

Government Bond Data Report

European market data update

Q3: 2016

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Highlights and Market Environment

This report provides a comprehensive data source with updated statistics of the Government bond¹ primary markets and trading in Europe (EU28).

The report collates recent data trends on origination, outstanding volumes, credit quality, trading activity and valuations of EU government bonds.

Among the main findings of this report are:

- European Government bond gross issuance totalled €2.0tn in 2016YtD, a decrease of 2% from the volume originated in the same period of 2015 (€2.03 tn).
- Of the new issues, the average bid-cover ratio (demand/amount allocated)² was 2.20 in 3Q16, an increase when compared to 2.11 in 2Q16.
- Government bonds outstanding stood at the end of 3Q16 at €9.9 Tn.
- Four European countries had their long-term credit ratings upgraded during the quarter (Cyprus, Hungary, Malta, and Slovenia) and no countries were downgraded.
- Average daily trading volumes of European government bonds fell in most jurisdictions during 3Q16, with the UK as the most notable exception. See chart in left panel.

	2013	2014	2015	1Q16	2Q16	3Q16
Issuance (€ bn)	2,803	2,728	2,605	712	669	619
Outstandings (€ tn)	8.9	9.3	9.7	9.9	9.9	9.9
Bid-cover ratio	2.18	2.29	2.22	2.08	2.11	2.20

Highlights

Auctions, issuance and bid-cover ratios

Issuance volumes have decreased over the last six years (from €2,341 bn in the first three quarters of 2010 to €2,000 bn in 2016YtD), as some countries, particularly those located in the euro area, continue to consolidate their fiscal balances.

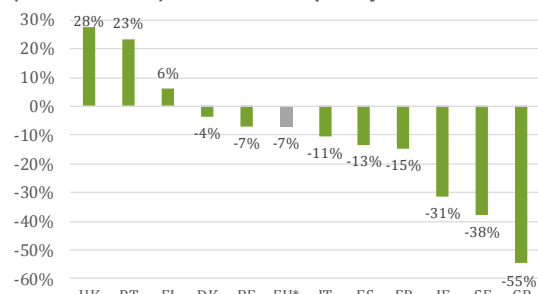
Of the instruments issued in 3Q16 through auctions, average bid-cover ratios increased noticeably compared to the ratios of instruments issued in 1H16. This was driven by higher bid-cover ratios of bonds with maturities of 10 years or below. This increase in average bid-cover ratio in 3Q16 went some way to mitigating a decreasing trend in the last 5 years, from an average of 2.29 in 2012FY to 2.22 in 2015FY and then 2.11 in 2Q16 (see Chart in left panel and Chart 2.2 in the report).

Credit quality

Improved fiscal balances have been reflected in recent credit ratings upgrades. In 3Q16 four EU countries had their long-term ratings upgraded, attributed to improved fiscal consolidation and debt burden reduction. There were no

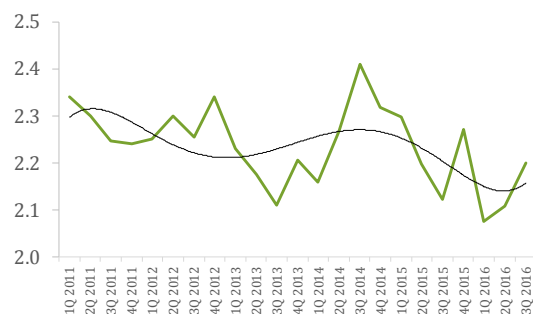
“European Government bond issuance totalled €2.0 Tn in the first three quarters of 2016”

Quarterly change in Government Bond average trading volumes (3Q16 vs 2Q16) Selected European jurisdictions



Source: AFME with information from European DMOs and other agency sources. See section 5 for details on aggregation basis and sources.
*Europe total is sourced from TRAX Facts as the quarterly variation of average daily volumes of government and sovereign bonds.

Average bid-cover ratio of European government bonds and bills

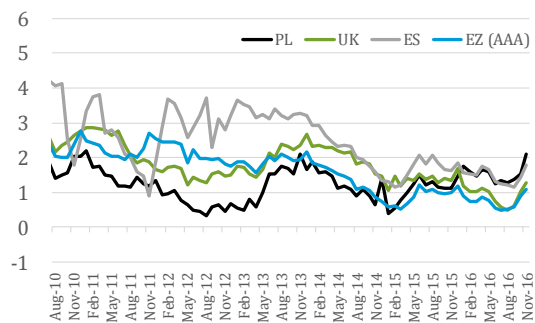


Source: AFME and Thomson Reuters Eikon. Weighted average of UK, DE, FR, ES, IT, BE, SE, NL, DK, and AT bonds and bills. Polynomial trend in black.

¹ Fixed income securities issued by central governments. The report includes Bonds and Treasury Bills and excludes agencies and Central Bank origination.

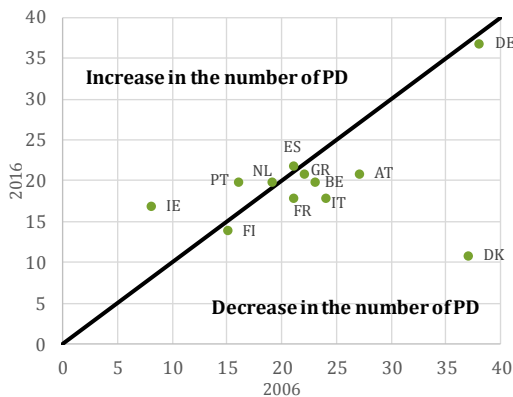
² Weighted average (by issuance volume) of bid-cover ratios in the United Kingdom, Spain, France, Italy, Germany, Belgium, Sweden, Netherlands, Denmark and Austria.

Maturity spread: difference of 1Y10Y yields (pp)



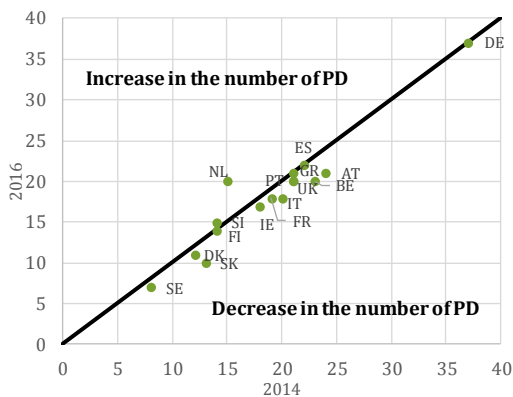
Source: AFME Primary Dealers handbook and national DMOs

Number of primary dealers in selected jurisdictions: 2006 vs. 2016



Source: AFME Primary Dealers handbook and national DMOs

Number of primary dealers in selected jurisdictions: 2014 vs. 2016



Source: AFME Primary Dealers handbook and national DMOs

ratings downgrades in 3Q16 after five EU countries were downgraded during 1H16.

Valuations: Recent reversal of flat yield curve

1Y10Y spreads of Eurozone AAA benchmark yields decreased from 117 bps at the end of 4Q15 to 56 bps in 3Q16. 1Y10Y spreads of UK Gilts also decreased from 168 bps in 4Q15 to 59 bps in 3Q16.

More recently, however, in the first part of 4Q16, euro area 1Y10Y maturity spreads have increased to 107bps in tandem with growing 5Y inflation expectations from 1.34% in September to 1.59% at the end of November.

Trading volumes and primary dealers

3Q16 saw the effect of the Brexit vote on the Government bond markets and the seasonal decrease in trading activity of the European summer. Most EU countries experienced a decrease in trading volumes in 3Q16 compared to 2Q16, although there was a 28% increase in trading volume in the UK.

Average daily trading volumes and turnover ratios have tended to decrease slightly during the first three quarters of 2016 compared with 2015, with lower trading activity in the FR, SE, PT, ES, IE, DK and BE. There have also been decreases in the latest available data for DE and NL (see section 5 of the report).

In some jurisdictions, notably DE, the UK and FR, turnover ratios of sovereign bonds have decreased since the 2008 crisis. For example, turnover ratios have fallen from 2.5% in 2008 to 1.5% in 2015 in the UK; from 2.6% to 1.5% in DE; and from 1.1% to 0.7% in FR.

The decrease in turnover ratios occurs in tandem with a fall in the number of European primary dealers (PD) in some jurisdictions. On average, in 2006 there were 23.2 PD by country, comparable with 19.2 in 2011 and 18.5 in 2016 (see graph in top left panel). In the last two years, the number of PD has also decreased in 9 of the 16 jurisdictions where information was compiled (see graph in bottom left panel).

