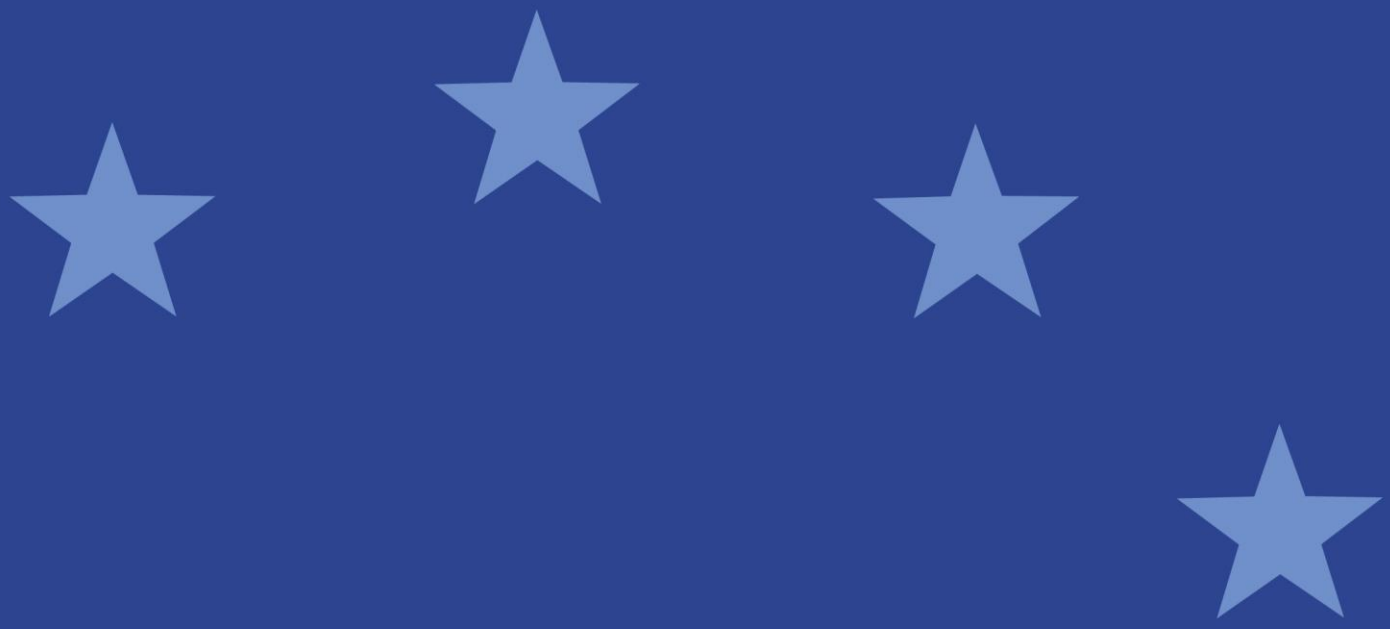
Trends
Risks
Vulnerabilities

No. 1, 2014



12 March 2014 | ESMA/2014/188

ESMA Report on Trends, Risks and Vulnerabilities, No. 1, 2014

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 The reporting period of this Report is 01 July 2013 to 31 December 2013, unless indicated otherwise. The reporting quarter of the Risk Dashboard in the Risk Section is 4Q13. Legal reference of this Report: Regulation (EU) No 1095/2010 of the European Parliament and of the Council of 24 November 2010 establishing a European Supervisory Authority (European Securities and Markets Authority), amending Decision No 716/2009/EC and repealing Commission Decision 2009/77/EC, Article 32 "Assessment of market developments", 1. "The Authority shall monitor and assess market developments in the area of its competence and, where necessary, inform the European Supervisory Authority (European Banking Authority), and the European Supervisory Authority (European Insurance and Occupational Pensions Authority), the ESRB and the European Parliament, the Council and the Commission about the relevant micro-prudential trends, potential risks and vulnerabilities. The Authority shall include in its assessments an economic analysis of the markets in which financial market participants operate, and an assessment of the impact of potential market developments on such financial market participants." The charts and analyses in this report are, fully or in parts, based on data not proprietary to ESMA, including from commercial data providers and public authorities. ESMA uses these data in good faith and does not take responsibility for their accuracy or completeness. ESMA is committed to constantly improving its data sources and reserves the right to alter data sources at any time. The shaded area in all charts indicates the reporting period of this report.

