# Financial Stability Note

No. 3 July 2017

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The Financial Stability Note is framed within the tasks that the CNMV carries out to monitor financial stability conditions in the areas it supervises. In particular, the Note assesses the stress level of domestic securities markets during the last quarter, identifies changes in the level of different financial risks and identifies the major sources of risk.

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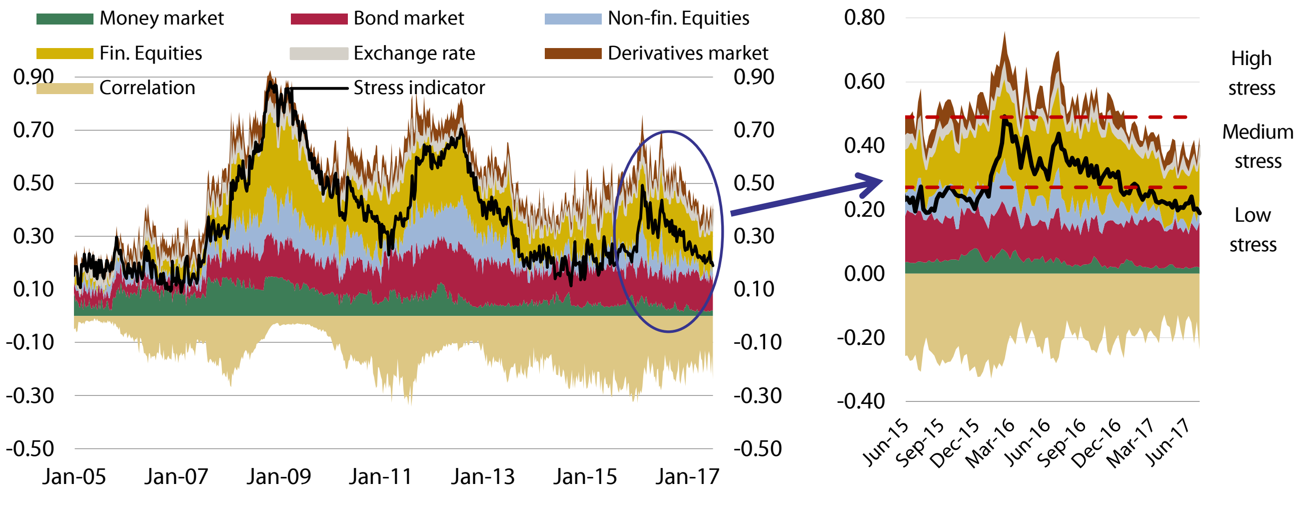
## Summary

✓ The Spanish financial markets stress indicator fell from 0.21 in April to 0.19 at the end of June[1], having marked its highest point at 0.24 early in the month. This represents a low level of stress. The segment with greatest stress was the bond market, reflecting a recent increase in volatility and thinner liquidity. Fallout from the resolution of Banco Popular and a later surge in volatility at another mid-scale bank late in Q2 did not, however, appreciably boost stress levels in any of the segments we watch (see *Market risk* for details).

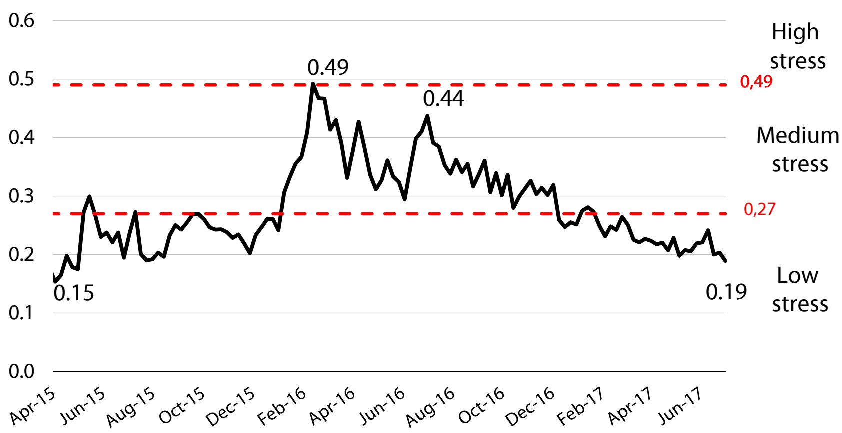
### Spanish financial markets stress indicator

FIGURE 1




Source: CNMV.

For further details on recent movements in this indicator and its components see CNMV statistical series (Market stress indicators), at http://www.cnmv.es/Portal/Publicaciones/SeriesWeb/Inicio.aspx?codrama=1295 . For further information on the methodology used to compile the indicator see Cambón M.I. and Estévez, L. (2016) A Spanish Financial Market Stress Index (FMSI). Spanish Review of Financial Economics 14 (January (1)), 23-41 or CNMV Working Document no. 60 (http://www.cnmv.es/Portal/Publicaciones/monografias.aspx ).



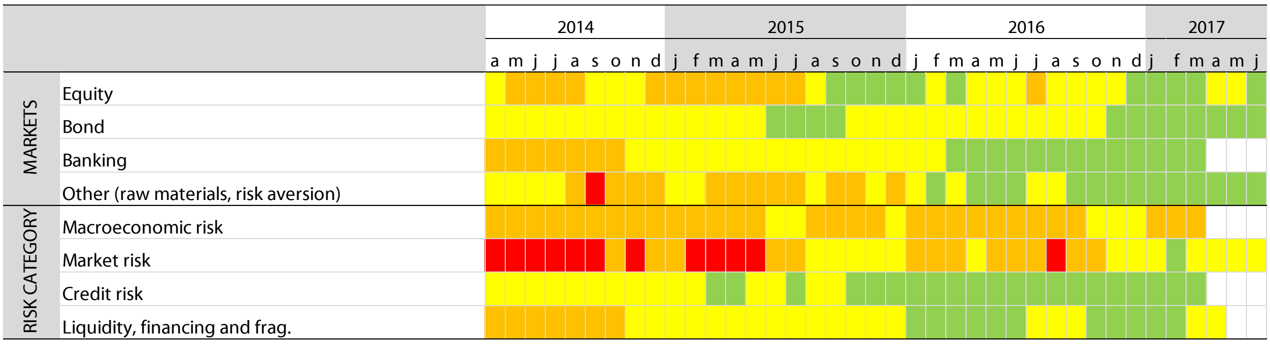

[1] The closing date of this report is 30 June.

- ✓ On the economic front, domestic activity remains on a healthy path as it does job creation. In fact, the most recent forecasts for the Spanish economy by national and international bodies are more bullish than those of a few months ago, indicating growth this year could even top 3%. As the heat map shows, macro-economic risk worsened slightly in Q1 due to the uptick in inflation. However, this is a short-lived phenomenon and the stronger performance by other economic measures gives grounds for optimism about the coming months. High unemployment and the need to consolidate the public finances remain the most pressing challenges.

- ✓ On financial markets, market and liquidity risk are still the most prominent. Market risk is most evident in fixed-income, but is starting to become significant in a number of equity segments despite a modest price dip in the past quarter. Given the current low-interest rate environment, it is important to keep a close eye on any circumstances that might raise risk premiums or interest rates and be aware of the potential consequences for holders of bonds and other less liquid assets.

- ✓ Potential triggers for a change in the macro-financial scenario notably include anything that might stoke political uncertainty. This includes ongoing, though much reduced, doubts about the US administration and above all negotiations on the UK's departure from the EU. It is still too soon to rule out a hard Brexit. In the string of elections scheduled for European countries this year voters have tended to opt for continuity and even the revitalisation of the European project, considerably reducing uncertainty among market agents. Finally, we should highlight the significance of the timing and intensity of the ECB's upcoming change in monetary policy tack. This will have major consequences for banks and still heavily-indebted economic agents.

