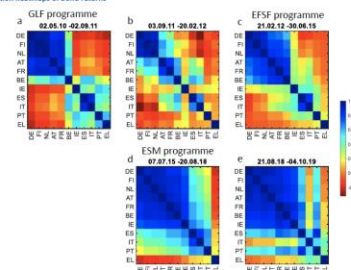
<sup>3</sup>European Stability Mechanism, Luxembourg, Luxembourg

We revisit the discussion of market sentiment in European sovereign bonds using a correlation analysis toolkit based on influence networks and hierarchical clustering. We focus on three case studies of political interest. In the case of the 2016 Brexit referendum, the market showed negative correlations between core and periphery only in the week before the referendum. Before the French presidential elections in 2017, the French bond spread widened together with the estimated Le Pen election probability, but the position of French bonds in the correlation blocks did not weaken. In summer 2018, during the budget negotiations within the new Italian coalition, the Italian bonds reacted very sensitively to changing political messages but did not show contagion risk to Spain or Portugal for several months. The situation changed during the week from October 22 to 26, as a spillover pattern of negative sentiment also to the other peripheral countries emerged.

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participants' assessment of Greek solvency led to flight-to-safety patterns. Other peripheral countries (Portugal, Spain, Italy) also showed similar patterns. Investors assumed that there was a substantial likelihood that market participants would reallocate investments from periphery bonds into safe havens. In other words, they assumed a flight-to-safety risk for the bonds issued by the periphery countries, which we can interpret as contagion fear.

Figure 3.1  
Correlation heatmaps of bond returns



Note: Every colored tile in the heatmap represents the correlation between the 10 year bond returns of the countries of the respective row and column. Correlation range between -0.5 (100% negative correlation, bond returns move more in opposite direction, dark red) to 1.0 (100% positive correlation, bond returns always move in the same direction, dark blue).

Source: Own calculations, Bloomberg.

In the autumn of 2011, the euro area financial crisis was broadening. Greece remained the member state under the most severe financial stress, and fears about the breakdown of the programme were mounting.<sup>7</sup> Investors increasingly discussed the possibility of a debt restructuring, which had been suggested on the political level.<sup>8</sup> These discussions fuelled market concerns that this could set a precedent for other euro area member states, adding to the perceptions of contagion risk from Greece.

Figure 3.1b shows that in the six months leading up to February 2012, Greece and Portugal were negatively correlated (red colours) to both the core and semi-core bloc, i.e. market participants deemed these two countries the most vulnerable. Spain and Italy remained negatively correlated only to a reduced core bloc (red colours only between Italy, Germany).

<sup>7</sup><https://www.bloomberg.com/news/articles/2011-09-06/greece-quo-vadis/>.

<sup>8</sup><https://www.reuters.com/article/us/eurozone/greek-debt-write-down-must-be-larger-german-finance-takes-their-own-2011-09-06>.



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## Showing how EU solidarity calmed markets over Brexit

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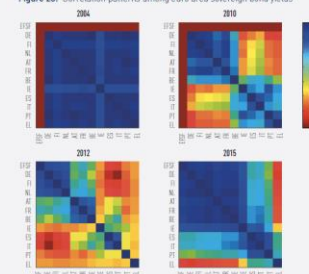
19/01/2021 | Martin Hillebrand, Peter Schwendner

Market sentiment, United Kingdom, Euro area, Brexit

By leaving the European single market on New Year's Day, the United Kingdom concluded a chapter first opened four and a half years earlier. At the time, the outcome of the Brexit referendum caught capital market participants by surprise, leaving them wondering whether the European Union (EU) would further dissolve or if European solidarity and integration would continue. Yet market sentiment quickly swung positive: by staying united in the first few weeks after the Brexit referendum, the EU calmed markets.



Figure 28: Correlation patterns among euro area sovereign bond yields



Note: The darker the blue the more in sync the price movements are, the brighter they are, the more they diverge. Source: ESM.

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The deeper the blue, the stronger the dominating correlation between countries.

Bond yield correlation network figures 25 and 26 show the dominating positive correlations (blue) and negative correlations (red) between sovereigns on a given day. When viewed as time-lapse videos, they can also visually demonstrate the strong to weak correlation over a given period of time.

### The week before the Brexit referendum

The uncertainty around the outcome of the UK referendum led to a dominant trend of negative correlation, with bond movements diverging, as investors sought safe haven Germany rather than peripheral countries.

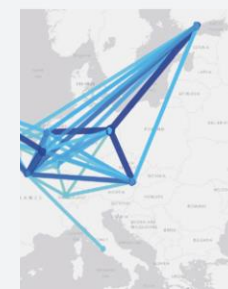
Figure 25



Note: For further information, please refer to ESM Working Paper No. 8: Europe Stability Mechanism: Testing Contagion Thesis. Source: ESM, screenshots provided by Frazer (www.frazer.de)

### it referendum

If the UK referendum, market sentiment recovered and converged, moving more in tandem again.



refer to ESM Working Paper No. 8: European Government Bond Dynamics and

## ESM RESEARCH

### Bond correlations show markets believe in ESM and EFSF

Market returns, or yield, can shed remarkable insight on the thinking of investors. Comparing returns across markets provides insight, for example, into how investors perceive, evaluate, and rank the risks of investing in different markets. To discover the impact of Europe's new rescue funds on investor perceptions, ESM researched the relative yield movements across the various European sovereign bond markets before, during, and after the recent economic and financial crisis.

The research found that during the peak of the euro crisis, investors segmented the euro area into stable core and riskier periphery countries. But, from its establishment in 2010, investors gained confidence in the EFSF's guarantee structure. They recognised the EFSF as an issuer that was as stable as a core country. And that, together with the stabilising effect of the rescue programmes, helped to reconnect the peripheral countries to the core.

Have the EFSF and ESM changed how bond investors perceive the risks of investing in different countries' sovereign bonds?

ESM research finds that they have.