Major upcoming regulatory, legislative and policy initiatives

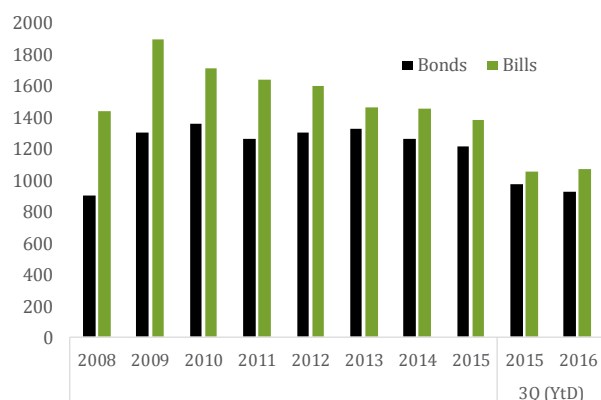
There several regulatory initiatives that are currently being considered at the European and national level with expected impact on the fixed income markets. Some of the key initiatives currently being developed are:

- MiFID II/R
- Market Abuse Directive/Regulation (MAD/MAR)
- Basel III
- CSDR
- Prospectus Regulation

AFME and its members are actively contributing on all of these and other initiatives.

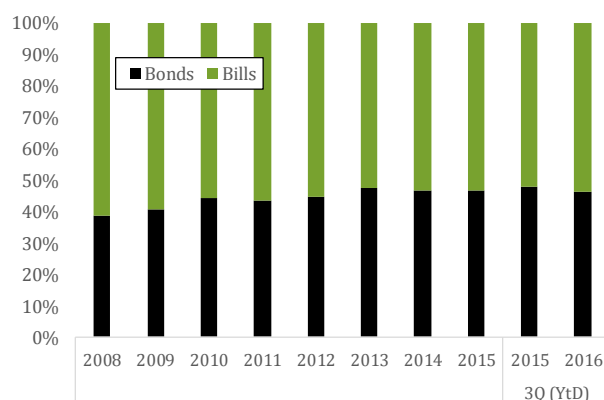
1 Issuance

1.1 Government Bonds and Treasury Bills issuance (EUR bn)



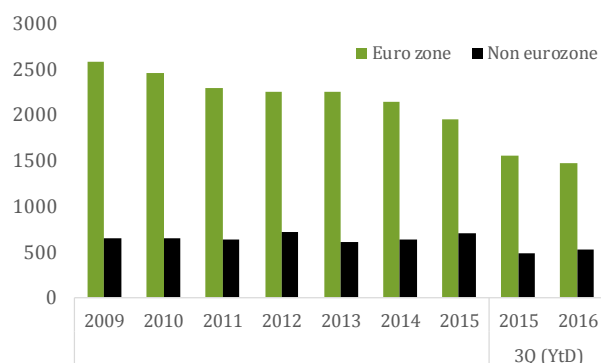
Source: ECB and National Debt Management Offices

1.2 Government Bonds and Treasury Bills issuance (%)



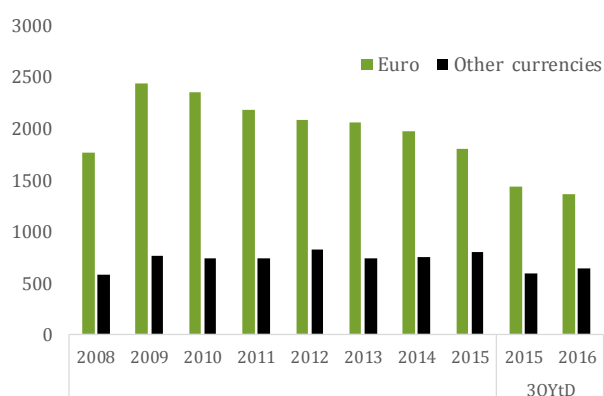
Source: ECB and National Debt Management Offices

1.3 Issuance by region (EUR bn)



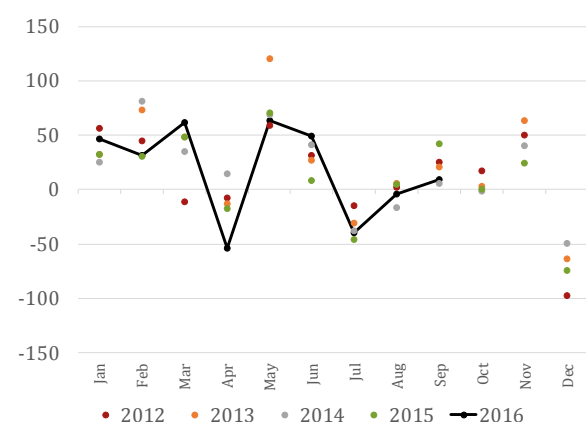
Source: ECB and National Debt Management Offices

1.4 Issuance by currency (EUR bn)



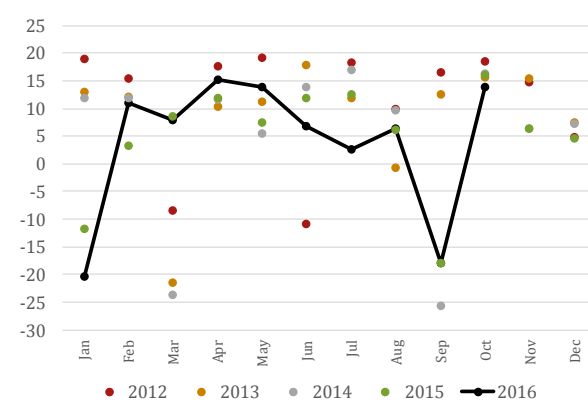
Source: ECB and National Debt Management Offices

1.5 Euro area net sovereign debt issuance (EUR bn)



Source: ECB

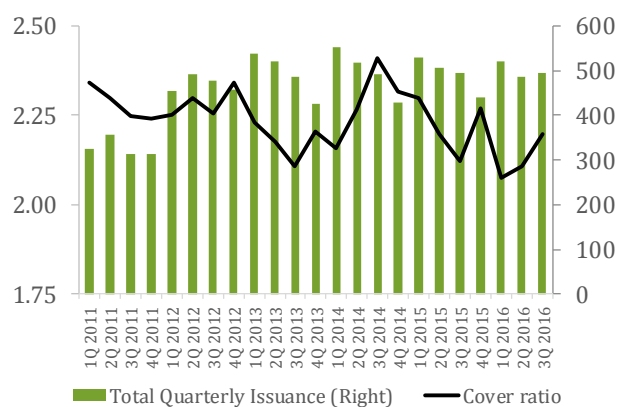
1.6 UK Gilts net issuance (GBP bn)



Source: UK Debt Management Office

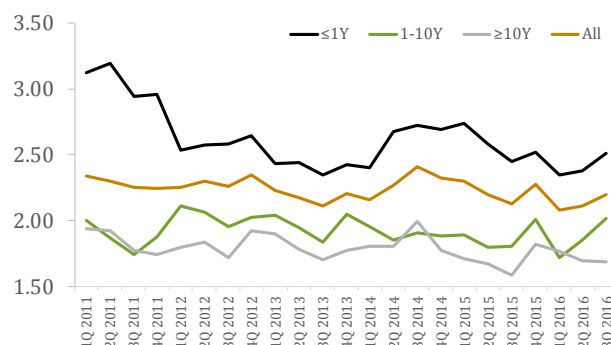
2 Recent auctions and primary dealers

2.1 Average bid-cover ratios and issued volumes in selected jurisdictions (EUR bn)



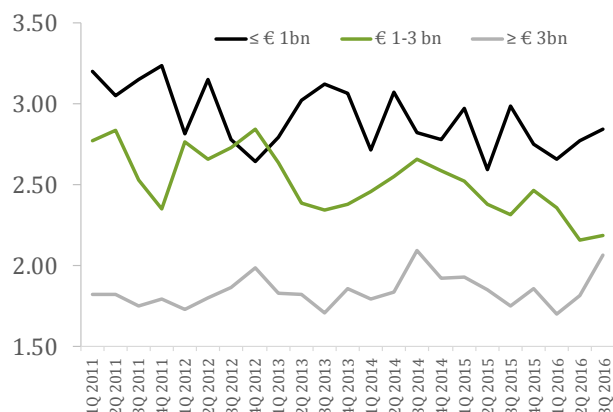
Source: Thomson Reuters Eikon. Weighted average of UK, DE, FR, ES, IT, BE, SE, NL, DK, and AT bonds and bills

2.2 Average bid-cover ratios by tenor (years) of issued instrument



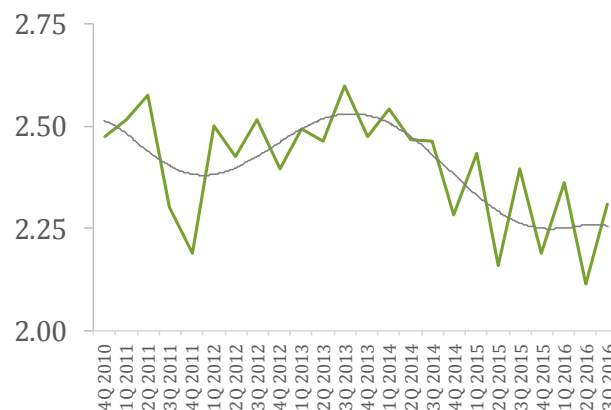
Source: Thomson Reuters Eikon. Weighted average of UK, DE, FR, ES, IT, BE, SE, NL, DK, and AT bonds and bills