**Heat map: summary by market and risk category** FIGURE 2




Source: CNMV. Starting with this edition the heat map includes and additional indicator: the bid-ask spread on the 10-year sovereign bond (*bono*). See article in CNMV Quarterly Bulletin Quarter 1 2015. "Identification of vulnerabilities in the Spanish financial system: an application of heat maps".

# Sources of risk

## Macro-economic environment

- The Spanish economy continued to grow at a healthy pace in the early months of this year, outperforming the wider euro zone (figure 21). Quarterly growth in GDP was 0.8% in Q1[2] (0.6% in the euro zone) with year-on-year growth of 3 % (1.9 % in the euro zone). Employment is also growing strongly, by 2.5% in Q1, enough to bring down the unemployment rate[3] to 18.8% of the active population (compared to 21% in Q1 2016). The CPI leading indicator put inflation at the end of the first half 2017 at 1.5% year-on-year, down four tenths of a point on May and 1.5 points on January and February when annual inflation was running at 3%. The fall in the annual rate was mainly driven by lower oil prices. The underlying rate, which strips out volatile components (energy and fresh food prices), was much more stable over the year, falling two tenths in May to 1%, very close to the euro zone figure.

- Fiscal retrenchment remains a major challenge for Spain. That said, both the tone of fiscal policy, which is expected to be slightly contractive this year, and the dynamism of the economy should support a gradual reduction in the public sector deficit[4]. The deficit was running at 0.39% of GDP by the end of Q1 (0.70% in the same period 2016). Latest forecasts by the European Commission put the deficit at 3.2% of GDP at end-2017, three tenths below their previous February forecast, and dropping below the 3% threshold in 2018. Public sector debt, meanwhile, edged back up above 100% of GDP[5] in Q1.

- Forecasts by Spanish and international institutions confirm the strong performance of the Spanish economy. Growth is now expected to be between 2.8% and 3.1% in 2017 and between 2.4% and 2.5% in 2018, upgrading forecasts made in the early months of the year[6]. That said, there are domestic and external forces which could curtail this rate of growth. Most will play out over the medium term and stem from factors such as the minority government, below-forecast growth elsewhere in Europe (the main market for Spain's exports) and the crystallisation of political risks outlined below (Brexit, US administration, etc.).

[2] The Bank of Spain forecasts growth might be even stronger in Q2 at 0.9%.
[3] Unemployment rate based on EAPS.
[4] The latest IMF Fiscal Monitor report, published in April, suggested the public sector deficit will fall by 1.3 points this year. Virtually half of this fall was in the cyclically adjusted (i.e. structural) deficit, projected to fall from 3.1% to 2.5% of GDP. The rest was due to falls in the cyclical deficit. Changes in structural deficit reflect the tone of fiscal policy applied by a government: falls are usually associated with restrictive fiscal policies. The cyclical deficit fluctuates with the economic cycle and falls when economic growth is strong as it is at the moment.
[5] The March 2017 figure was 100.4% of GDP, up from 99.4% at end-2016.
[6] The European Commission, for instance, upgraded its 2017 forecast from 2.3% to 2.8% while the Bank of Spain raised its forecast three tenths of a point to 3.1%.

## Low interest rate environment

- Current rock-bottom rates are good for anyone looking to raise finance and encourage investment. However, this environment, which has now lasted many years, comes with some risks to the financial system. One such is the proliferation of strategies seeking higher returns (which generally means taking on greater risk). Another is that it makes it hard for the banking sector to sustain acceptable levels of profitability. Although these risks must be continuously monitored, we can now start to assume, with an increasingly probability as time passes, that European interest rates may be about to rise. This could be bad news for agents who are still highly indebted and those that have a large proportion of fixed-income securities in their portfolios although, conversely, a rise would ease the difficulties of the banking sector.

- Households, meanwhile, are following the same trends in their financial decision-making as we have seen since 2013, shunning term deposits and investing in sight deposits and investment funds. The drift away from term deposits, down by a further 7% between January to April, reflects the meagre returns currently on offer. Much of the cash from maturing term deposits and higher salary earnings as employment expands is being channelled into either sight deposits (total balance rose by 3.9% in the year to April) or investment funds (AUM up 5%). In the case of investment funds, we find that investors are preferring higher-risk funds, such as equities or global funds, both of which classes attracted net subscriptions above EUR 5.7 billion in the first three months of 2017 (figure 28). This preference reflects the search for yield by retail investors.

- Profitability in the Spanish banking sector, as in other European countries, remains very low by historical standards due to low interest rates and a persistent decline in lending volumes coupled with a high percentage of non-productive assets[7]. There has also been a rise in legal costs following recent court rulings, most notably in relation to "floor clauses". Other factors are more promising for the sector's outlook, such as the dynamism of the domestic economy which is contributing to the decline in NPLs since 2013 and expectations of an interest rate rise. Nevertheless, the sector faces serious challenges: some are structural, such as competition from Fintechs, and others come from exposure to certain economies vulnerable to political uncertainty. The resolution process of Banco Popular is discussed in the section on *Market risk*.

[7] The Bank of Spain Financial Stability Report published in May showed that ROE for deposit-taking institutions was 4.3% in 2016 (compared to 5.6% in 2015). This is well below returns seen in the early years of the last decade, when ROE was running at more than 12% annually, peaking at 20% in 2007.

### Political uncertainty

- The progress of Brexit negotiations, which got underway in June, is one of the main sources of political risk to the euro zone's economic and financial scenario. Following the UK's snap election earlier in June, the British government reiterated its intention to restrict the free movement of people and leave the single market, although it also stressed its wish to seal an ambitious trade deal with the EU. The possibilities of a hard Brexit are unchanged. Elsewhere, uncertainty surrounding elections in various European countries has reduced considerably in recent months. Election results have been favourable to continuing the EU project. The easing of uncertainty has led to a notable reduction in risk premiums on Italian and French sovereign debt, down from highs of 210 bp and 80 bp, respectively, in April, to 168 bp and 35 bp by end-June.

- Decisions coming out of the US Administration remain a focus of attention for financial markets, but the degree of uncertainty has reduced over the last few months. Measures to restrict trade and immigration could weigh on economic activity in the medium and long terms. In the financial markets, the late-2016 rally in stock and long-term debt markets triggered by expectations of a massive fiscal stimulus package partly dissipated during the first half of the year on fixed-income markets. In this context, risks persist that the Federal Reserve, which hiked rates again in June to 1-1.25%, may normalise monetary policy faster than expected. We are seeing a clear determination by the Fed to return policy to normal as weaker economic and inflation figures can be put down to temporary factors. That said, uncertainty remains on both the timing of rate rises and when the Fed will start reducing its balance sheet. A scenario where investor expectations are out of kilter with Fed decisions could trigger short-lived bouts of volatility in financial markets.

- Finally, geopolitical tensions remain high. If any of these should materialise it could have a substantial impact on financial markets. Tensions stem from deteriorating relations between the world's powers or the possibility of terrorist acts on a global scale.

### Other risks: cyber security

- In recent years, cyber attacks have escalated into a significant risk to the integrity, efficiency and robustness of financial markets. Attacks can cause big economic costs[8], disrupt the proper functioning of entities and severely damage their reputation[9]. This risk is only likely to grow given the increasing digitisation of information and of

[8] Cybersecurity Ventures estimates that the annual cost of cyber attacks will double from USD 3 trillion in 2015 to USD 6 trillion in 2021.
[9] As shown by the Wannacry ransomware attack in May this year or the Petya variant attack in late June.

trading and post-trade market processes. Cyber security is particularly important to large-scale and infrastructure entities, which rely heavily on IT systems and whose functions are vital to financial markets (trading platforms, central securities depositaries, trade registers, central counterparties, etc.). It is therefore essential to promote the coordination of efforts across jurisdictions and between authorities in the same jurisdiction and to raise awareness of this issue in corporate culture. The application of basic protection measures can help prevent and/or mitigate the consequences of an attack.