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List of abbreviations

ABS	Asset-Backed Securities
AuM	Assets under Management
AVG	Average
BF	Bond fund
BPS	Basis points
CAP	Cumulative Accuracy Profile
CCP	Central Counterparty
CDO	Collateralised Debt Obligation
CDS	Credit Default Swap
CEREP	ESMA Central Rating Repository
CRA	Credit Rating Agency
CSD	Central Securities Depository
DTCC	Depository Trust & Clearing Corporation
EA	Euro Area
EBA	European Banking Authority
ECB	European Central Bank
EF	Equity fund
EFAMA	European Fund and Asset Management Association
EIOPA	European Insurance and Occupational Pensions Authority
EM	Emerging market
EMIR	European Market Infrastructure Regulation
EOB	Electronic Order Book
EONIA	Euro Overnight Index Average
ESMA	European Securities and Markets Authority
ETF	Exchange Traded Fund
EU	European Union
FMI	Financial market intermediary
FRA	Forward Rate Agreement
HFT	High Frequency Trading
HY	High Yield
ICSD	International Central Securities Depository
IMF	International Monetary Fund
IPO	Initial Public Offering
IRS	Interest Rate Swap
LTRO	Long-Term Refinancing Operation
MA	Moving Average
MBS	Mortgage-Backed Securities
MMF	Money Market Funds
MS	EU Member State
MTN	Medium Term Note
NAV	Net Asset Value
NCA	National Competent Authority
OIS	Overnight Index Swap
OMT	Outright Monetary Transactions
OTC	Over the Counter
RMBS	Residential Mortgage-Backed Securities
SCDS	Sovereign Credit Default Swap
SF	Structured Finance
UCITS	Undertaking for Collective Investment in Transferable Securities
VaR	Value at Risk
YTD	Year to Date

Countries abbreviated according to ISO standards
Currencies abbreviated according to ISO standards

Executive summary

Trends

Securities markets: Conditions in EU securities markets improved in 2H13, bolstered by a combination of macroeconomic prospects in many EU economies and ongoing liquidity support measures from central banks. Temporary spikes in market uncertainty stemmed mainly from speculation over the future of central bank support and the budget standoff in the US. EU equity markets performed strongly. Distressed sovereign bond markets and lower-rated corporate bonds experienced a downward trend in spreads, yields and volatility. For sovereign bonds, this reflected an easing of tensions over EU sovereigns, whereas for corporate bonds the trend was associated with a shift in risk assessments and a continued search-for-yield by investors. Issuance was strong for equity whilst subdued for sovereign and investment-grade corporate debt markets. Across a broad range of markets at global level, sensitivities prevailed during the reporting period – and have been further fuelled since – especially surrounding the global economic outlook and EM economic and financial market risks.

Investors: In 2H13 EU fund flows remained moderately positive, although the low interest rate environment continued to weigh on fixed-income assets, and also for funds invested in EM. This was especially the case for bond funds, which experienced sizeable outflows. EU equity funds received inflows for several quarters, in line with the favourable development in stock markets. EU MMFs managed to reduce the pace of withdrawals, potentially supported by reduced uncertainty over sovereigns and banks in which MMFs invest. Alternative funds continued to attract capital inflows in 2H13 and generated positive returns, also by using significant leverage.

Market infrastructures: Activity on EU trading venues was in line with 1H13. At the global level, the share of interest rate swaps centrally cleared increased somewhat. The continuity of key financial benchmarks in the EU remains a major concern for ESMA, even though the withdrawal of banks from interbank interest reference rate panels was largely halted during the reporting period.

Risks

Main risks: Sources

Risk	Change since 3Q13
Risks in EU sovereign debt markets	→
Market clustering	→
Funding risk	→
Valuation risk	↗
Market functioning	↗

Note: Assessment of main risk sources for markets under ESMA remit, change since the last assessment. Upward arrows indicate an increase in the contribution to risks, downward arrows a decrease.

Main risks: Categories

Risk category	Change since 3Q13	Outlook for 1Q14	Systemic risk
Liquidity risk	→	→	●
Market risk	→	→	●
Contagion risk	→	→	●
Credit risk	→	→	●

Note: Assessment of main risk categories for markets under ESMA remit since past quarter, and outlook for current quarter. Systemic risk assessment based on categorisation of the ESA Joint Committee. Colours indicate current risk intensity. Coding: green=low, yellow=moderate, orange=high, red=very high. Upward arrows indicate a risk increase, downward arrows a risk decrease.

Systemic stress: Risks in EU financial markets eased during 4Q13 due to a combination of improved macroeconomic conditions in some EU economies, leading to lower tensions in EU sovereign debt markets, and ongoing liquidity support and monetary policy measures. Although risks were below those observed in the more acute phases of the crisis, they were still at high levels, as evidenced in early 2014 by the rapid propagation of instability from EM countries to EU markets. The high correlation between EU and EM bond yields suggest that EU markets are increasingly exposed to contagion risks related to global confidence effects.

Liquidity risk: The signals on liquidity risk in 4Q13 were mixed. While volatility in equity and bond markets decreased further, heterogeneity across regions and market segments remained. Overall, liquidity risk developments should be treated with caution as liquidity support measures remain in place and shifts in yield curves could significantly alter liquidity risks.

Market risk: Market risk, although still high, stabilised in 4Q13. However, signals were mixed. Equity valuations rose in the EU and the US. In the EU, PE ratios remained well below their long-term average, whereas in the US they remained above their long-term average, pointing to future valuation risks. Corporate bond spreads in lower-rated bonds continued to decline, potentially reflecting a shift in risk assessment and

continued search-for-yield behaviour. Fund flows were volatile in the US, and bond market outflows continued in the US and EM areas.

Contagion risk: The level of contagion risk in sovereign debt markets remained broadly stable, concentrated in the most vulnerable group of MS. Nevertheless, the downward trend in volumes and spreads on the CDS market came to an end. After a period of strong co-movement between EU sovereigns, the clustering of core and peripheral countries increased.