2.3 Average bid-cover ratios by size of issued instrument



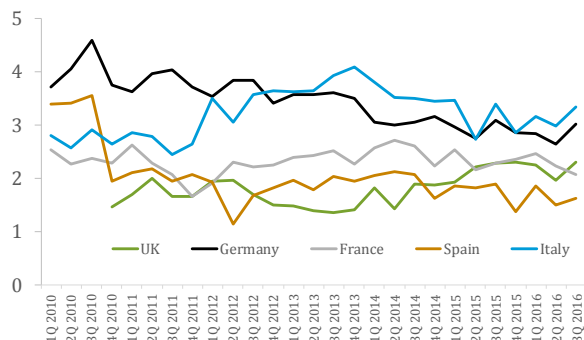
Source: Thomson Reuters Eikon. Weighted average of UK, DE, FR, ES, IT, BE, SE, NL, DK, and AT bonds and bills

2.4 Average auction size in selected European jurisdictions (EUR bn)



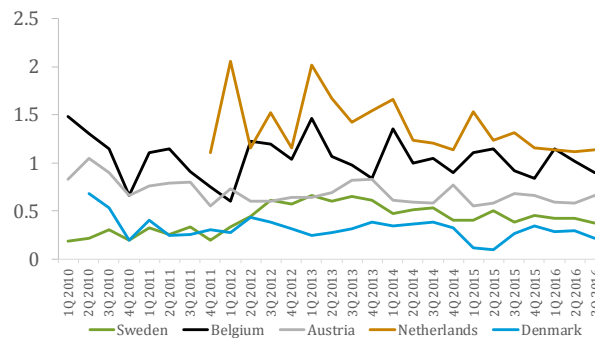
Source: Thomson Reuters Eikon. Weighted average of UK, DE, FR, ES, IT, BE, SE, NL, DK, and AT bonds and bills. Polynomial trendline in grey.