## Risk categories

### Market risk: yellow

- The Ibex 35 gained a cumulative 11.7% in the first half of the year, the strongest performance by any European index[10], thanks to the powerful 11.9% rally in Q1. Q2 began on a positive note, helped by the result of French elections which bolstered the credibility of the European project, but the prospect of the ECB continuing to withdraw monetary stimulus coupled with the Fed rate hike and falling oil prices dissipated these gains, leaving the Ibex 35 down 0.2% on the quarter. The biggest gains in Q2 were made by small caps, motorway operators and property firms, while the biggest losses were in the telecommunications and oil & gas sectors, which registered the impact of the drop in crude prices.

- A potentially significant event for Spain's financial stability in Q2 was the resolution of Banco Popular after the European Central Bank declared it unviable in early June. A resolution scheme was implemented by the European Single Resolution Board[11] and the Spanish National Resolution Authority (FROB)[12], under which Banco Santander acquired 100% of Banco Popular's capital on 7 June for one euro following steps to cancel shares and recapitalise hybrid financial instruments and subordinated debt. A few days later on 12 June, following pressure on Liberbank, with steep falls and extreme volatility in its shares which could have made the bank vulnerable in a context where it had not published negative news, the CNMV decided, under European Regulation 236/2012, following consultations with the European Securities Markets Authority (ESMA), to impose a one-month freeze on new or additional net short positions in the stock[13]. The measure, allowed by the above cited European Regulation in cases of serious threat to financial stability or market confidence, successfully contributed to normalising the bank's stock price over the next few weeks. Relevant indicators show that contagion and stress risks did not change perceptibly either in general terms or in the segments of financial intermediaries or non-financial equities.

- The price/earnings ratio (P/E) of the Ibex 35 held stable in Q2 at less than 15 and was 14.7 in June, above its historical average of 13.6 (figure 4). Also, short positions reduced to below 0.9% of total market capitalisation (figure 3), close to annual lows.

[10] In the first half of 2017, gains by other benchmark European indices ranged from 4.6% for the Euro Stoxx 50 to 7.4% for the German Dax 30. The CAC 40 (France) and Mib 30 (Italy) rose by 5.3% and 7% respectively over the same period.
[11] Under Regulation (EU) 806/2014 of the European Parliament and Council, of 15 July, Directive 2014/59/EU of the European Parliament and Council, of 15 May, and Law 11/2015, of 18 June, on recovery and resolution of credit entities and investment firms.
[12] See FROB resolution: http://www.frob.es/en/Lists/Contenidos/Attachments/419/ProyectodeAcuerdoreducido_EN_v1.pdf
[13] See CNMV resolution http://www.cnmv.es/Portal/verDoc.axd?t=%7bb4301c3b-0339-4ce6-98fe-a067ad4b52e5%7d, and two months extension http://www.cnmv.es/Portal/verDoc.axd?t={25870438-c3c8-40fd-a3f0-b93b512b20e3}.

The greatest volume of short positions were in Día and, to a lesser extent, Técnicas Reunidas.

- The greatest market risk remains in fixed-income assets, whose long-term interest rates declined further in Q2, by between 12 bp and 14 bp, due in part to the impact of ECB purchase programmes – of both sovereign and corporate debt – and the easing of political uncertainty in Europe. The decline was unevenly spread by country – long yields fell by between 12 bp and nearly 100 bp in Spain, France and Portugal, but Germany's increased by 13 bp – and asset type. Expectations of a change in ECB monetary policy are growing day by day even if uncertainty shrouds the timing. The part-withdrawal of stimulus[14], inflation nearing the ECB's target and some knock-on effect from US rate hikes are all factors that may tend to bring forward the timing of this change. In this environment, it is sensible to assess the consequences of any rate rise for the most deeply indebted agents and those with heavy exposure to fixed-income and complex illiquid assets. Remember that the ECB's acquisition of corporate debt had risen to EUR 95,000 million by June[15], including the bonds of 15 Spanish issuers[16], while the volume of Spanish public sector debt acquired totalled EUR 188,589 million at end-May[17].

## Credit risk: green

- The risk premium on Spanish corporate issuers narrowed, most sharply in the financial sector following Santander's acquisition of Banco Popular. Popular's risk premium had risen significantly over the quarter but fell back substantially after its acquisition by Santander. At the end of Q2 the average risk premium of financial firms was 90 bp, higher than the 69 bp of non-financial companies (figure 12) which fell to its lowest since 2008. The sovereign risk premium (measured as the spread between Spanish *bono* and German *bund* yields) also fell significantly over the quarter, to 106 bp (figure 11), an annual low, helped by the easing of political uncertainty in Europe and the expansion of the Spanish economy.

- Household loans outstanding continued the downward trend of recent months but corporate loans continued to recover, growing at a faster pace. The decline in household borrowings was unchanged at -1.2% year-on-year, explained by the slowdown in new consumer lending (4.3% in May) and a more modest fall in mortgage books (-2.8% in May). In the corporate market, loans grew by 0.6% year-on-

[14] Since April, the ECB has cut monthly debt purchases from EUR 80 billion to EUR 60 billion.
[15] At 23 June 2017, the ECB was holding EUR 95,222 million of European corporate debt, of which 14.6% was acquired on the primary market.
[16] According to the ECB Economic Bulletin (volume 4, 2017), the balance of corporate debt held by the ECB was EUR 92,000 million on 7 June, 11% of the total for possible eligible assets. Of this 10% (approximately EUR 9,200 million) was from Spanish issuers.
[17] This represents 22.2% of all long-term debt securities issued by the various tiers of government in Spain.

year in May, notching up three consecutive months of growth for the first time since 2009. Greater willingness to lend on the part of financial institutions and a growing economy have revived demand for credit among corporate borrowers, especially SMEs, which seem to be slowing their pace of deleveraging.

### Liquidity, financing and fragmentation risk: yellow

- Fixed income issues filed with the CNMV totalled EUR 46,759 million in the first half of the year, down 33.2% on the first half 2016. In contrast, fixed-income issuance by Spanish companies abroad continued to grow apace, continuing the upward trend of recent years. In the January to May period such issues increased by nearly 29% year-on-year. By asset type, the big shift in Q2 was a resurgence of mortgage covered bonds at the expense of securitisations. Issuance in Europe's debt markets gathered pace as the year wore on[18] as issuers rushed to raise funds on attractive market terms that might not be on offer in the future. On equity markets, Unicaja Banco went public with a EUR 687.5 million share subscription offering. This follows three other public offerings by public share offers in Q1.

- Average daily trading volumes in the continuous market were EUR 3,266 million in Q2, a quarter-on-quarter increase of 35.6% and the third consecutive quarterly rise. Year-on-year volumes were up 11.8%. Trading of Spanish shares on foreign stock markets accounted for 35% of all trading[19] in Q2, slightly below the average for Q1 (38.4 %).

- Liquidity indicators, measured by bid-ask spreads, held steady in Q2 for the Ibex 35 and improved slightly for the *bono*, whose liquidity had tightened in Q1 in reaction to political uncertainty and the ECB's sovereign debt purchases.

- The spread between yields on Spanish corporate loans and the rest of the euro zone widened slightly in both the less-than-a-million (to 20 bp) and more-than-a-million (to 34 bp) brackets.

[18] According to Dealogic, debt volumes issued in Europe in the first half of the year by financial institutions and non-financial companies totalled EUR 638,000 million, up 7.7% on the same period 2016.
[19] Source: Thomson Reuters.