Credit risk: Credit risk has remained broadly unchanged. Although debt issuance was globally subdued, sovereigns and corporates were able to issue debt with longer maturities. Banks continued to wind down their wholesale funding needs in an orderly fashion, but a substantial proportion of debt outstanding has to be rolled over in coming quarters. As the improvement in conditions relies partly on accommodating monetary policy measures, a rise in the interest rate could eventually trigger an increase in credit risk, especially in vulnerable countries.

Vulnerabilities

High-frequency trading activity in EU equity markets: This article sheds further light on HFT on EU equity markets using unique data collected by ESMA, based on a sample of 100 stocks traded from nine EU countries. Overall, HFT is found to account for around 22% of value traded and 60% of orders in the EU. Empirical estimates show that HFT activity is positively related to traded volumes and fragmentation and negatively to volatility.

Structural vulnerabilities stemming from the low interest rate environment: A prolonged phase of low interest rates may generate valuation risk through distorted pricing and increase liquidity and funding risk due to lower profitabilities and changes in risk attitudes. On the other hand, rapid exit strategies may go along with increased valuation, funding and credit risks, driven mainly by volatile portfolio adjustments and unguided market expectations. Coordinated and gradual adjustments heighten credit risk by constraining future income streams. For all exit types the withdrawal of indirect subsidies to particular markets weakens the business models of the institutions affected and implies revaluation, liquidity and counterparty risks.

EU Central Securities Depositories – Systemic considerations: This article concerns itself with CSDs in the EU and systemic considerations arising from the services they provide, their links and industrial organisation. The links among FMIs tend to form dynamically and can result in changeable, complex and extensive interdependencies. Indeed, this holds true for FMIs' links with the wider financial sector. This may support efficiency and financial stability in normal times, for example by promoting financial market integration and diversification. Subsequent rearrangements in business structures, however, can lead to a redistribution of risks and possibly change their nature, with potential implications for resilience and shock-propagation in times of crisis.

The CRA industry's market and performance – What evidence from ESMA's Central Repository? This article analyses trends and developments in the credit rating industry, beginning with the data that Credit Rating Agencies (CRAs) submit to ESMA's Central Rating Repository (CEREP). It provides an overview of the market, focusing on its level of concentration and how different competitive structures are emerging in connection with different classes of credit ratings. It also highlights whether and how the financial crisis has had an impact on the CRA industry and the structure of CRAs' credit rating portfolios. Since the credit rating assigned to financial instruments by CRAs is an important factor in investors' portfolio management, we also look at the performance of these ratings, including a comparison by asset class and period of observation.

Stress-testing of investment portfolios: Since the onset of the financial crisis, stress testing has become an integral part of the risk management of investment portfolios. It is viewed as a complementary tool to some of the more standard risk metrics such as volatility and VaR. A stress testing programme that has the input and buy-in not only of an investment company's risk management team but also its portfolio managers and senior management is the one most likely to better position its portfolios for major market events.

Trends
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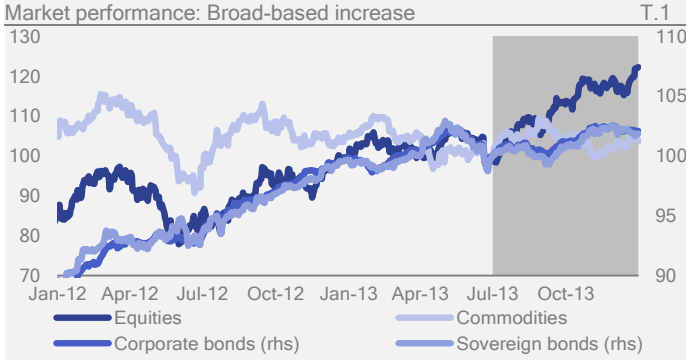
Securities markets

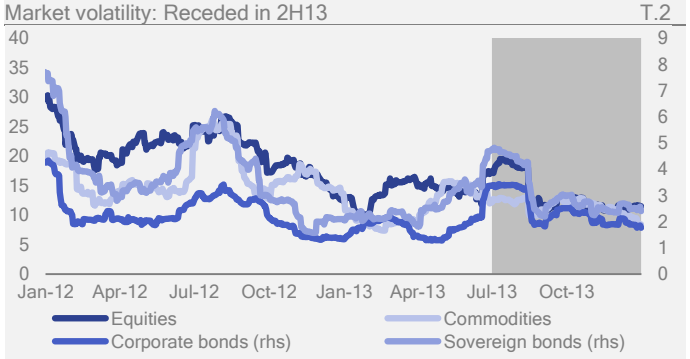
Market overview

Market performance: Broad-based increase T.1



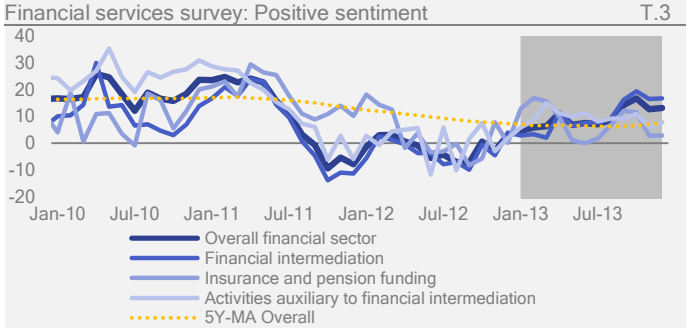
Note: Return indices on EU equitie (Datastream regional index), global commodities (S&P GSCI), EA corporate and sovereign bonds (Iboxx Euro, all maturities). 1/7/2013=100.
Sources:Thomson Reuters Eikon, Datastream ,ESMA.