2.5 Average auction size in selected jurisdictions (EUR bn)



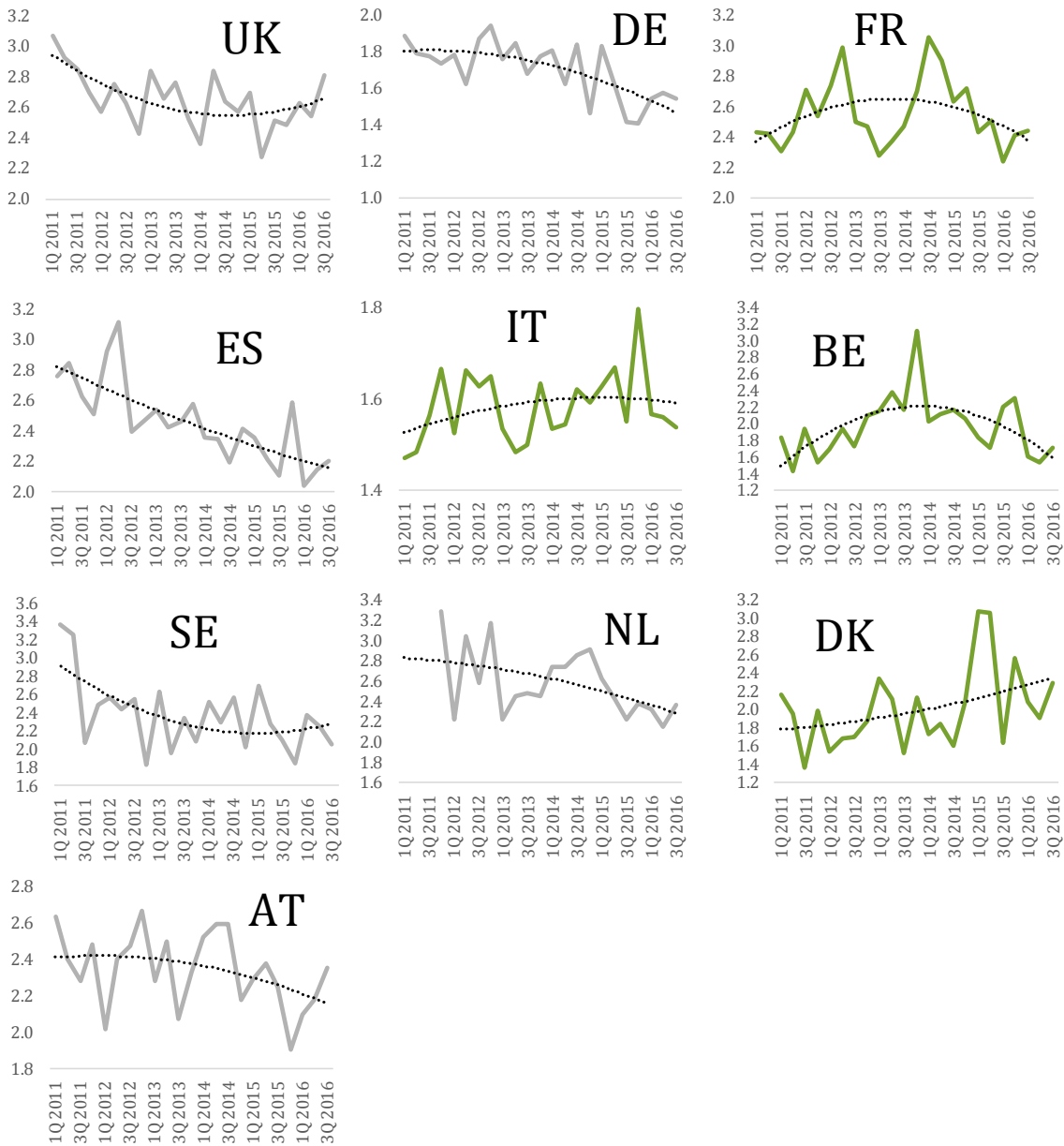
Source: Thomson Reuters Eikon

2.6 Average auction size in selected jurisdictions (EUR bn)



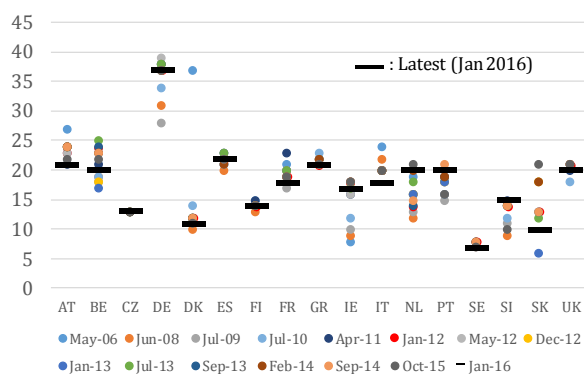
Source: Thomson Reuters Eikon

2.7 Average bid-cover ratios in selected jurisdictions: 2011-16



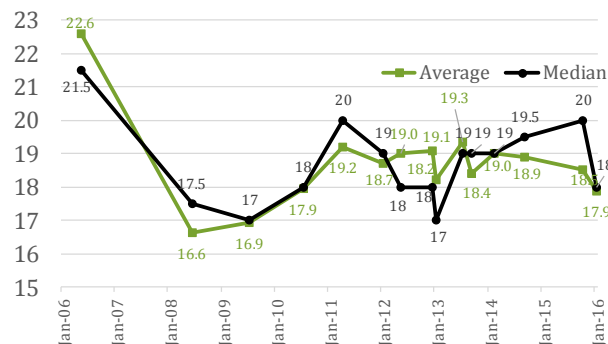
Source: Thomson Reuters Eikon

2.8 Number of primary dealers relative to historic number



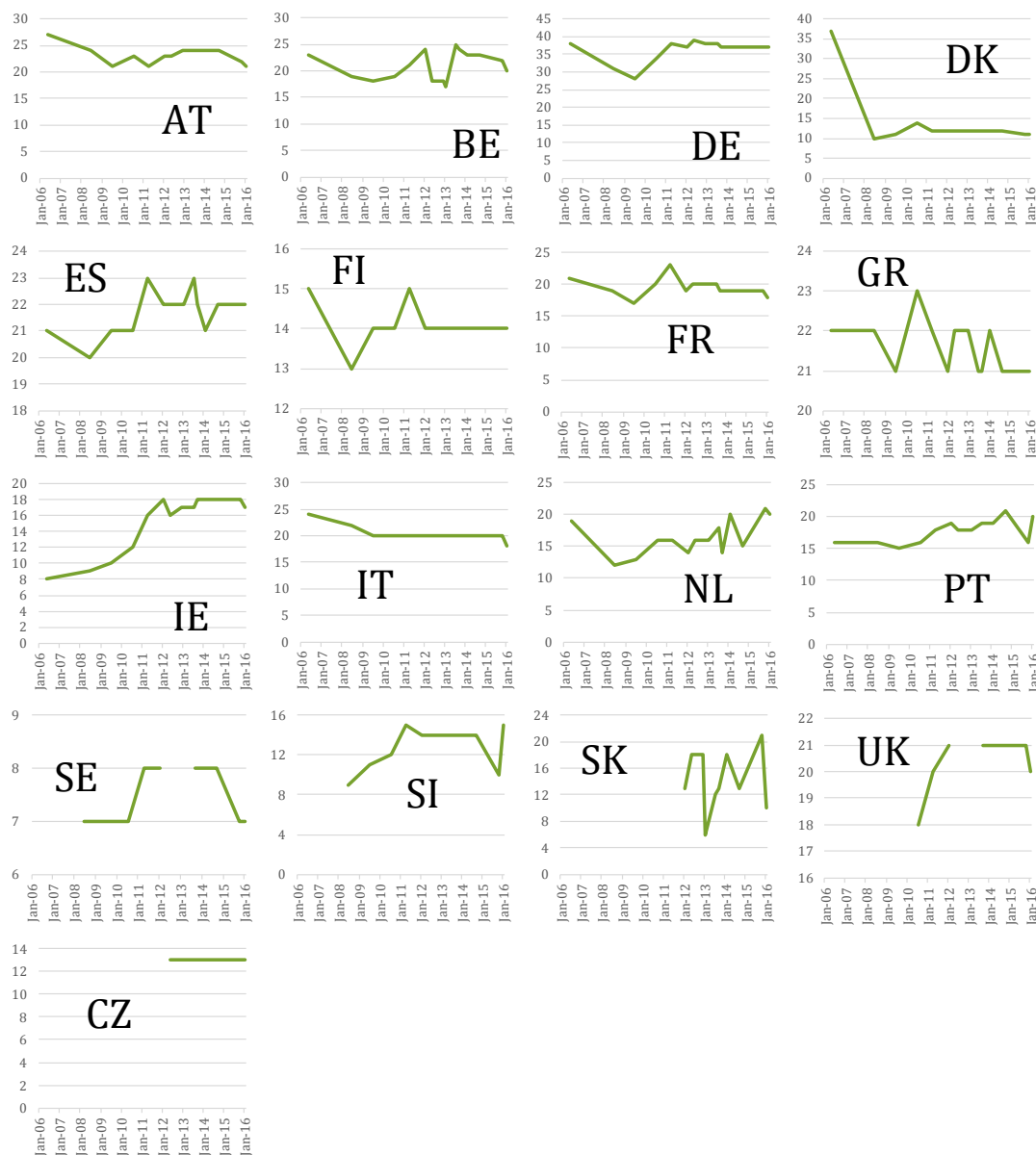
Source: AFME Primary Dealers Handbooks and national DMOs

2.9 Average and median number of primary dealers in Europe



Source: AFME Primary Dealers Handbooks and national DMOs. Average and medians of: AT, BE, CZ, DE, DK, ES, FI, FR, GR, IE, IT, NL, PT, SE, SI, SK and UK

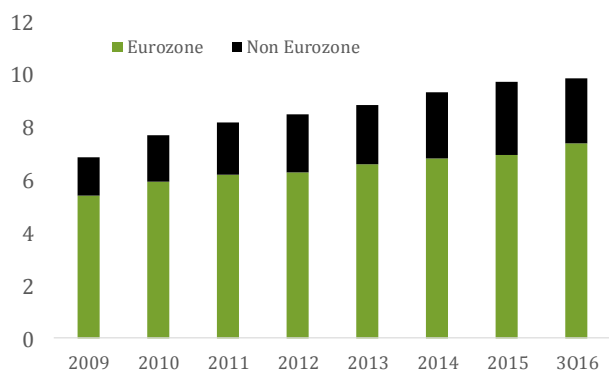
2.10 Number of primary dealers in Europe by jurisdiction: 2006-16



Source: AFME Primary Dealers Handbooks and national DMOs

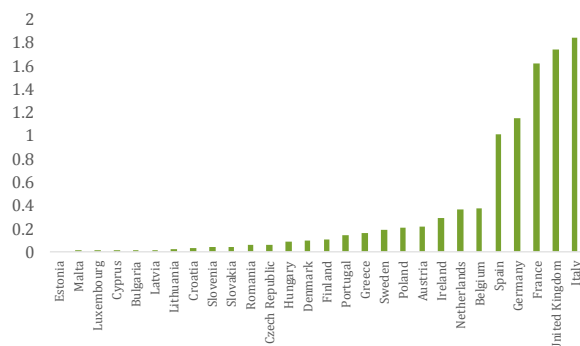
3 Outstanding

3.1 Outstanding debt securities issued by Central Governments (Nominal, EUR tn)



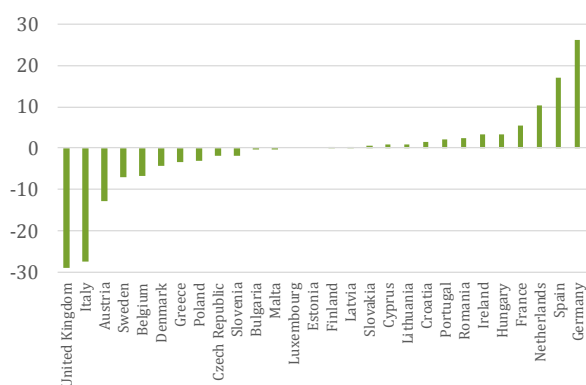
Source: ECB and Thomson Reuters Eikon

3.2 European government bonds outstanding by country (EUR tn)



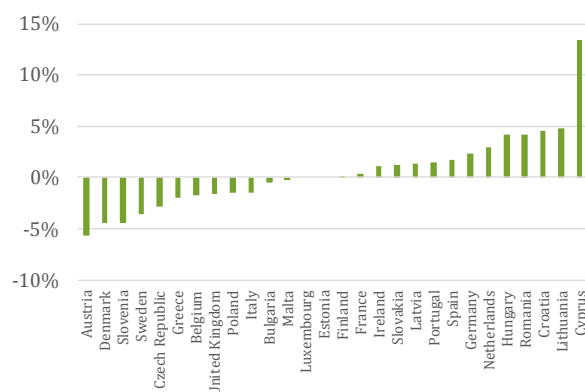
Source: Thomson Reuters Eikon

3.3 Change in outstandings Q2 to Q3 2016 (EUR bn)



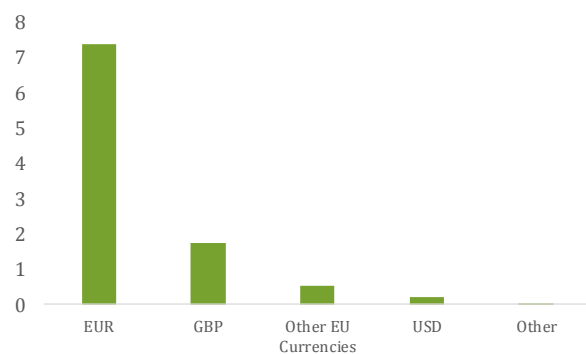
Source: Thomson Reuters Eikon

3.4 % Change in outstandings from Q2 to Q3 2016



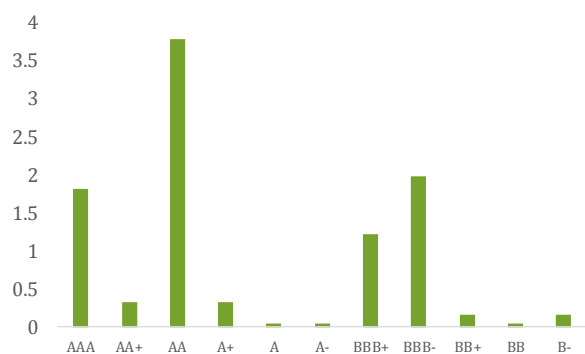
Source: Thomson Reuters Eikon and Standard and Poor's

3.5 European government bonds outstanding by currency (EUR tn)



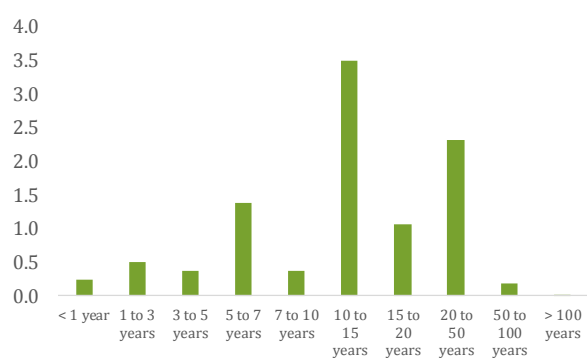
Source: Thomson Reuters Eikon

3.6 European government bonds outstanding by current rating of issuer (EUR tn)



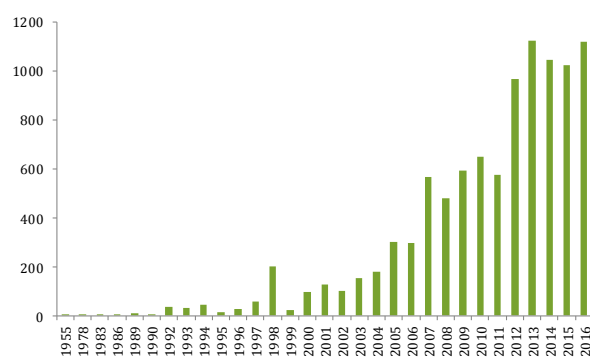
Source: Thomson Reuters Eikon and Standard and Poor's