## Contagion risk: yellow

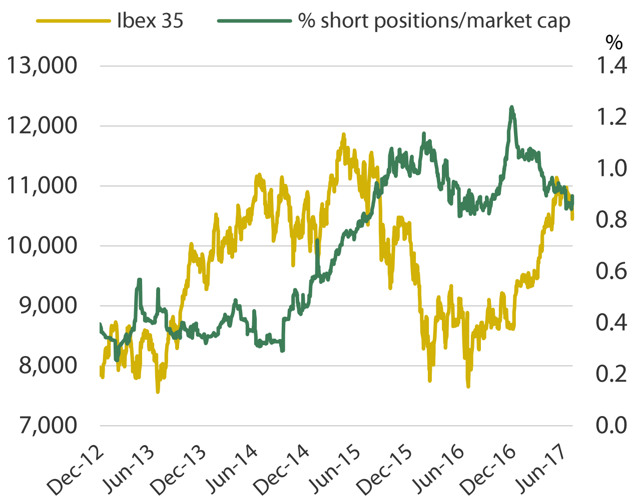
- The median correlation between the prices of different Spanish financial asset classes during Q1 2017 was at its lowest since 2009[20] (figure 29). In general, lower correlation allows greater diversification and helps reduce contagion risk between asset classes.

- Figure 30 shows how the correlation between yields on Spanish public sector debt and those of the wider zone periphery rose considerably in Q2 to become higher than the correlation between *bono* yields and yields on core European benchmark bonds. However, the picture varied for different core countries: correlations of Spanish sovereign yields with French and Belgian debt rose but its correlation to German sovereign debt tended to reduce. This pattern is partly explained by the reduction in political uncertainty across the EU following recent elections.

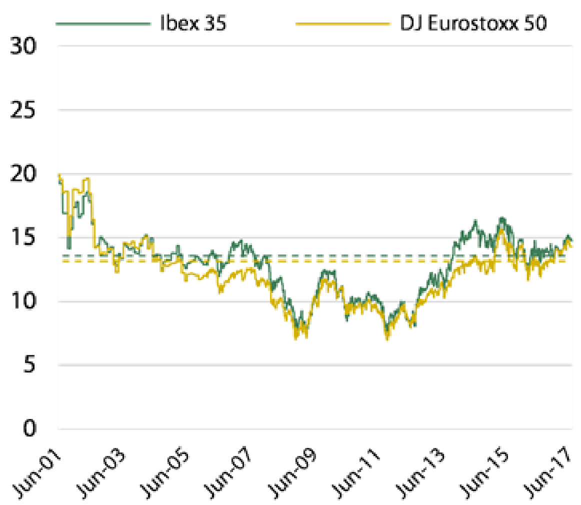
[20] As from 7 June 2017 yields calculated do not include the CDS on Banco Popular's 5-year senior debt in the corresponding asset class.

## Market risk: yellow

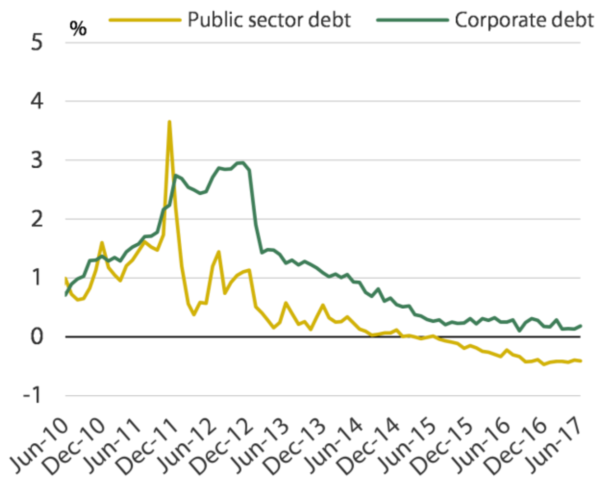
### Figure 3: Short selling



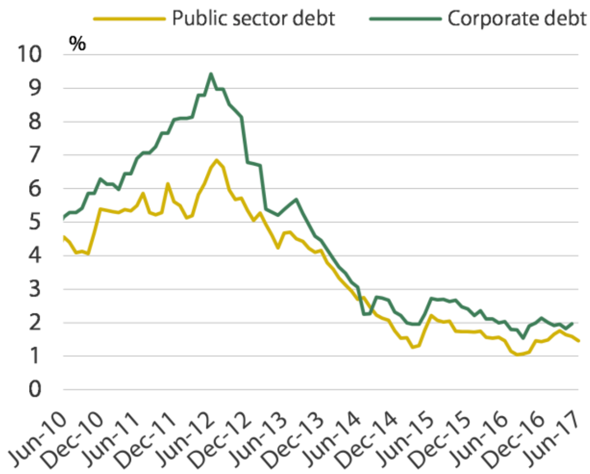

### Figure 4: Price earnings ratio (P/E)




### Figure 5: Short-term interest rates (3m)

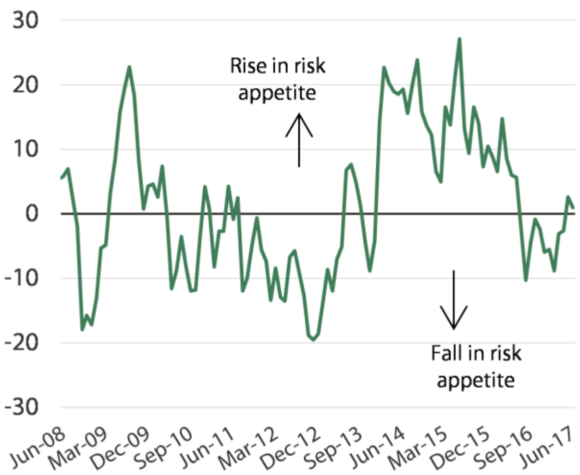



### Figure 6: Long-term interest rates (10Y)



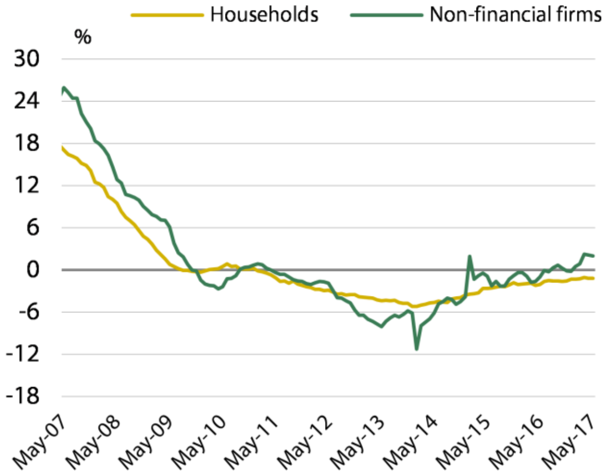

### Figure 7: Oil price


### Figure 8: Risk appetite (State Street)

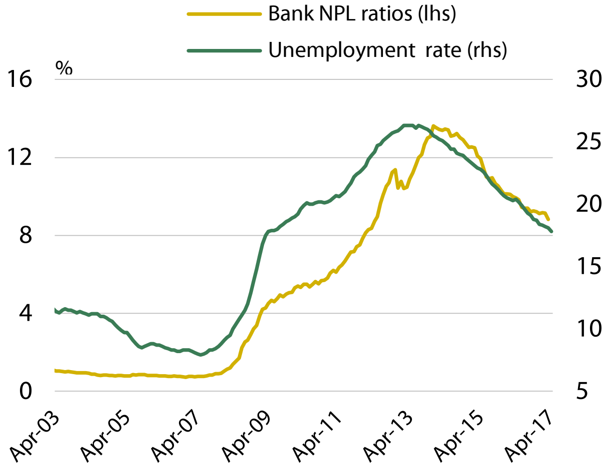


## Credit risk: green

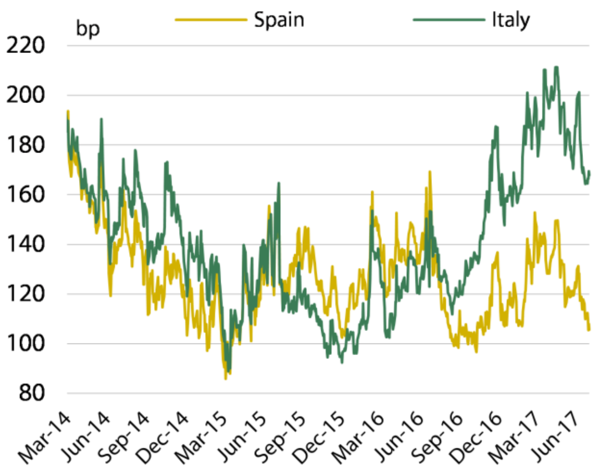
### Figure 9: Financing of non-financial sector