Market volatility: Receded in 2H13 T.2



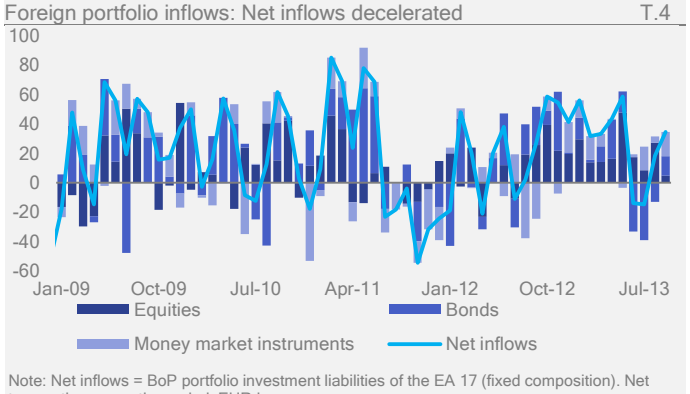
Note: 40D volatility of return indices on EU equities (Datastream regional index), global commodities (S&P GSCI), EA corporate and sovereign bonds (Iboxx Euro all maturities), in %.
Sources: Thomson Reuters Eikon, Datastream, ESMA.

Financial services survey: Positive sentiment T.3



Note: EC survey of EU financial services sector and subsectors (NACE Rev.2 64, 65, 66). Confidence indicators are averages of net balance of responses to questions on development of the business situation over the past three months, evolution of demand over the past three months and expectation of demand over the next three months, in % of answers received.
Sources: European Commission, ESMA.

Foreign portfolio inflows: Net inflows decelerated T.4



Note: Net inflows = BoP portfolio investment liabilities of the EA 17 (fixed composition). Net transactions over the period, EUR bn.
Sources: ECB, ESMA.

Securities markets performed positively in 2H13, as reflected in the steep increase in the EU equity index. Market volatility decreased after a peak at the beginning of the reporting period. Sentiment in the financial services sector remained favourable in 2H13, although market participants were less optimistic about their business situation than in 1H13. With regard to the direction of short term capital flows, net inflows decelerated over the period, while net outflows were positive and stable until starting to decrease slightly in 2Q13. Finally, spread compression increased across markets, reflecting both structural and cyclical factors.

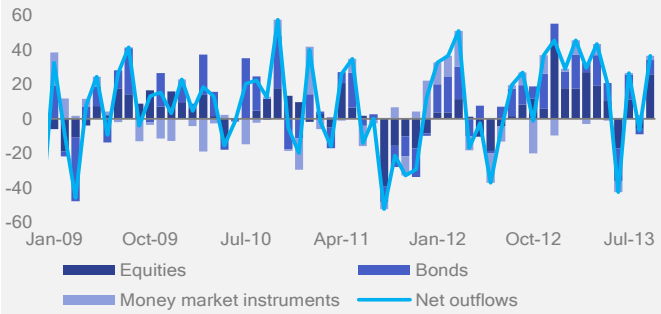
Market performance: EU equity markets performed strongly in 2H13 and were consistently above their five-year average, outperforming both US and Japanese equity markets. Sovereign and corporate bonds also performed strongly during the second half of the year, albeit to a lesser extent. Commodity prices declined slightly compared to the beginning of the reporting period. After a peak in July and August, precious metal prices (which drive the overall index) receded, following a shift in investor expectations on the monetary policy stance in the US.

Market volatility: After a peak at the beginning of 2H13 in most markets, possibly reflecting US debt ceiling concerns, volatility on EU equity markets eased and stood at five-year average, significantly below the levels reached during earlier episodes of market stress. Corporate and sovereign bonds followed a similar pattern, although volatility remains consistently lower by nature. Overall commodity price volatility remained broadly at the same level, below 20%, as per the end of 1H13, with precious metal prices more erratic than energy or agricultural prices.

Market sentiment: Financial services sector confidence improved in 2013 and remained robust into year-end. However, for activities auxiliary to financial intermediation the net balance of respondents saying their business situation had improved over the past three months declined to around 7% at the end of 2013, the lowest to a moderate level relative to recent years, below its percentage since January. Demand for financial services followed a similar trend, rising through the year but easing somewhat towards year-end. A slight majority of survey participants nonetheless indicated that they expected demand to continue increasing in early 2014.