3.7 Maturity wall of European government bonds outstanding (EUR tn)



Source: Thomson Reuters Eikon

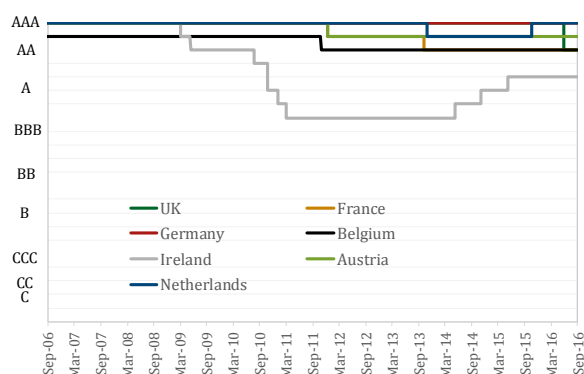
3.8 European government bonds outstanding by year of issuance (EUR bn)



Source: Thomson Reuters Eikon

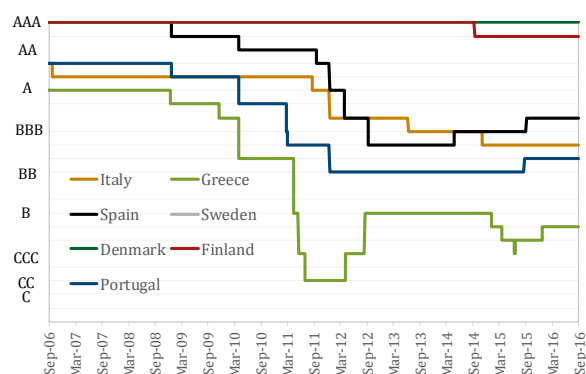
4 Credit quality

4.1 Long-term foreign currency credit rating (Central and Northern Europe)



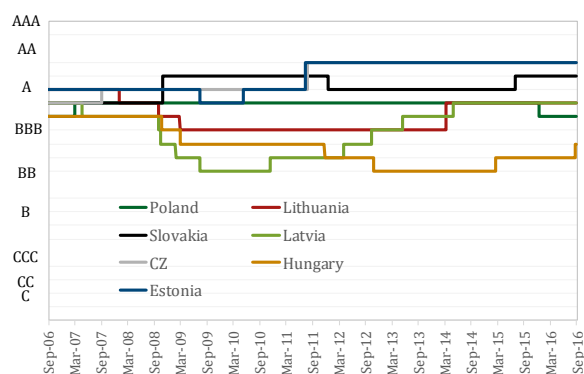
Source: Thomson Reuters Eikon with data of Standard and Poor's

4.2 Long-term foreign currency credit rating (Nordics and Southern Europe)



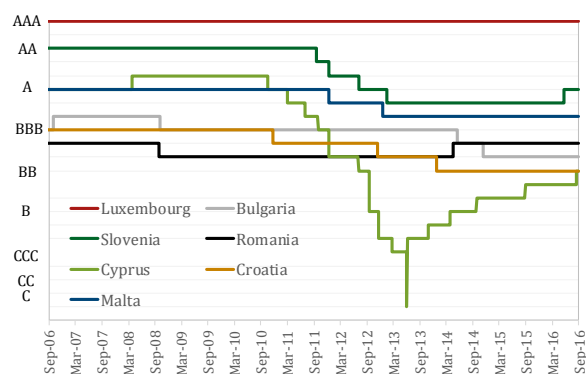
Source: Thomson Reuters Eikon with data of Standard and Poor's

4.3 Long-term foreign currency credit rating (Visegrad 4 and Baltic states)



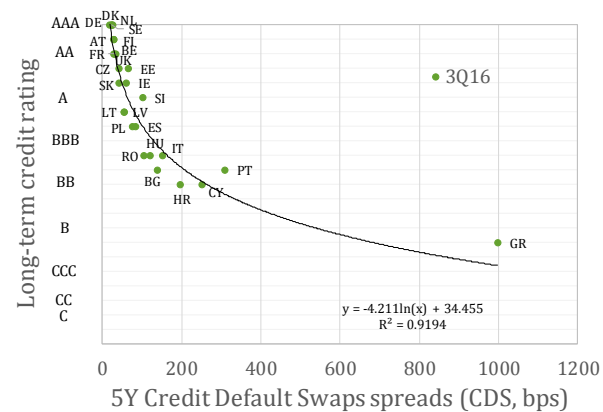
Source: Thomson Reuters Eikon with data of Standard and Poor's

4.4 Long-term foreign currency credit rating (Balkans, CY, MT and LU)



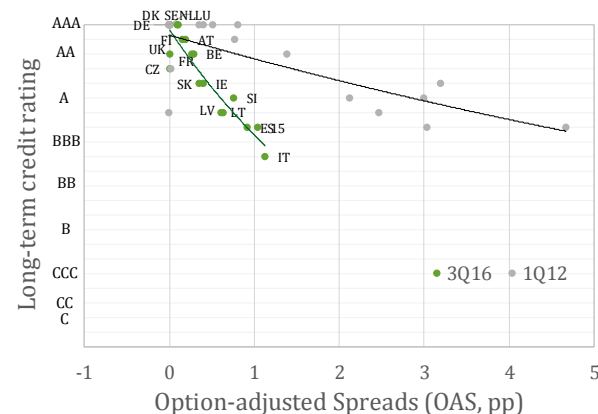
Source: Thomson Reuters Eikon with data of Standard and Poor's

4.5 Long-term foreign currency credit rating and 5Y Credit Default Swaps (CDS)



Source: Deutsche Bank and Standard and Poor's

4.6 Long-term foreign currency credit rating and option-adjusted spreads (OAS)



Source: Barclays and Standard and Poor's

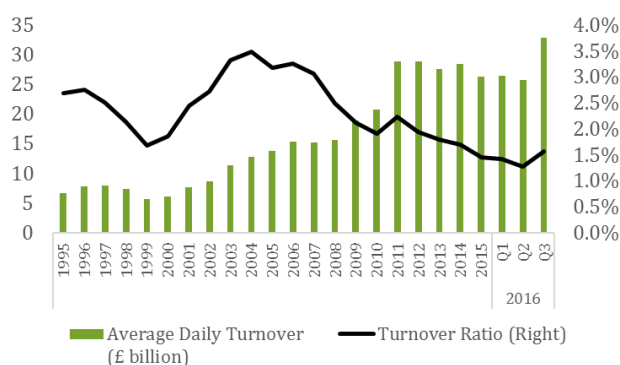
4.7 European rating actions on long-term foreign currency ratings (2016 YtD)

Issuer	Rating action	Date	Rated by	Rationale
Poland	Downgrade to BBB+ (negative) from A-	Jan-16	S&P	Concerns about institutional checks and balances eroding the independence and effectiveness of key institutions
Greece	Upgrade to B- (stable) from CCC+	Jan-16	S&P	Compliance with the terms of its support programme
Ireland	Upgrade to A (stable) from A-	Feb-16	Fitch	Public debt dynamics and fiscal balance continue to improve supported by strong growth
Croatia	Downgrade to Ba2 (negative) from Ba1	Mar-16	Moody's	Increasing debt burden and weak medium-term growth
Finland	Downgrade to AA+ (stable) from AAA	Mar-16	Fitch	Weak economic performance which has translated into unfavourable debt dynamics
Hungary	Upgrade to BBB- (stable) from BB+	May-16	Fitch	Improved external balance sheet, fiscal consolidation and improvement in the banking sector's situation
Ireland	Upgrade to A3 (positive) from Baa1	May-16	Moody's	Improvement in growth performance and debt burden reduction over the past year
United Kingdom	Downgrade to AA (negative) from AAA	Jun-16	S&P	Uncertainty following the referendum result
United Kingdom	Downgrade to AA (negative) from AA+	Jun-16	Fitch	Negative impact of the referendum result on the economy, public finances and political continuity
Slovenia	Upgrade to A (stable) from A-	Jun-16	S&P	Strengthening domestic demand and fiscal consolidation
Finland	Downgrade to Aa1 (stable) from Aaa	Jun-16	Moody's	Expected weak growth reduces resilience to future shocks and deterioration in fiscal position
Austria	Downgrade to Aa1 (stable) from Aaa	Jun-16	Moody's	Weak medium-term growth prospects and the challenge it poses for reducing the high government debt burden
Cyprus	Upgrade to BB (positive) from BB-	Sep-16	S&P	Strong economic performance, further debt reduction and steady improvement in the banking sector's asset quality
Hungary	Upgrade to BBB- (stable) from BB+	Sep-16	S&P	Improving fiscal outcome, external financial profile and growth expectations
Slovenia	Upgrade to A- (stable) from BBB+	Sep-16	Fitch	Fiscal consolidation and structural reforms supporting GDP recovery. Completion of support package to the banking sector
Malta	Upgrade to A- (stable) from BBB+	Oct-16	S&P	Strong economic growth, improvement in fiscal performance and in the external position
Cyprus	Upgrade to BB- (positive) from B+	Oct-16	Fitch	Continued strong progress in its adjustment following the 2013 banking crisis and economic recovery
Hungary	Upgrade to Baa3 (stable) from Ba1	Nov-16	Moody's	Declining government debt burden, structural economic improvements and reduction in external vulnerability