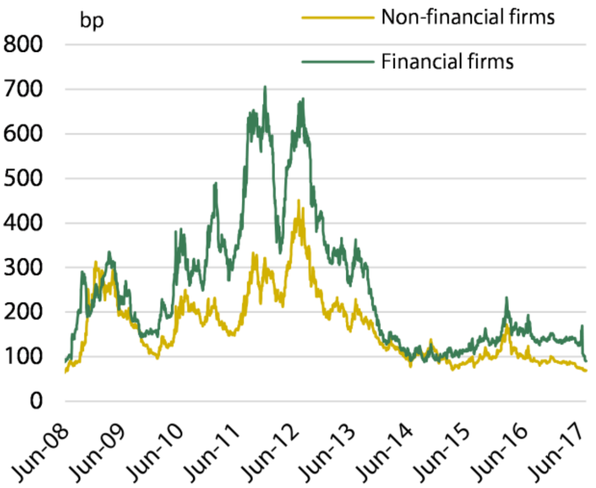

### Figure 10: NPLs and unemployment



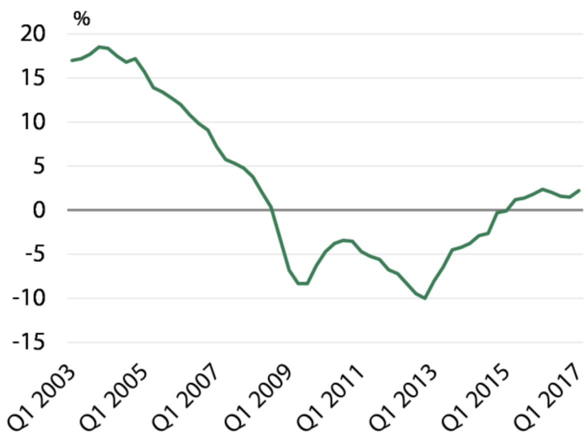

### Figure 11: Risk premium on 10Y sovereign debt (spread to German yields)



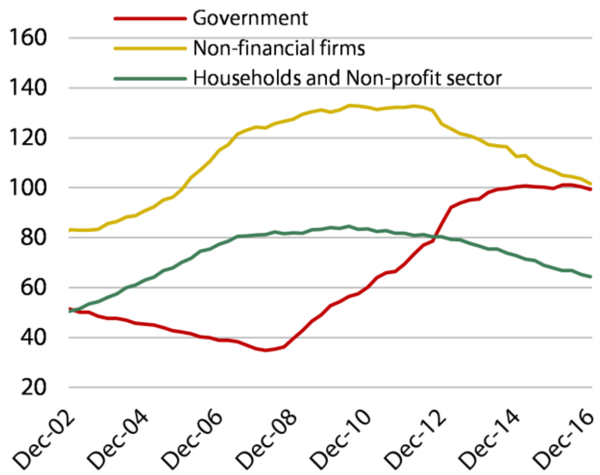

### Figure 12: Risk premium on private debt (5Y CDS)




### Figure 13: Residential prices (year-on-year change)

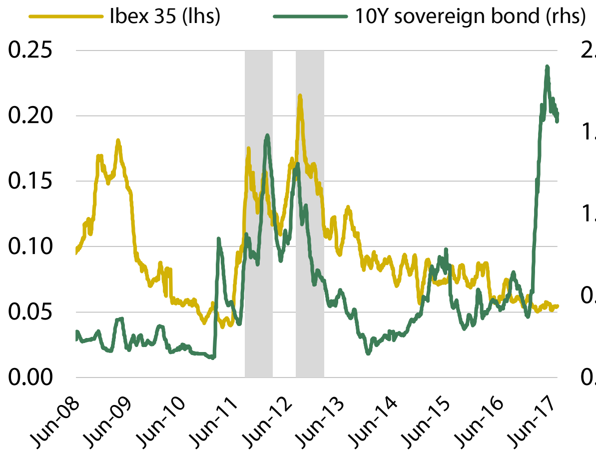



### Figure 14: Borrowing (% GDP)



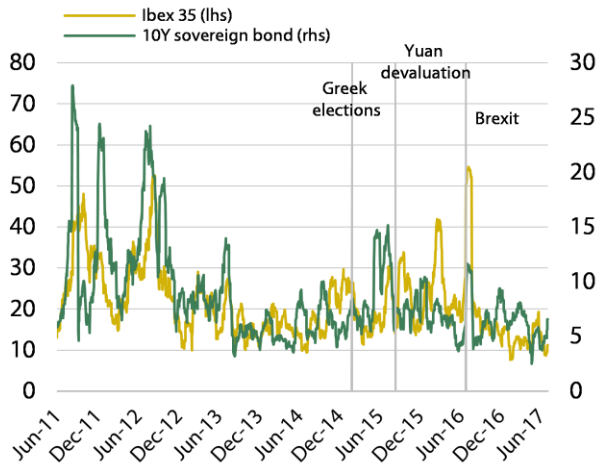
## Liquidity, financing and fragmentation risk: yellow

### Figure 15: Liquidity (bid-ask spread, %)

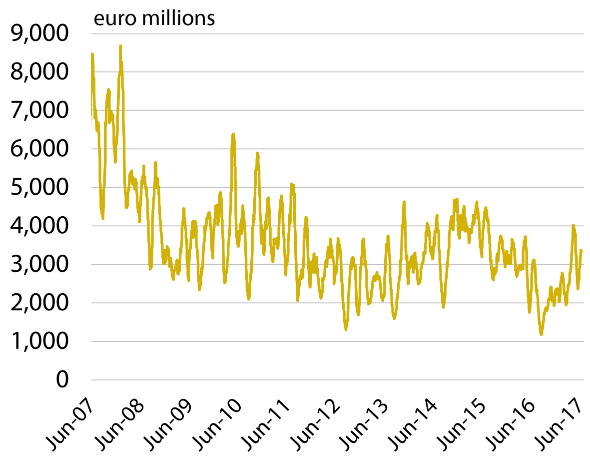



The shaded area shows periods when short-selling was banned.

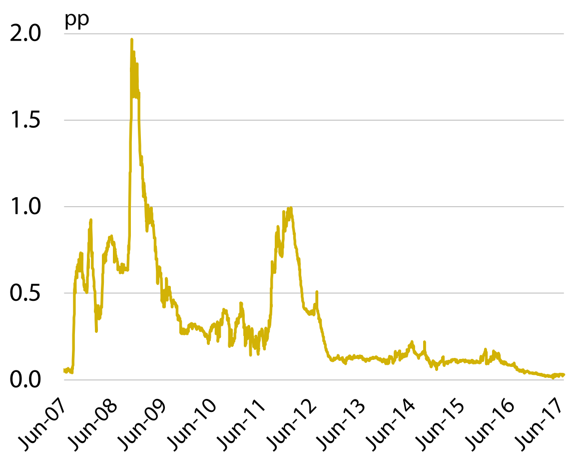
### Figure 16: Volatility (1m moving average)