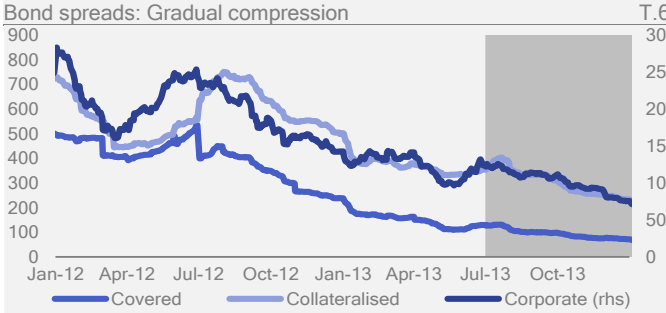
Foreign portfolio flows: Net foreign portfolio capital inflows were positive in September 2013, at EUR 35bn, up from EUR 19bn in the previous month and contrasting with the negative EUR -15bn net inflows in July 2013. In terms of composition over the three-month period, inflows into EA bond markets were positive only in September, compared with EUR -14bn in August and EUR -39bn in July, with positive net inflows into equity and money markets. The total over 3Q13 amounts to EUR 38bn, lower than the EUR 88bn net inflow during 2Q13. The decline in net inflows into European markets since June 2013 follows a nine-month period of high net inflows, reflecting disengagement from EA bonds by

Foreign portfolio outflows: Erratic from 3Q13 T.5



Note: BoP portfolio investment assets of the EA 17 (fixed composition). Net transactions over the period, EUR bn.
Sources: ECB, ESMA.

Bond spreads: Gradual compression T.6



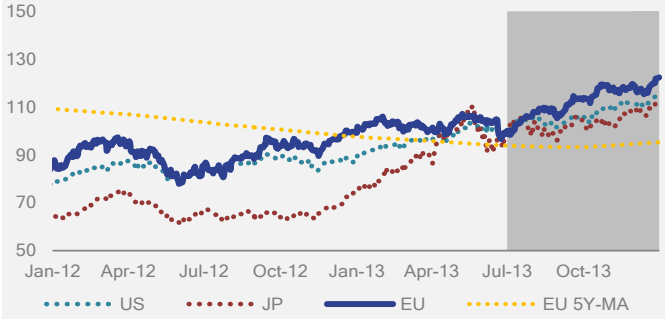
Note: Yield spread between higher and lower-graded Iboxx Euro bond indices, based on the availability and continuity of indices: AA minus BBB for corporate bonds, AAA minus A for covered bonds, AAA minus BBB for collateralised bonds other than covered bonds, in basis points.
Sources: Thomson Reuters Datastream, ESMA.

foreign investors and their reengagement in other markets, as well as valuation effects, with equities performing better than bonds over the period. Outflows were positive in September 2013, at EUR 37bn, following slightly negative outflows in August 2013. Breaking down the composition of these flows, we see that they have generally been positive and dominated by bonds and equities since the beginning of 2013. Summed over quarters, net outflows over 3Q13 stood at EUR 57bn, higher than the EUR 21bn outflows in 2Q13 but much lower than the levels seen during the first quarter of 2013 and the last of 2012.

Yield compression: Spreads between higher- and lower-graded EA non-sovereign bonds continued to narrow, reflecting sustained yield compression. This was because yields on lower-rated bonds fell while higher-rated bond yields remained broadly stable. This development mirrors trends in securitisation spreads and the flattening in the yield curve at the short-end of the money market since the middle of the year. Yield compression may reflect three distinct factors: first, structural improvements with rebalancing in several EA economies; second, cyclical developments with perceived improvements shifting risk perceptions and possibly resulting in risk repricing; finally, potential search-for-yield strategies in the current environment with portfolio reallocation to riskier investments.

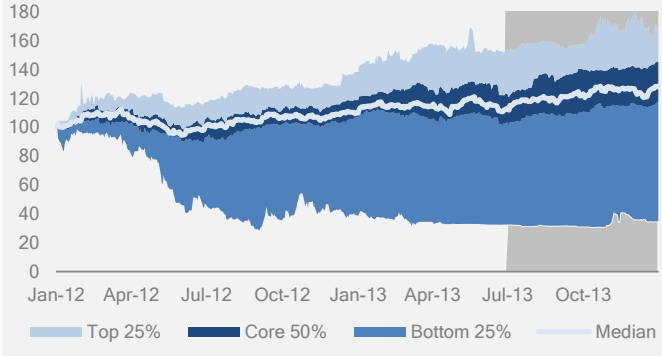
Equity markets

Prices: Rebound in EU equities T.7



Note: Datastream regional equity indices for the EU, the US and JP. 1/7/2013=100.
Sources: Thomson Reuters Datastream, ESMA..

Dispersion: Small increase T.8

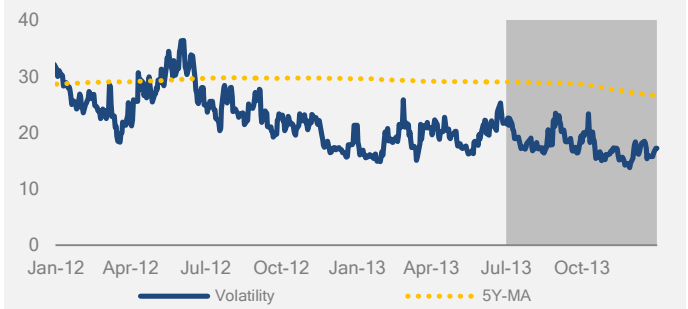


Note: Dispersion of the 27 main national equity indices, EU. Indexed, 01.01.2012=100.
Sources: Thomson Reuters Datastream, ESMA.

