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The Anatomy of Government Bond Yield Synchronization in the Euro Area

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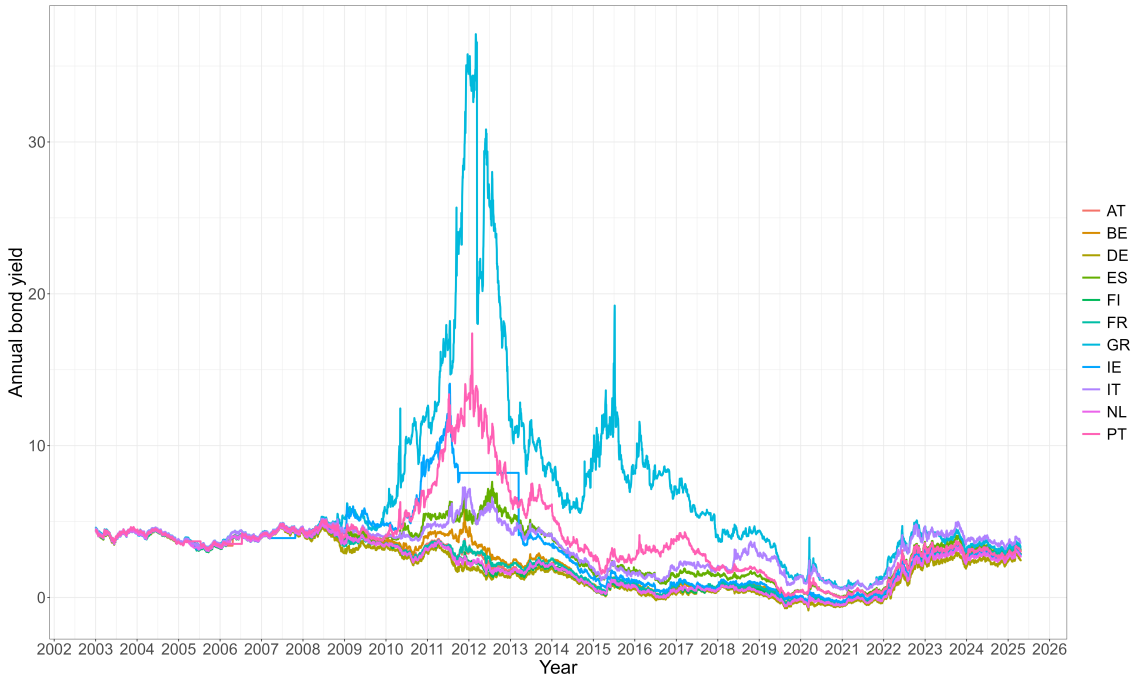
Interest rate synchronization is vital for the effective transmission of common monetary policy in the Eurozone. We study the synchronization of government bond yields, identifying three phases: pre-crisis, crisis, and recovery. Using a novel factor-based method, we show how yield divergence during crises hindered policy transmission. The analysis also provides a financial interpretation via optimal portfolios and flight-to-quality dynamics.

The views expressed in this blog are those of the authors and do not necessarily reflect those of the European Central Bank or the Eurosystem

Introduction

The Eurozone is characterized by a common monetary policy authority and distinct fiscal policy authorities. The central bank policy rate is therefore the same for all countries in the Eurozone, but government bonds yields can differ, reflecting country-specific characteristics. As a consequence, financial traders can construct portfolios comprising the different bonds. In this context, idiosyncratic shocks affect the composition of portfolios, sovereign bond demand and, in turn, bond yields. Asynchronous yield movements appear, hindering the transmission mechanism of conventional monetary policy within the Euro Area. The Great Recession of 2008 and the subsequent Sovereign Debt Crisis of 2009-2012 have highlighted this possibility (see graphique 1), even endangering the stability of the whole European architecture. A precise quantitative assessment of yields' synchronization in the Eurozone is therefore crucial for identifying periods in which conventional monetary policies are ineffective and unconventional ones are required.

Graphique 1: The time series of 10-years Euro Area government bond yields in the 2003–2019 period.



Lecture: Values on the y-axis are in percentage points.

Note: AT=Austria; BE=Belgium; DE=Germany; FI=Finland; FR=France; GR=Greece; IR=Ireland; IT=Italy; NE=The Netherlands; PT=Portugal; SP=Spain.

Source: Bloomberg data and authors' calculations.