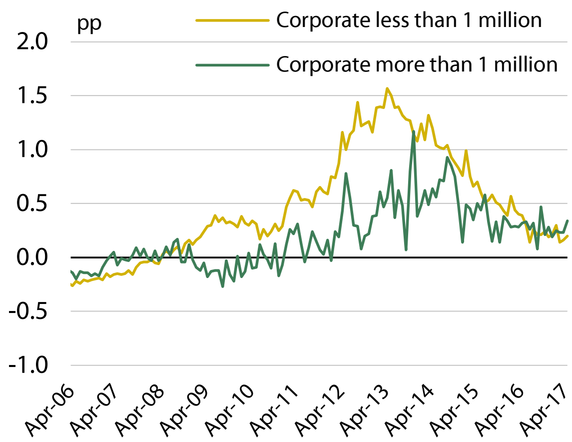

### Figure 17: SIBE trading (1m moving average)



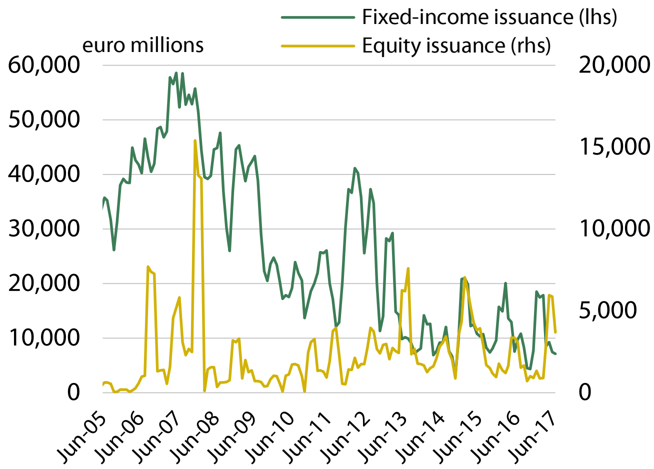

### Figure 18: Interbank spread (LIBOR-OIS)




### Figure 19: Spain-EU spread on corporate credit rates

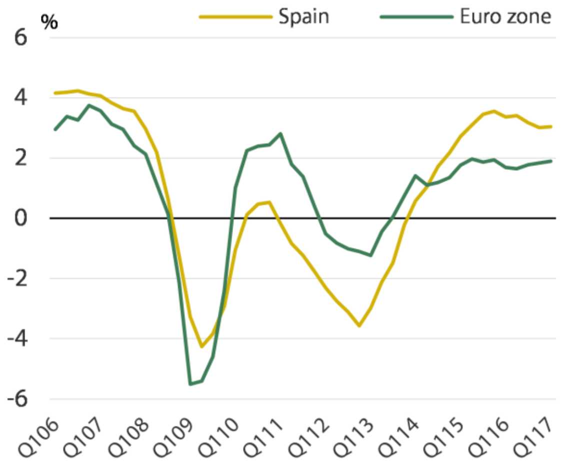



### Figure 20: Issuance (3m moving average)

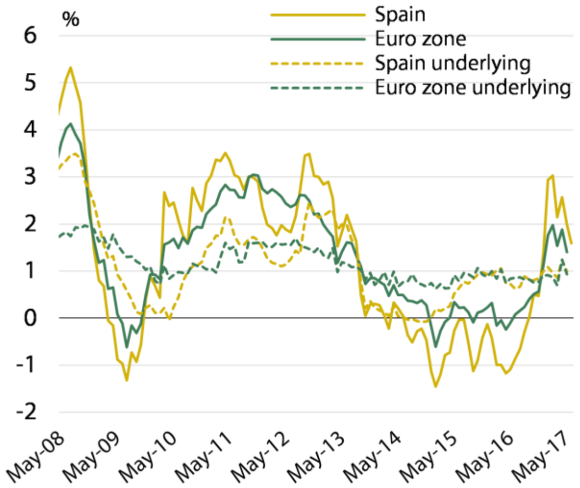


## Macro-Economic Risk: orange

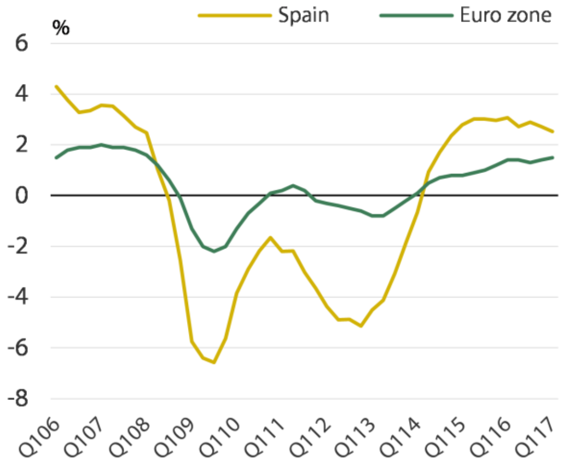
### Figure 21: GDP (year-on-year change)



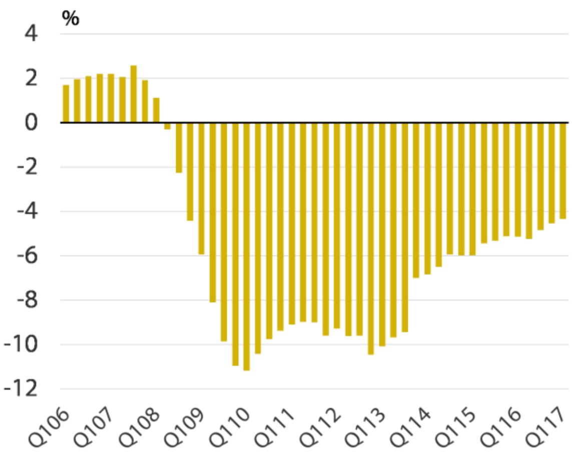

### Figure 22: HICP and underlying CPI (year-on-year change)




### Figure 23: Employment (year-on-year change)

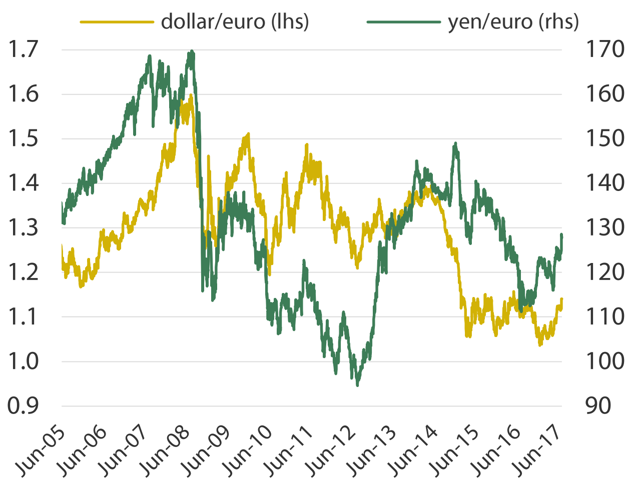



### Figure 24: Public sector budget (% GDP)

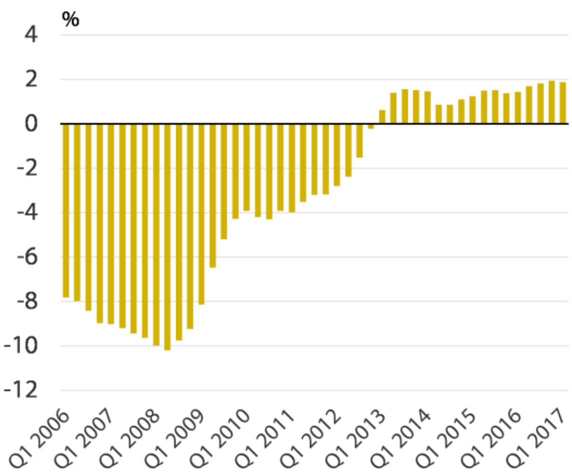



Cumulative 4-quarter data.