Source: Fitch, Moody's, S&P

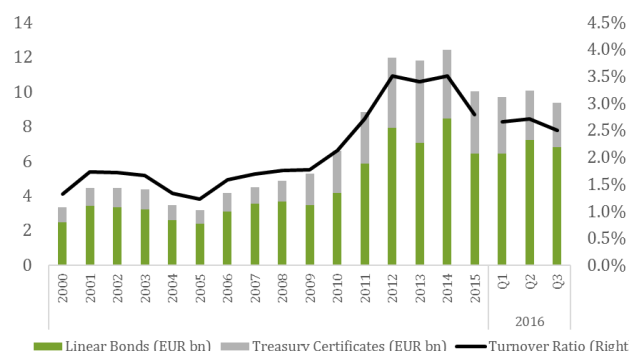
5 Secondary market trading volumes and turnover ratios³

5.1 United Kingdom: Average daily trading volume (bonds only) and turnover ratio⁴



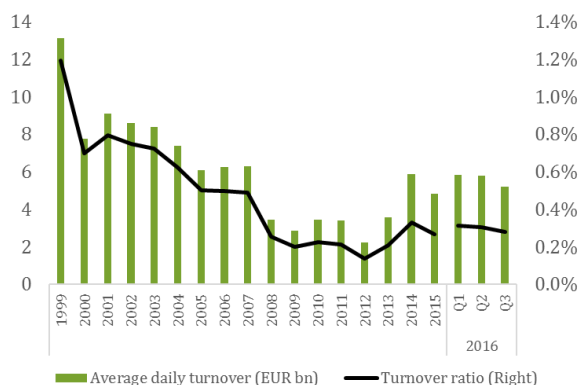
Source: UK Debt Management Office

5.2 Belgium: Average daily trading volume and turnover ratio⁵



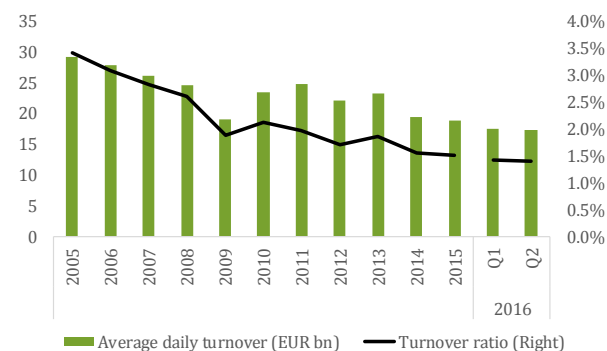
Source: Belgian Debt Agency and ECB

5.3 Italy: Average daily trading volume (bonds and bills) and turnover ratio. Electronic trading⁶



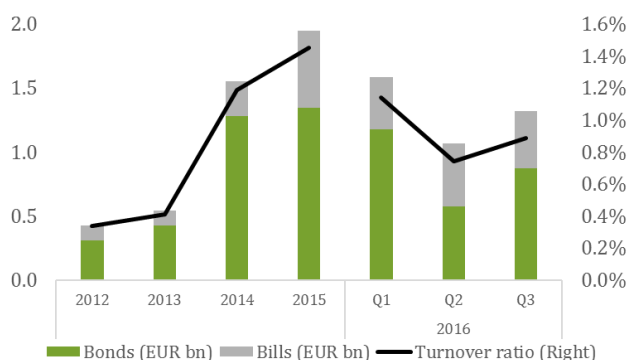
Source: Italian Dipartimento del Tesoro

5.4 Germany: Average daily trading volume (aggregated bonds and bills) and turnover ratio⁷



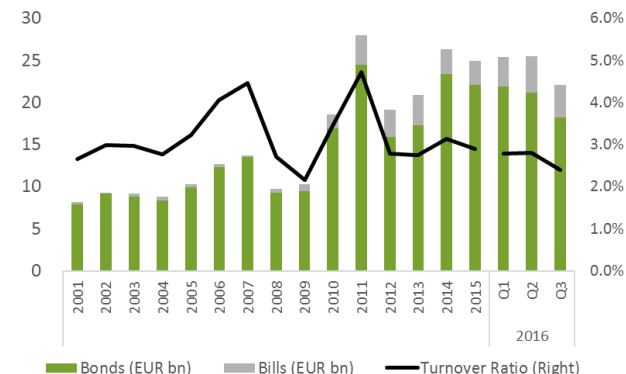
Source: Deutsche Finanzagentur and ECB

5.5 Portugal: Average daily trading volume and turnover ratio⁸



Source: Agência de Gestão da Tesouraria e da Dívida Pública – IGCP and ECB

5.6 Spain: Average daily trading volume and turnover ratio⁹



Source: Tesoro Público de España

³ Turnover ratios are calculated as the average daily trading volume relative to total outstandings. Cash trading only (excludes repo and derivatives transactions). Given the differences in the aggregation basis across jurisdictions, the data is not fully comparable between countries.

⁴ Turnover data reported to the DMO by the Gilt-edged Market Makers (primary dealers).

⁵ Turnover is total outright transactions.

⁶ Turnover on electronic interdealer regulated market.

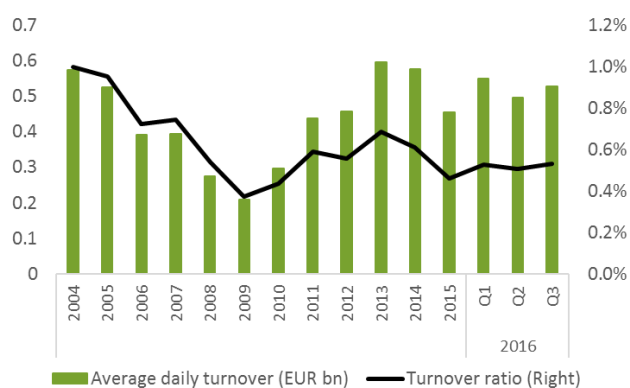
⁷ Turnover of both electronic and OTC trading. The traded volume is aggregated for a representative part of the members of the Bund Issues Auction Group with trades with all counterparties. Bubills, Schaetze, Bobls, Bunds and inflation-linked securities. Capital and coupon strips as well as US-dollar bonds are excluded.

⁸ Turnover of electronic and OTC trading reported on MTS-Portugal, BrokerTec and eSpeed.

⁹ Turnover is total outright transactions. Includes Treasury Bills, non-stripped Government Bonds and stripped Government Bonds.

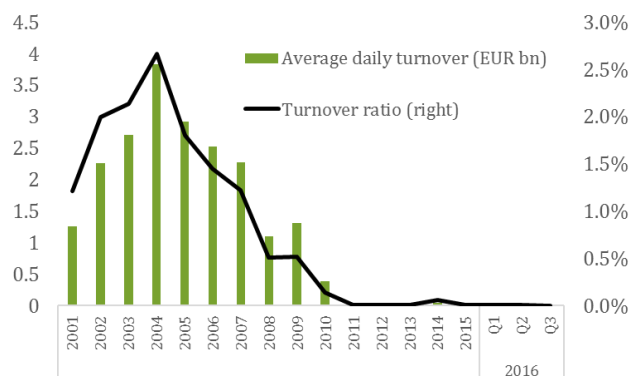
Secondary market trading volumes and turnover ratios

5.7 Finland: Average daily trading volume (aggregated bonds and bills) and turnover ratio¹⁰



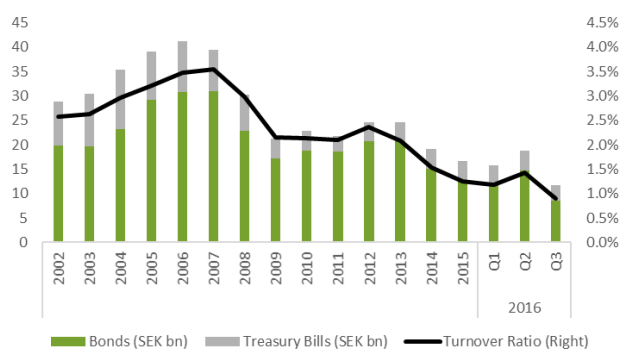
Source: Finland Valtiokonttori and ECBi

5.8 Greece: Average daily trading volume (bonds only) and turnover ratio¹¹



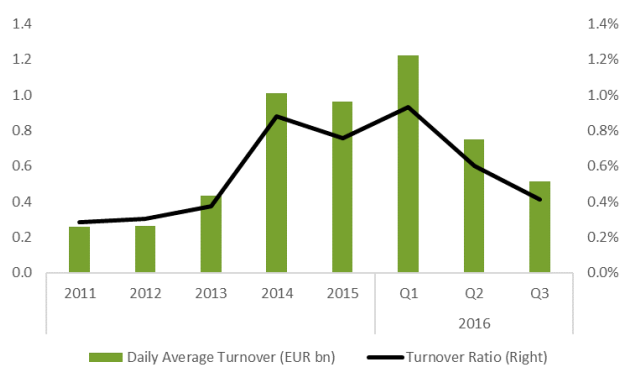
Source: Bank of Greece and ECB

5.9 Sweden: Average daily trading volume and turnover ratio¹²



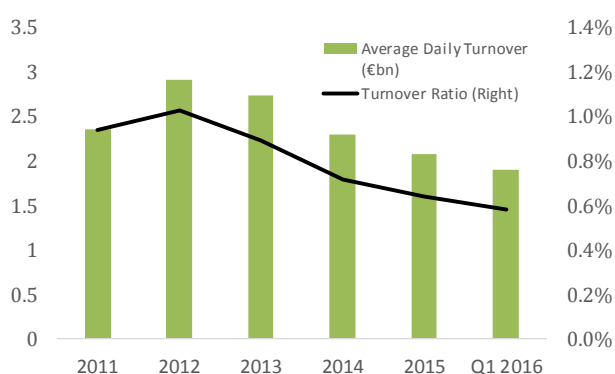
Source: Swedish National Debt Office (Riksgälden) and ECB