1 A new method to study synchronization of Euro Area interest rates

In a recent paper (Barbieri, Guerini and Napoletano, 2024) we empirically investigate the synchronization in Eurozone government bonds' yields by means of a rich dataset at daily frequency that we built using the Bloomberg platform. To measure synchronization, we employ a new procedure that provides more accurate information about the synchronization of bond yields compared to the information obtained from a mere comparison of correlation coefficients. The procedure involves estimating few factors that summarize the common movements across the many yields in our sample and then selecting only those factors that reflect statistically significant co-movements, and disregarding other factors which reflect only spurious information. Another advantage of the latter method is that it avoids making ad-hoc choices about the number of factors that significantly influence synchronization.

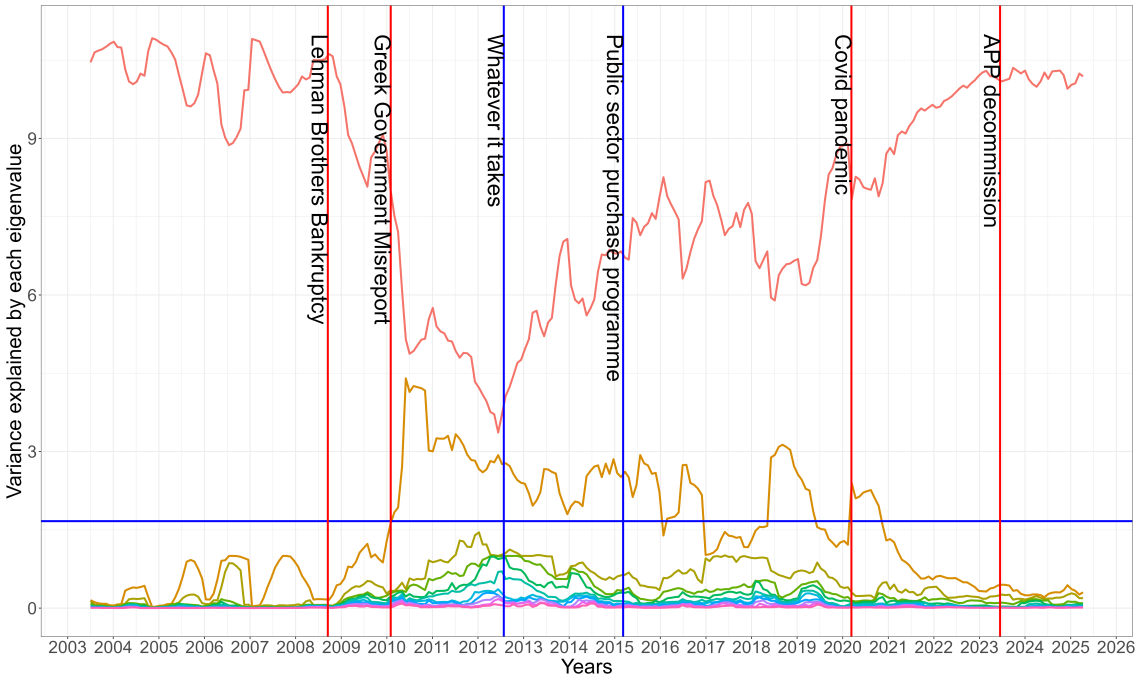
2 Three periods of synchronization and divergence

Our findings suggest that synchronization in yields is relatively scarce in the short-run, i.e. for 1-year government bond yields, since the most relevant factor explains only 30% of the total variance of the series, and it is statistically significant only during specific periods. This situation contrasts with 5-year and 10-year government bond yields. In both cases, one factor explains between 75% and 80% on average of the total variance of

those yields until 2008; about 40% on average between 2008 and 2014; and about 60% from 2015 to 2025. Between 2008 and 2021, also a second factor became significant, especially during the Great Recession and during the Euro Area Sovereign Debt Crisis.

graphique 2 provides an overview of our results by showing the evolution of all estimated factors for 10-year yields until 2025. Factors above the displayed blue horizontal threshold in the figure indicate significant correlation between movements of Euro-Area countries' government bond yields. The figure also shows vertical bars marking the timing of the most significant crises and of Euro-Area monetary policy events (e.g. the famous "Whatever it Takes" speech by the ECB president Mario Draghi in July 2012 or the beginning of the Public Sector Purchase Programme, PSPP, directed towards sovereign bonds of Euro Area countries). It is clear from the Figure that at most two significant factors have driven the comovements of Euro Area bond yields during the twenty-years period between 2003-2025. As a complement to graphique 2, graphique 3 shows also the share of total variance of the yield series (i.e. the share of comovements) explained by the above two significant factors during the period between 2003 and 2025.