### Figure 25: Exchange rates

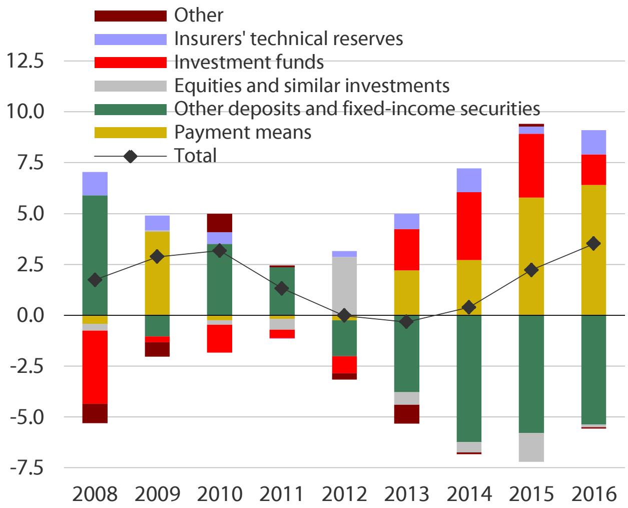



### Figure 26: Current account balance (% GDP)



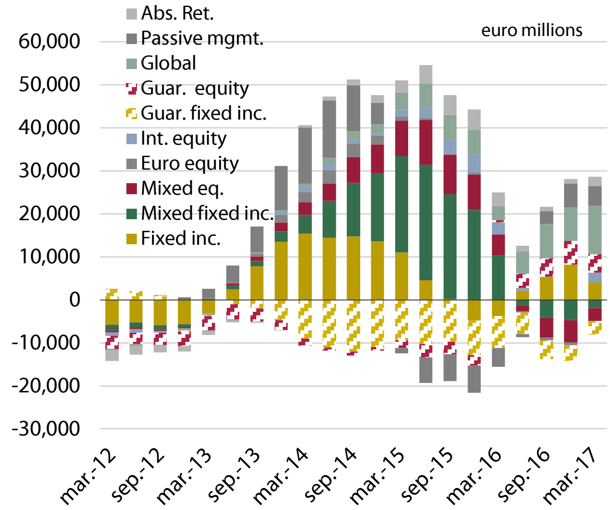
## Investors

### Figure 27: Households: net acquisition of financial assets (% GDP)




Cumulative 4-quarter data.

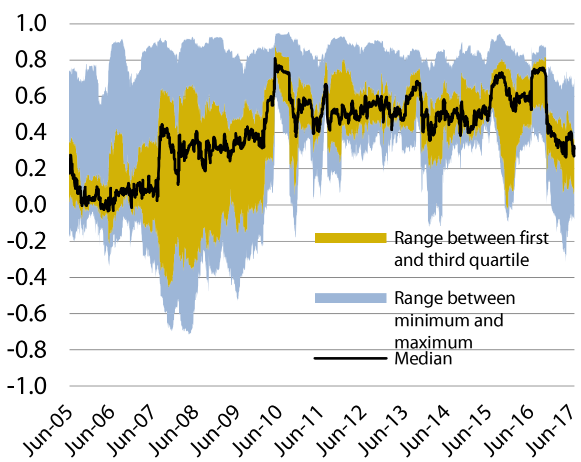
### Figure 28: Net subscriptions to funds



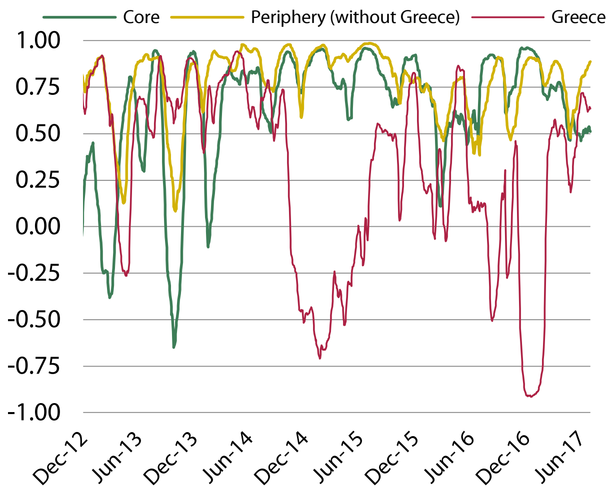

Cumulative 4-quarter data (EUR millions).