EU equity markets performed strongly in 2H13 and volatility declined slightly amid lower perceived pressure from the EU sovereign debt crisis. Equity price dispersion among EU national equity indices increased slightly. The EU equity index clearly outperformed its US and JP counterparts. Despite strong market performance, EU price-earnings ratios remained below their long-term average, whereas in the US they were above their long-term average. Liquidity in EU equity markets deteriorated slightly, with bid-ask spreads remaining at moderate levels. With regard to new listings, the number and value of IPOs increased in 2H13 due to high activity in 4Q13.

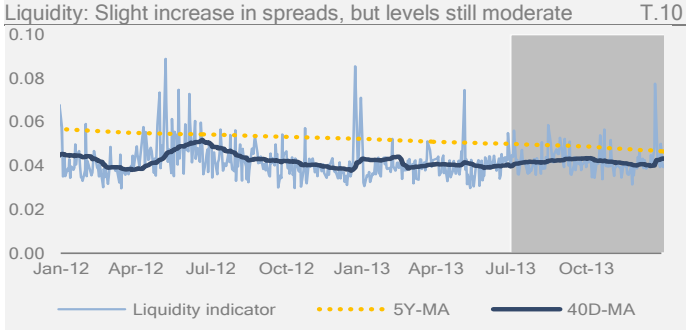
Performance: EU equity prices rose by 22% in 2H13 and were consistently above their five-year average. News on the economic environment was positive for some EU countries and perceived pressure from the EU sovereign debt crisis eased. EU equity market performance in 2H13 compared with a 15% gain in the US and a 13% gain in Japan. US debt ceiling concerns at the time could explain the weaker performance of the US compared to EU markets. While price-earnings ratios for European equities rose, they remained well below their long-term average. As the price-earnings measure is based on an EA stock index, this may mask heterogeneity in markets across the EA. This stood in contrast to the US, where price-earnings ratios remained above their long-term average.

Volatility: Slight decline T.9



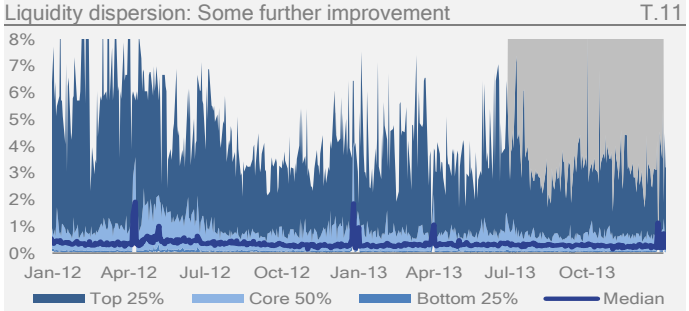
Note: Implied volatility of options on EURO STOXX 50, %.
Sources: Thomson Reuters Datastream, ESMA.

Liquidity: Slight increase in spreads, but levels still moderate T.10



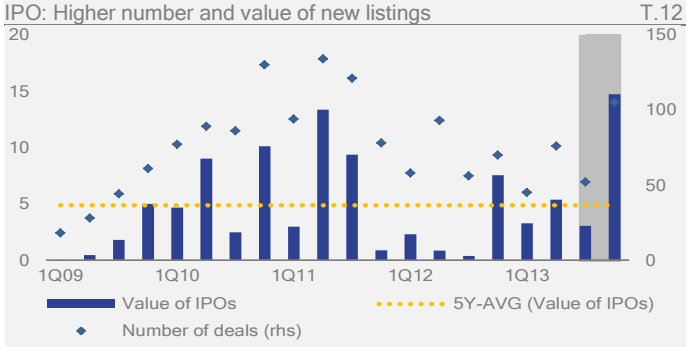
Note: Liquidity measured as median bid-ask spread, EU components of EURO STOXX 50, %.
Sources: Thomson Reuters Datastream, ESMA.

Liquidity dispersion: Some further improvement T.11



Note: Dispersion across EU countries of the national median percentage quote bid-ask spreads for the components of the main national index, %. Truncated at 8% for clarity purposes. No data for LV, LT, MT, SI and SK.
Sources: Thomson Reuters Datastream, ESMA.

IPO: Higher number and value of new listings T.12



Note: Offering value of IPOs, EUR bn.
Sources: PwC IPO Watch Europe, ESMA.

Price dispersion: Dispersion among EU national equity price indices increased slightly from already high levels. As in 1H13, the degree of dispersion reflects the differentiation in EU equity markets. In particular, price movements in the bottom quartile are decoupled from positive trends in most other national indices.

Volatility: Overall, option-implied equity volatility declined slightly from an average of 19.2% in 1H13 to an average of 17.9% in 2H13, remaining moderate relative to recent years and below its five-year average of 26.7%. However, there were two temporary spikes at the end of August and the beginning of October. The former reflected concerns over interventions in Syria, the latter concerns about the US debt ceiling at the time. In both cases, peak volatility remained below the levels reached during episodes of market stress before 2H13.