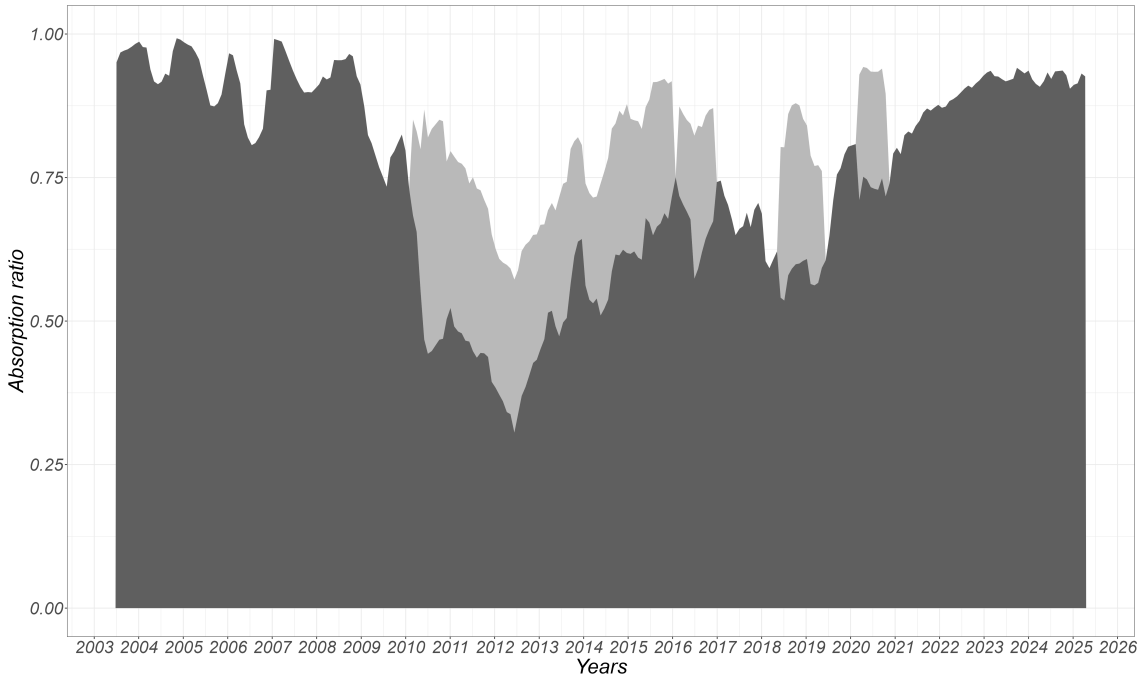
Graphique 2: Synchronization factors for 10-years government bond yields in the Euro Area



Lecture: Values on the vertical axis range between 1 and the 11 (the number of countries in our sample) and are proportional to the share of total variance of government bond yields series explained by a given factor (eigenvalue). An increase (resp. decrease) of a line in the plot indicates an increase (a decrease) in the total variance of the series explained by a given factor. The blue horizonal bar in the graph indicates the significance threshold for factors (eigenvalues) according to our procedure. Factors above the threshold are statistically significant whereas factors below the threshold are not.

Source: Bloomberg data and authors' calculations.

Graphique 3: Absorption ratio of the two main factors between 2003 and 2019



Lecture: The absorption ratio is equal to the share of variance of Euro-Area government bond yields time-series explained by a given factor. Values on the y-axis are between 0 (no variance explained) and 1 (all variance explained)

Source: Bloomberg data and authors' calculations.

We can identify three phases in the synchronization of Euro Area government bond yields. A "pre-crisis" period (until 2008), during which synchronization of government bond yields was high, and the transmission mechanism of common monetary policy was therefore functioning well. A "crisis" period, whose beginning can be dated at the Lehman Brothers' bankruptcy in 2008. The degree of synchronization of government bonds started to decrease dramatically, reaching the lowest point in the mid-2012, just before the *Whatever it Takes* speech by Mario Draghi. At that time the share of Euro-Area yields comovements explained by the first factor dropped to almost 25%, while the second factor explains another 25% (see graphique 3). Since then, the "Recovery" phase has begun, suggesting that the unconventional quantitative easing policies implemented by the ECB (like the PSPP) were effective in reestablishing a normal functioning of the transmission mechanism of monetary policy in the Euro Area. However, the recovery was not fast. Our results indicate that the pre-crisis levels of synchronization were eventually recovered only at the end of 2023 (see also graphique 2), i.e. 10 years after the quantitative easing policies.