## Contagion risk: yellow

### Figure 29: Correlations between asset classes

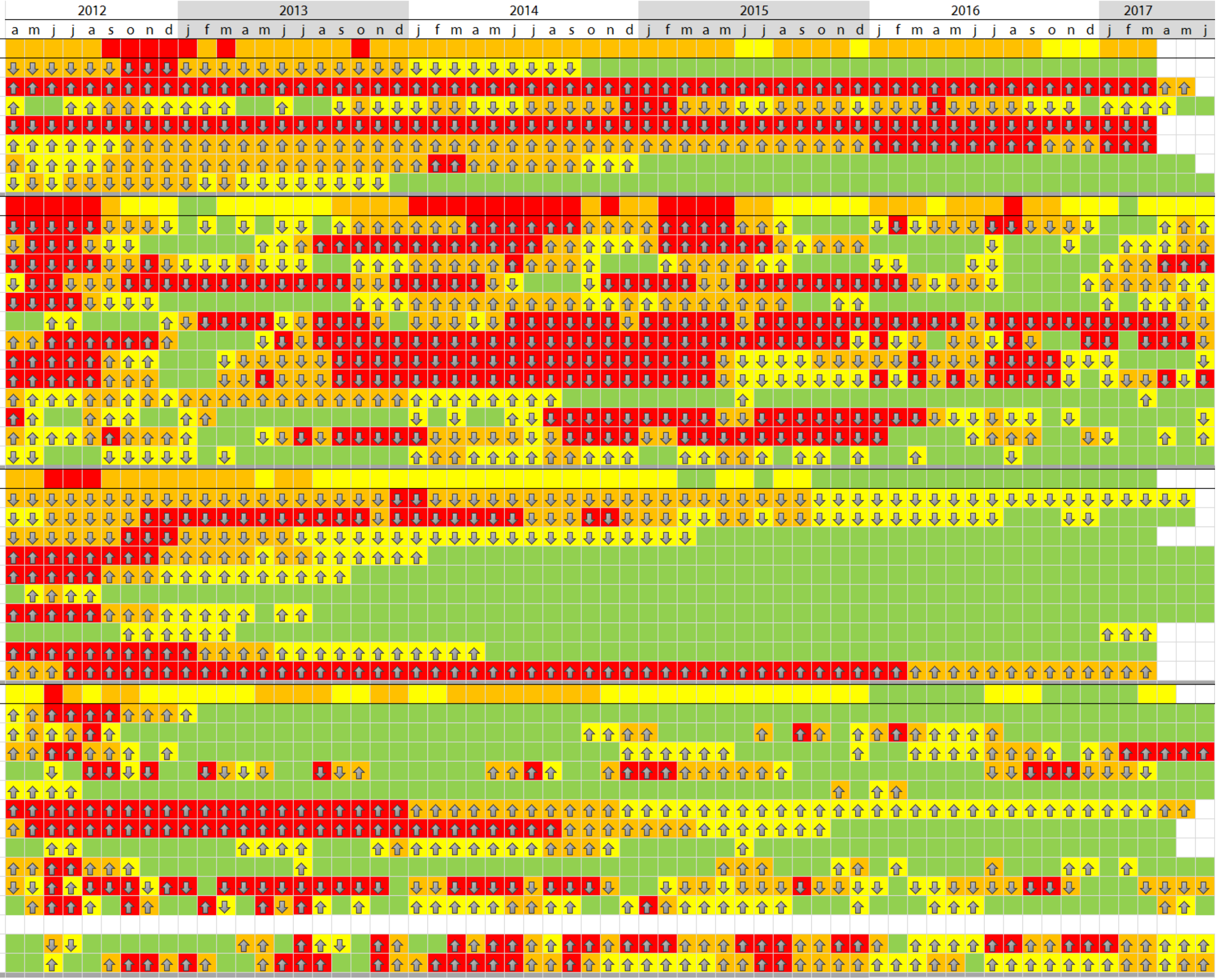



### Figure 30: Correlation between yields on the Spanish and other European 10Y bonds



# Heat map: risk categories

| | INDICADOR | Reference intervals[1] |
|---|---|---|
| MACRO RISK | **Macroeconomic risk** | |
| | GDP (% a.c.) | fixed_1t |
| | Unemp. rate (% active population) | fixed_1t |
| | CPI (% a.c.) | fixed_2t |
| | Public deficit (% GDP) | fixed_1t |
| | Public debt (% GDP) | fixed_1t |
| | Competitiveness indicator | fixed_2t |
| | Economic sentiment indicator | fixed_1t |
| MARKET RISK | **Market risk** | |
| | Ibex 35 | p_3Y_2t |
| | Medium Caps Index | p_3Y_2t |
| | Small Caps Index | p_3Y_2t |
| | FTSE Latibex All-Share Index | p_3Y_2t |
| | P/E ratio Ibex 35 | p_h_2t |
| | ST interest rate 3m public debt (%) | p_3Y_2t |
| | Interest rate 3m commercial paper (%) | p_3Y_2t |
| | LT interest rate 10Y public debt (%) | p_3Y_2t |
| | LT 10Y private fixed-income interest rate (%) | p_3Y_2t |
| | Steepness of 10Y-1Y curve (bp) | fixed_1t |
| | Oil price (US$/barrel) | p_3Y_2t |
| | Gold price (US$, 31/12/1969 = 100) | p_3Y_2t |
| | Risk aversion indicator | fixed_2t |
| CREDIT RISK | **Credit risk** | |
| | Lending - households (% a.c.) | fixed_2t |
| | Lending non-financial companies (% a.c.) | fixed_2t |
| | Property prices (% a.c.) | fixed_2t |
| | Risk premium sovereign debt bond (bp) | fixed_1t |
| | CDS sovereign debt bond (bp) | fixed_1t |
| | CDS non-financial sector (bp) | fixed_1t |
| | CDS financial sector (bp) | fixed_1t |
| | Changes standards credit supply (%) | fixed_2t |
| | Credit/deposits ratio | fixed_2t |
| | NPL ratio (%) | fixed_1t |
| RIESGO DE LIQUIDEZ, FINANCIACIÓN Y FRAGMENTACIÓN | **Liquidity, financing and fragmentation risk** | |
| | *Bid-ask spread* Ibex 35 (%) | p_3Y_1t |
| | Volatility Ibex 35 (%) | p_3Y_1t |
| | Liquidity - LT public debt (%) | p_3Y_2t |
| | Trading SIBE (daily average, € m) | p_3Y_1t |
| | Interbank spread (LIBOR-OIS) 3m (bp) | fixed_1t |
| | Lending from the Eurosystem (€ m) | fixed_1t |
| | Spread Int. Rt. Bus. Cred. Sp-EMU <1 million (%) | fixed_1t |
| | Spread Int. Rt. Bus. Cred. Sp-EMU >1 million (%) | p_3Y_1t |
| | Volatility public debt price (%) | p_h_2t |
| | Gross fixed-income issues (€ m) | p_h_2t |
| | Equity issues (€ m) | p_3Y_2t |
| | Correlation int. rate 10Y public debt bond | corr_3m_2t |
| | With core euro bonds: Ger, Fr, Holl, Bel | corr_3m_2t |
| | With periphery euro bonds: Ita, Por, Gre, Ire | corr_3m_2t |




(1) Reference intervals can be: (i) "fixed": predetermined numerical thresholds, one- (1t) or two-tailed (2t); (ii) "corr_3m": 3-month windows correlation coefficients; (iii) "p_3Y": percentiles obtained from distribution over 3 past years, one- (1t) or two-tailed (2t); or (iv) "p_h": percentiles obtained from historical distribution. Source: CNMV, Bloomberg and Thomson Reuters Datastream.

## Explanatory notes

**Spanish financial markets stress indicator (figure 1):** The stress indicator provides a real-time measure of systemic risk to the Spanish financial system in a range between zero and one. It works by evaluating the level of stress in six segments of the financial system (equities, fixed income, financial intermediaries, money markets, derivatives and the forex market) and aggregates the results into a single figure. Stress in each segment is gauged using cumulative distribution functions and the subsequent aggregation is adjusted to allow for cross-segment correlations, so that the indicator gives greater weight to stress situations where correlations are high. The stress variables used for each segment (three in each) are typically volatilities, risk premiums, liquidity indicators and sharp falls in value. These accurately represent the characteristics of market stress. Econometric estimates suggest that indicator values below 0.27 correspond to periods of low stress in the financial system, while values between 0.27 and 0.49 correspond to intermediate stress periods and anything above 0.49 indicates high stress. The methodology used follows that proposed in Holló, Kremer and Lo Duca's 2012 study of a similar indicator for the euro zone. For further details on recent movements in this indicator and is components see CNMV statistical series (Market stress indicators), at www.cnmv.es/portal/Menu/Publicaciones-Estadisticas-Investigacion. For further information on the methodology used to compile the indicator see Cambón M.I. and Estévez, L. (2016) A Spanish Financial Market Stress Index (FMSI). Spanish Review of Financial Economics 14 (January (1)), 23-41 or CNMV Working Document no. 60 (www.cnmv.es/portal/Publicaciones/monografias).

**Heat map: summary by market and risk category (figure 2 and final appendix).** The heat maps included in this report show the monthly change in the indicators most relevant to the Spanish financial system over recent years. They contain information on Spain's securities markets, banking sector and some macro-economic indicators. The purpose of such maps is to show where the indicators are compared to their recent history (usually the last three years) or with respect to pre-set limits. This is represented by different colours. The change in an indicator from green to hotter colours (orange or red) does not necessarily indicate a risk, but rather a movement toward an extreme value (very high or very low) for the period measured or relative to the benchmark range of values. If an indicator remains at an extreme value for a prolonged period it may suggest more detailed analysis is needed, i.e. it can be taken as a warning sign. The bigger heat map (see page 13) includes 43 indicators[21], of which five are calculated by the CNMV. The multitude of indicators included makes it possible to analyse vulnerabilities by each segment of the financial markets (equities, fixed income, banking, etc.) or risk category (macro, market, liquidity, credit, etc.) as shown in figure 2. The colour of each aggregate (market or risk category) is based on a weighted average of the values of its component indicators. In each aggregate, one of its individual component colours determines its general colour: for instance in macro-economic risk, the aggregate is determined by GDP and remains blank on the heat map until the GDP figures are released. For further details on the methodology and analysis of these maps see the article

[21] Starting in June 2017 the heat map includes an additional indicator: the bid-ask spread on the 10-year sovereign bond (*bono*).

"Identification of vulnerabilities in the Spanish financial system: an application of heat maps", in the CNMV Quarterly Bulletin for Q1 2015.

**Short positions (figure 3):** Data for aggregate net short positions is the sum, at the reference date, of individual declared positions of at least 0.5% plus the total of positions of between 0.2% and 0.5%. The series only includes positions that had been declared at the date in question and are not recalculated to take account of any subsequent changes or exceptional inclusions of notifications prior to each calculation date.

**Contagion risk:** the indicators making up this block are somewhat more complex. We explain the most important indicators below:

- Correlation between asset classes (figure 29). Correlations between the asset pairs are calculated using daily data in three-month windows. There are six asset classes: sovereign debt, financial firms' corporate debt, non-financial firms' corporate debt and Ibex 35 stocks of financial firms, utilities and other sectors. A high correlation between the various Spanish asset classes would suggest gregarious behaviour by investors. This could tend to increase volatility during periods of stress. It would also mean reduced benefits from diversification as, in these circumstances, it would be harder to escape exposure to sources of systemic risk.

- Correlation between yields on the Spanish *bono* and other European 10Y bonds (figure 30). The correlation is calculated using daily data in three-month windows. Core countries are Germany, France, the Netherlands and Belgium. Peripheral countries are Portugal, Italy, Greece and Ireland.