5.10 Ireland: Average daily trading volume (aggregated bonds and bills) and turnover ratio¹³



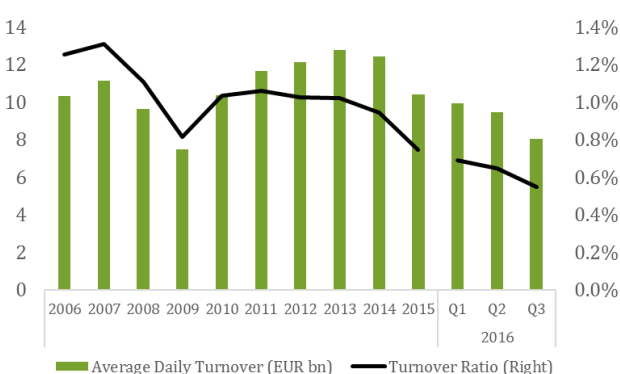
Source: Irish Stock Exchange and ECB

5.11 Netherlands: Average daily trading volume (bonds only) and turnover ratio¹⁴



Source: Ministerie van Financiën

5.12 France: Average daily trading volume (bonds only) and turnover ratio¹⁵



Source: Agence France Trésor and ECB

¹⁰ Turnover of customer trades, MTS Finland and Euro MTS.

¹¹ Turnover on Electronic Secondary Securities Market (HDAT).

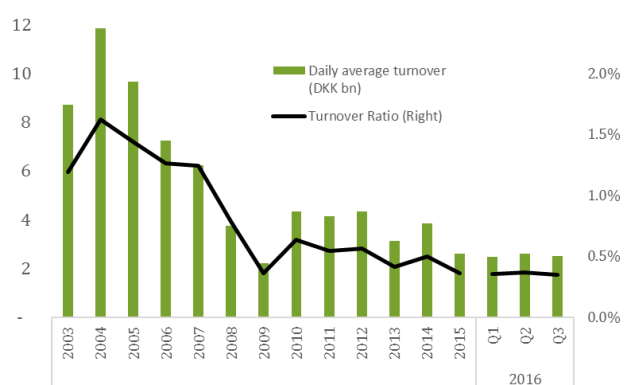
¹² Turnover is total outright transactions.

¹³ Turnover on Irish Stock Exchange.

¹⁴ Turnover is customer and interdealer trading. Total outright transactions, including electronic and OTC trading.

¹⁵ Turnover of voice and electronic trading (not including PSPP transactions or trading without an SVT). Q2 is the average of the first two months of the quarter.

5.13 Denmark: Average daily trading volume (bonds and bills) and turnover ratio¹⁶

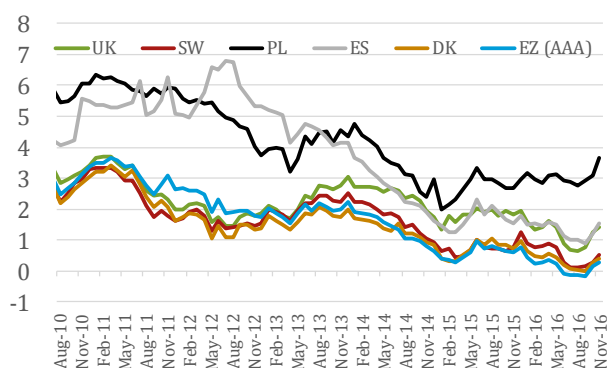


Source: Danmarks Nationalbank

¹⁶ Turnover of MTS, TradeWeb, Bondvision and trades reported to Nasdaq OMX (including voice trading).

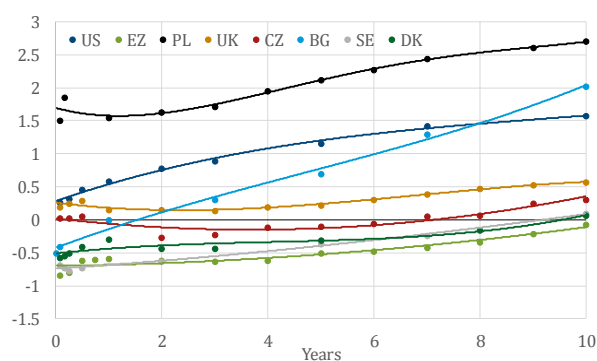
6 Valuations

6.1 Selected European 10Y spot yields



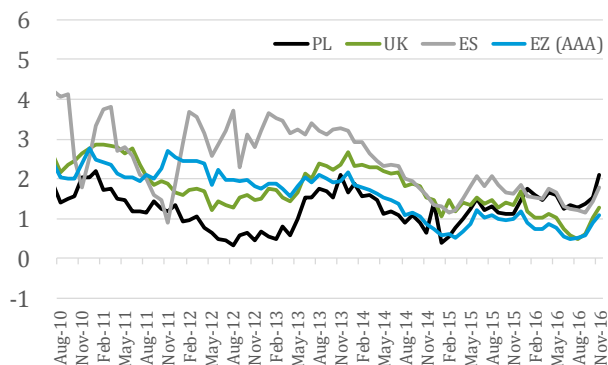
Source: ECB and Thomson Reuters Eikon

6.2 Sovereign spot yield curve of selected jurisdictions: 30 Nov 2016



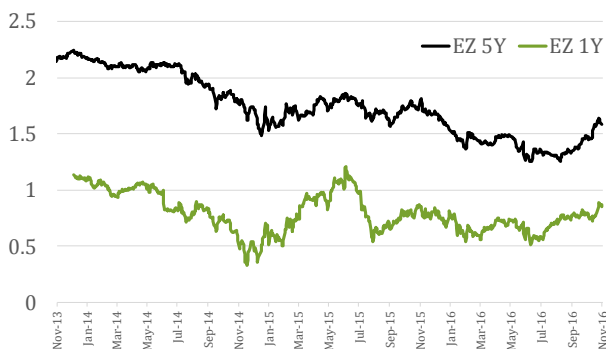
Source: Thomson Reuters Eikon

6.3 Slope: 1Y10Y spread



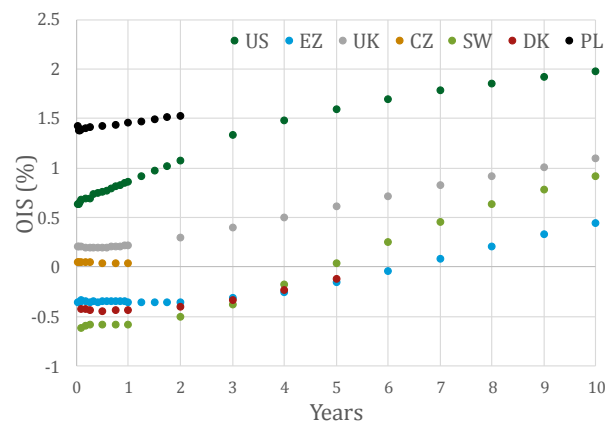
Source: ECB and Thomson Reuters Eikon

6.4 Market-implied inflation expectations (EuroZone)



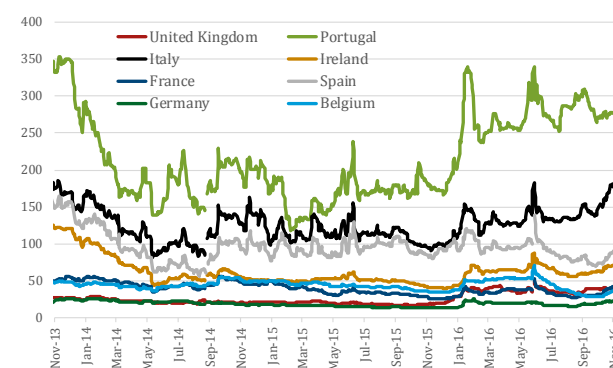
Source: Thomson Reuters Eikon

6.5 Overnight index swap (OIS) yield curve: 30 Nov 2016



Source: Thomson Reuters Eikon

6.6 5Y Sovereign Credit Default Swap (CDS, bps)



Source: Thomson Reuters Eikon

Summary of the Methodologies Adopted for this Report

1. Issuance

1.1. – 1.4. Government bond issuance by type, region and currency

The charts aggregate central government gross debt issuance volumes originated by EU28 member states. It excludes debt issued by government agencies and Central Banks.