3 A financial interpretation

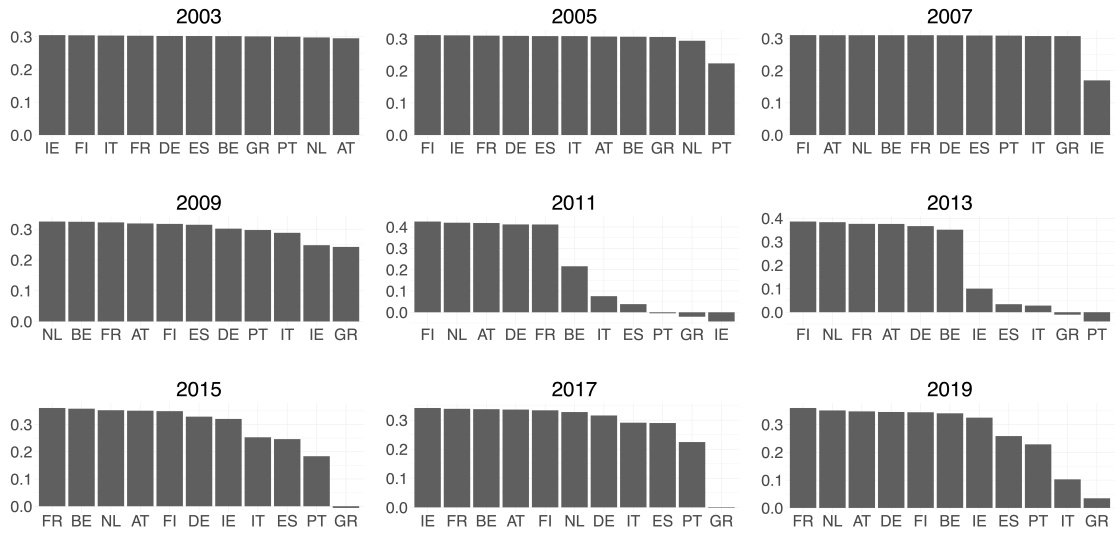
The fact that spreads between the yields of the bonds of different member countries exist, and that they move heterogeneously, suggest that financial traders can build portfolios by buying and selling the bonds issued by the Eurozone states in different proportions. Recent results in portfolio theory (Avellaneda and Lee, 2010 ; Bouchaud and Potters, 2015) show that the factors detected through our procedure can be interpreted as optimal

portfolios (*eigenportfolios*) of Euro Area government bonds at a given maturity, with risk proportional to the total variance explained by each factor, and where each bond enters with different weights (corresponding to the element associated to a given bond in the eigenvector associated to a factor). Tracking these weights over time therefore gives a glimpse on how government bonds of different countries in the Euro Area were traded, especially at crisis times.

4 Divergence trades and flight-to-quality

graphique 4 and graphique 5 show the evolution of the weights of each Euro-Area 10-year government bonds in the two portfolios associated with the two main factors we detected in our analysis. Note that the years in the two plots do not match exactly because the second main factor was significant only starting from 2008 (see above).

Graphique 4: Evolution of the weights of the Euro Area countries' 10-year government bonds in the optimal portfolio associated with our first main factor