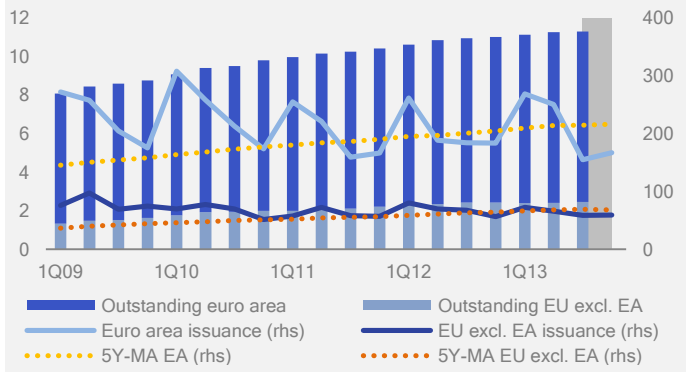
Liquidity: In 2H13 bid-ask spreads for stocks in the Eurostoxx 50 index widened slightly to 0.043%, up from 0.040% in 1H13. At this level, the median bid-ask spread remained below its five-year average of 0.047%. Regarding the volatility of bid-ask spreads, there were two temporary spikes in August and October 2013, when greater market volatility was reflected in higher bid-ask spreads. Spreads also remained substantially below the levels reached during previous periods of market stress.

Liquidity dispersion: In 2H13, there was some further reduction in liquidity dispersion between EU markets as liquidity improved in those markets featuring the lowest liquidity. Since liquidity dispersion in the core 50% markets remained stable, on average liquidity dispersion decreased. The group of countries displaying the lowest market liquidity remained unchanged on 1H13, suggesting that cross-country variation in liquidity is linked to structural characteristics of these markets.

New listings: The number and value of IPOs increased considerably in 2H13, when there were 157 issuances worth a total of EUR 17.8bn. This compares with 121 deals and a value of EUR 8.6bn in 1H13. In 3Q13, the overall IPO value was below the five-year average of EUR 4.3bn per quarter. However, IPO activity in Q3 tends to be weak anyway, and the IPO value in 3Q13 was higher than in the same period of 2012 (56 deals with a total value of EUR 0.4bn in 3Q12). At EUR 14.7bn, the quarterly IPO value in 4Q13 was the highest since 4Q07. The total value of IPOs in 2013 was EUR 26.4bn, as compared with a total of EUR 11.0bn in 2012 and EUR 26.6bn in 2011.

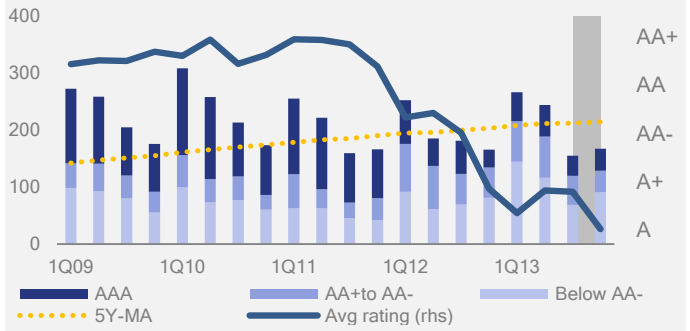
Sovereign bond markets

Issuance: Sharp fall in sovereign issuance T.13



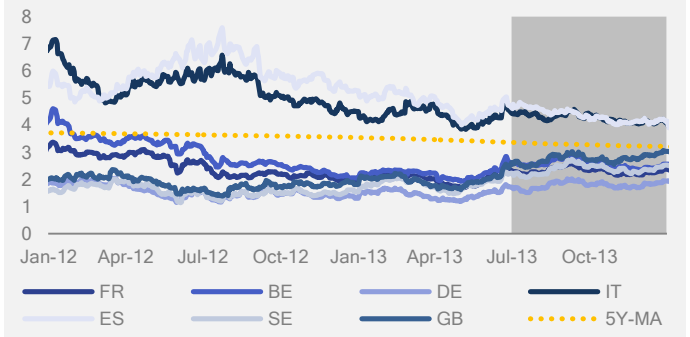
Note: Quarterly issuance, EUR bn (rhs), and outstanding debt, EUR tn (lhs).
Sources: Dealogic, Eurostat, ESMA.

Issuance: Decrease in average credit quality T.14



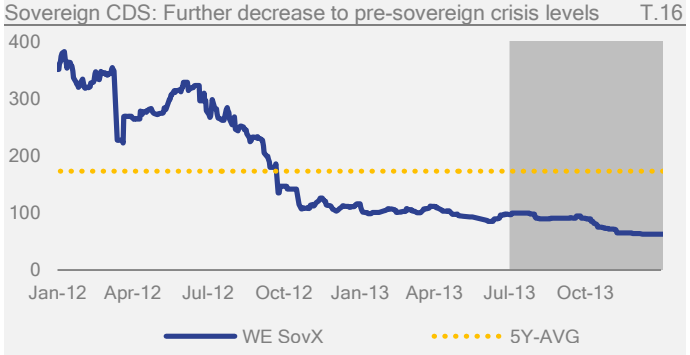
Note: Quarterly issuance in the euro area ranked by S&P ratings at launch, EUR bn. Weighted-average rating computed by converting ratings into a numeric scale (AAA=1, AA+=2, etc).
Sources: Dealogic, Standard & Poor's, ESMA.