Issuance data of Eurozone member states are sourced from the European Central Bank (ECB) “Debt securities issued by euro area residents by original maturity; currency and sector of the issuer” report with “Central Government” as the basis of aggregation. The data are available in: <https://www.ecb.europa.eu/stats/money/securities/debt/html/index.en.html>

Issuance volumes of non-Eurozone member states are sourced from national Debt Management Offices (DMO), Central Banks and Ministries of Finance depending on data availability. More specifically:

UK Debt Management Office:
http://www.dmo.gov.uk/index.aspx?page=Gilts/Net_Issuance_Data

Sweden Riksgalden:
<https://www.riksgalden.se/en/For-investors/Government-securities/Auction-results/>

Poland Finanse:
<http://www.finance.mf.gov.pl/uk/public-debt/t-bills-and-t-bonds/transactions-database>

Hungary ÁKK:
<http://www.akk.hu/en/page/statistics>

Denmark National Banken:
<http://www.nationalbanken.dk/en/governmentdebt/auctionsandissuance/Pages/Auction-results---government-bonds.aspx>

Czech Republic CNB:
https://www.cnb.cz/en/financial_markets/treasury_securities_market/government_bonds/

Croatia Ministry of Finance:
<http://www.mfin.hr/en/public-debt>

Bulgaria Ministry of Finance:
<http://www.minfin.bg/en/page/70>

Data are aggregated in Euros by converting the original values of non-Euro volumes using the relevant daily currency pair exchange rate as published by the ECB. Data available in

<https://www.ecb.europa.eu/stats/exchange/eurofxref/html/index.en.html>

For Charts 1.1 and 1.2, “Bills” refer to central government debt securities issued with a tenor of 1 year or less, while “Bonds” relate to central government debt securities issued with a tenor of above 1 year.

1.5. – 1.6. Net sovereign debt issuance

Net issuance relates to gross issuance volumes originated by central governments net of redemptions during the relevant period. As in 1.1-1.4, the data excludes debt securities issued by agencies and other related general government securities.

For Eurozone member states, data are sourced from the ECB’s “Debt securities issued by euro area residents by original maturity; currency and sector of the issuer” report with “Central Government” as the basis of aggregation.

For UK net issuance, data are sourced from the UK Debt Management Office according to the “Monthly Gross and Net Issuance report” available in: http://www.dmo.gov.uk/index.aspx?page=Gilts/Net_Issuance_Data

2. Auctions and Primary Dealers

2.1. – 2.7. Bid-cover ratios

Bid-cover ratios data is sourced from Thomson Reuters Eikon for 10 jurisdictions (selected based on overall outstanding debt size and auction data quality). Where the data is not in Euros, it is converted using the relevant exchange rate from the ECB as in 1.1-1.4.

2.8.- 2.10. European Primary Dealers

The number of European primary dealers are sourced from AFME’s Primary Dealers handbooks as published for the relevant period, and from AFME’s regularly updated Primary Dealers list for the counterparty type definitions under the Harmonised Reporting Format (or “HRF table”).

In Belgium, the list also aggregates “Recognised Dealers” in the total number of Primary Dealers.

In Germany, members of the “Bund Issues Auction Group” are aggregated. Technically, there are no primary dealers but banks which are members of the auction group.

In the Netherlands, the list also aggregates “Single Market Specialists” in the total number of Primary Dealers.

3. Outstanding

3.1. Outstanding debt securities issued by central governments

2009-2015 outstanding volumes are sourced from the ECB “Debt securities outstanding (Securities other than shares, excluding financial derivatives). 1Q16 and 2Q16 outstanding volumes are sourced from Thomson Reuters Eikon (see section 3.2-3.6 for the methodology and aggregation basis).

3.2. – 3.8. European Government bonds outstanding

The charts display outstanding central government gross debt volumes originated by EU28 member states. It excludes debt issued by government agencies and Central Banks.

The data is sourced from Thomson Reuters Eikon and is required to have a maturity date, issue date and issue amount in order to be included. The data was sourced with issue amounts in US Dollars and so was converted to Euros using the relevant exchange rate from the ECB as in 1.1–1.4.

The credit ratings used in 3.6 are the long term foreign currency issuer credit ratings and are sourced from Standard and Poor’s as reported by Thomson Reuters Eikon at the end of the relevant quarter.

4. Credit Quality

4.1. – 4.4 Credit ratings in selected European jurisdictions

Charts 4.1-4.4 aggregate the long-term credit rating in foreign currency of EU 28 member states as rated by Standard and Poor’s. Data were retrieved from Thomson Reuters Eikon but primarily sourced from Standard and Poor’s.

4.5.-4.6. Relationship between S&P long-term credit ratings and CDS and OAS

Chart 4.3 illustrates the relationship between S&P long-term credit ratings in foreign currency as described in charts 4.1-4.2, with sovereign Credit Defaults Swap rates.

Credit ratings are sourced from Standard and Poor’s as reported by Thomson Reuters Eikon as of the end of the relevant quarter.

CDS data are sourced from Deutsche Bank’s web-based platform “Sovereign default probabilities online” available in:

[https://www.dbresearch.com/servlet/reweb2.ReWEB?rwnode=DBR_INTERNET_EN-PROD\\$NAVIGATION&rwbobj=CDS.calias&rwsite=DBR_INTERNET_EN-PROD](https://www.dbresearch.com/servlet/reweb2.ReWEB?rwnode=DBR_INTERNET_EN-PROD$NAVIGATION&rwbobj=CDS.calias&rwsite=DBR_INTERNET_EN-PROD)

For purposes of comparability, the CDS spreads assume a recovery rate of 40% across all jurisdictions.

Chart 4.4 illustrates the relationship between S&P long-term credit ratings in foreign currency and Option-Adjusted spreads (OAS). OAS are sourced from Barclays Capital.

4.7. European rating actions

Rating actions on long-term foreign currency ratings of EU28 member states as rated by Standard and Poor’s, Fitch and Moody’s. Changes to credit outlooks are not aggregated.

The column “rationale” is a summary of the main drivers behind the respective rating actions as per the agencies’ press releases and detailed ratings reports.

5. Trading volumes and turnover ratio

5.1. – 5.13 Trading volumes and turnover ratio

The charts display secondary market daily average trading volumes and turnover ratios for the selected jurisdictions. The turnover ratio is equal to the daily average trading volume divided by the total outstanding debt volume for the country at the time of the trading.

Trading volumes are sourced from national Debt Management Offices (DMO), Central Banks and Ministries of Finance depending on data availability. Publicly available sources are:

UK Debt Management Office:

<http://www.dmo.gov.uk/index.aspx?page=Gilts/Turnover>

Belgian Debt Agency:

http://www.debtagency.be/en_products_olo_volume.htm

Italian Dipartimento del Tesoro:

http://www.dt.tesoro.it/en/debito_pubblico/dati_statistici/bollettino_trimestrale/

Deutsche Finanzagentur:

<http://www.deutsche-finanzagentur.de/en/institutional-investors/secondary-market/>

Portuguese Agência de Gestão da Tesouraria e da Dívida Pública – IGCP:

<http://www.igcp.pt/gca/?id=89>

Tesoro Público de España:

<http://www.tesoro.es/en/deuda-publica/estad%C3%ADsticas-mensuales>

Finland Valtiokonttori:

http://www.treasuryfinland.fi/en-US/Statistics/Funding/Secondary_market

Bank of Greece:

<http://www.bankofgreece.gr/Pages/en/Markets/HDAT/statistics.aspx>

Irish Stock Exchange:

<http://www.ise.ie/Market-Data-Announcements/Statistical-Reports/>

comparability, the CDS spreads assume a recovery rate of 40% across all jurisdictions. Data are sourced from Deutsche Bank's web-based platform "Sovereign default probabilities online".

6. Valuations

6.1. Selected European 10Y benchmark yields

The chart aggregates the end-of-month sovereign 10Y benchmark yield rates in selected European jurisdictions (United Kingdom, Sweden, Poland, Spain, Denmark and the Euro zone benchmark). The Euro zone yield rate is sourced from the ECB and relates to the AAA-rated benchmark sovereign interest rate for a 10-year tenor. The yields for the other jurisdictions are sourced from Thomson Reuters Eikon.

6.2. Sovereign spot yield curve

Spot yield curve for jurisdictions for the 1 to 10 years maturities as of the selected period. All data points are sourced from Thomson Reuters Eikon.

6.3. Slope of the sovereign debt yield

The chart aggregates the difference between 1 year and 10-year spot rates in the selected jurisdictions. The slope of the Euro zone curve is sourced from the ECB and relates to the slope of AAA-rated benchmark sovereign yields. The slopes of the other jurisdictions are sourced from Thomson Reuters Eikon.

6.4. Implied inflation expectations in the Euro zone

The chart aggregates the historic market-implied HICP inflation expectation of the Euro zone for 1 and 5 years ahead. Specifically, EUIL1YF1Y=R and EUIL5YF5Y=R contracts retrieved from Thomson Reuters Eikon.

6.5. Overnight index swap (OIS) yield curve

The chart aggregates the OIS yield curve in the respective jurisdictions, illustrating the market-implied expectations of future changes in the central banks' policy rates. All data points are sourced from Thomson Reuters Eikon and retrieved during the disclosed day.

6.6. 5Y Sovereign Credit Default Swap

The chart aggregates historic 5Y CDS spreads for selected jurisdictions. For purposes of

Annex

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