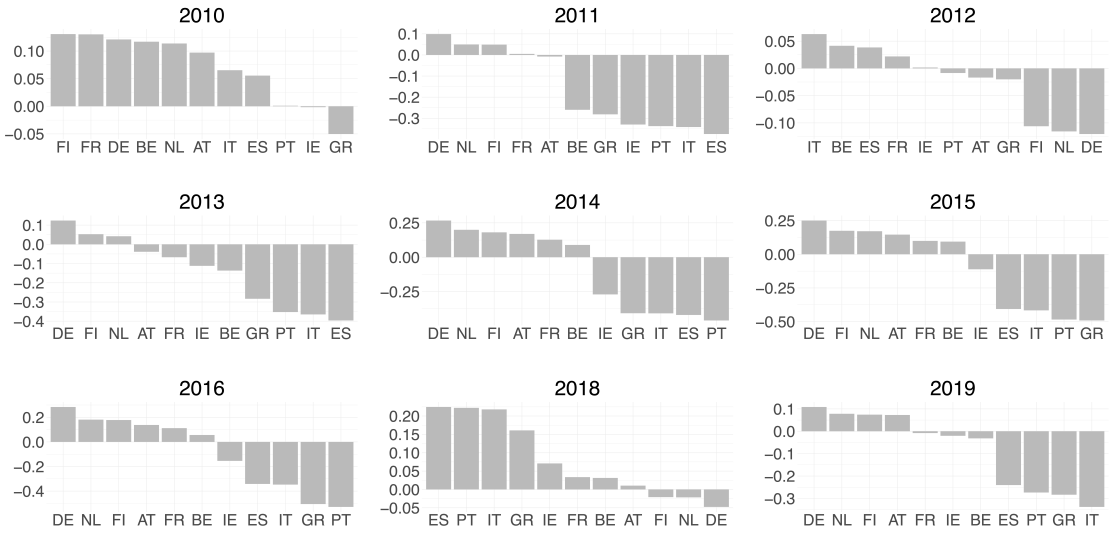


Lecture: The value of the y-axis of each plot in the figure measures the weight of each sovereign bond in the portfolio. Values are between −1 and 1. A positive (negative) weight indicates that the bond is hold with a long (short) position.

Note: AT=Austria; BE=Belgium; DE=Germany; FI=Finland; FR=France; GR=Greece; IR=Ireland; IT=Italy; NE=The Netherlands; PT=Portugal; SP=Spain.

Source: Bloomberg data and authors' calculations.

Graphique 5: Evolution of the weights of the Euro Area countries' 10-year government bonds in the optimal portfolio associated with our seconnd main factor



Lecture: The value of the y-axis of each plot in the figure measures the weight of each sovereign bond in the portfolio. Values are between −1 and 1. A positive (negative) weight indicates that the bond is hold with a long (short) position.

Note: AT=Austria; BE=Belgium; DE=Germany; FI=Finland; FR**=**France; GR=Greece; IR=Ireland; IT=Italy; NE=The Netherlands; PT=Portugal; SP=Spain.

Source: Bloomberg data and authors' calculations.

The analysis of the two figures reveals the following. In the "pre-crisis" period, when synchronization was high, all bonds were traded similarly, i.e. they had basically equal weights. This changed completely during the "crisis" period, between 2008 and 2012. As far as the first portfolio, the weights associated with bonds of the countries which were more exposed to the Sovereign Debt Crisis (Greece, Spain, Portugal, Italy, Ireland) decreased. This trend is even more marked considering bond weights associated with the second portfolio, which is the portfolio associated with lower risk (i.e. with lower variance). This portfolio even shows the presence of divergence trades, i.e. bonds that were held with opposite positions during the years of the crisis. In particular, in 2012, i.e. at the peak of the Sovereign Debt Crisis, one can identify a large "periphery" of countries (including not only the countries most exposed to the crisis but also France, Austria and Belgium), whose bonds were held in the portfolio in opposite position with respect to bonds of countries in a small "core" of countries including only Germany, the Netherlands and Finland. The presence of divergence trades during the crisis time indicates the emergence of a significant flight-to-quality phenomenon where traders acquired typically long positions on bonds of countries in the North (Germany, the Netherlands, Finland) at the expenses of countries in the South (e.g. Greece, Italy, Portugal, Spain), France and Belgium, whose bonds were traded with short positions instead. These, divergence trades and flight-to-quality exacerbated the asymmetries in government bond yields dynamics destabilizing the transmission mechanism of conventional monetary policy. Finally, graphique 5 also indicates that the divergent trades survived, although to a much lesser extent, during the "recovery" period, characterized by the presence of

ECB quantitative easing programs and by a slow return to yields synchronization. Still, in 2019 the government bonds of Southern countries like Greece, Italy, Spain and Portugal were traded in opposite direction with respect to bonds of Germany, The Netherlands and Finland (whereas France, Belgium and Ireland were almost absent from the portfolio).

5 Conclusion

Our results are robust to a large battery of econometric controls and they shed new light on the debate about the effectiveness of interest-rate policy transmission in the Euro Area. It is in fact well known that the heterogeneous response of different countries' yields to the same ECB interest rate policy is a key fragility for the Euro area (See e.g. Ciccarelli, Maddaloni and Peydró, 2013). Our procedure allows policymakers to quantify the asynchronicity in government bonds yields movements and, being based on daily data, it can be updated frequently to promptly understand whether in a specific period, the conventional interest rate tools will be effective or not. As a matter of fact, under divergence trades, the conventional monetary policy will exert asymmetric effects across the Eurozone and the unconventional monetary policy instruments should be used instead.

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