Yields: Marked downward trend on distressed markets T.15



Note: Yields on 10-year sovereign bonds, selected EU members, %. 5Y-MA = 5Y moving average of all bonds.
Sources: Thomson Reuters Datastream, ESMA.

Sovereign CDS: Further decrease to pre-sovereign crisis levels T.16



Note: Spread on 5Y Western Europe SovX index, basis points. Index computed as an average of CDS spreads on 14 European countries. On 13/03/2012, Greece was replaced by Cyprus and the latter was excluded on 13/09/2012 due to low turnover.
Sources: Thomson Reuters Eikon, ESMA.

Two developments stood out in 2H13 on EU sovereign bond markets. First, gross sovereign issuance fell sharply both in EA and non-EA states. Secondly, distressed markets experienced a downtrend in yields and CDS spreads and a marked reduction in volatility. This compared with a broadly stable situation in non-distressed markets. As a consequence, yield dispersion was lower and volatility levels were more homogeneous. Taking a longer-term perspective, yields in non-distressed and distressed markets remained significantly below their long-term average. Developments in liquidity on EU sovereign markets were less marked, with bid-ask spreads broadly stable at low levels. However, liquidity dispersion across EU countries increased slightly.

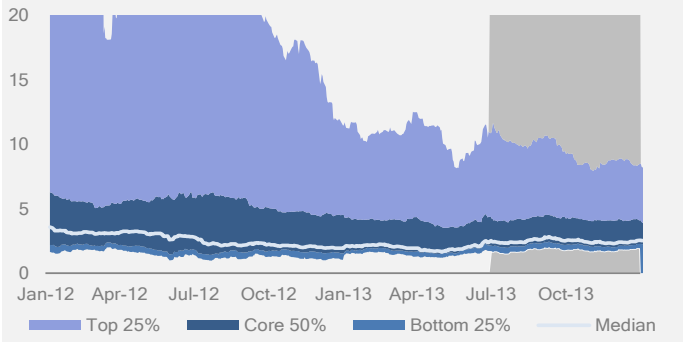
Issuance: Sovereign issuance fell sharply in 2H13. 2H issuance is generally lower than the average for the first two quarters of each year; however, 2H13 issuance levels were at their lowest since 2H08, reflecting the impact of fiscal consolidation on new sovereign debt issuance, as market access issues appeared to have eased. Total EU sovereign issuance in 2H13 was EUR 441bn, down 33% from EUR 658bn in 1H13 and well below 2H12 issuance of EUR 493bn. It also fell short of its five-year average. EA and non-EA issuance were equally affected. EA sovereign issuance fell from EUR 520bn in 1H13 to EUR 323bn in 2H13. This compares to the 2H12 figure of EUR 369bn. Non-EA sovereign issuance was down from EUR 139bn in 1H13 to EUR 118bn in 2H13, 2H12 non-EA sovereign issuance having totalled EUR 125bn. Outstanding EU sovereign debt stood at EUR 11.3tn (86.8% of EU GDP) in 3Q13 (latest data available), including EUR 8.8tn for the EA (92.7% of EA GDP). This compares to EUR 11.3tn (86.8% of EU GDP) in 2Q13, including EUR 8.9tn for the EA (93.4% of EA GDP).

Ratings: The average credit quality of EA sovereign issues deteriorated in 2H13, driven chiefly by the downgrade of one issuer. Issuance was down 38% to EUR 152bn for below AA-rated issues in 2H13, compared to a decrease of 36% to EUR 87bn for AA rated issues and a 30% drop to EUR 74bn for AAA rated issues.

Yield levels: In 2H13, sovereign yields displayed two-fold development. On the one hand, yields were broadly stable or increased slightly for non-distressed countries but remained below their five-year average. On the other, yields decreased more markedly for distressed countries. A number of factors impacted on EU sovereign bond markets. Most importantly, a shift in risk perception in some EA distressed markets helped to reduce yields there, while the yield trend in the non-distressed markets broadly followed shifts in the yield curve. Yields in non-distressed markets are still below the five-year moving average. Taking a longer-term view, yields in non-distressed and distressed markets remained significantly below their long-term average. Yields at 2H13 were around 300bps to 400bps below a 25-year average for non-distressed markets and around 200bps to 300bps below a 25-year average for distressed markets.

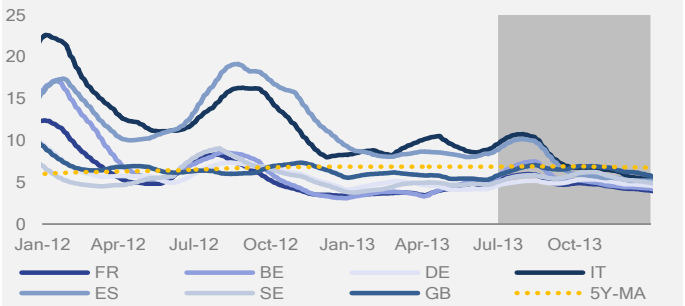
Spreads: European sovereign CDS spreads continued to narrow in 2H13. The SovX index, which is based on 14

Yield dispersion: Initial slight increase, then narrowing T.17



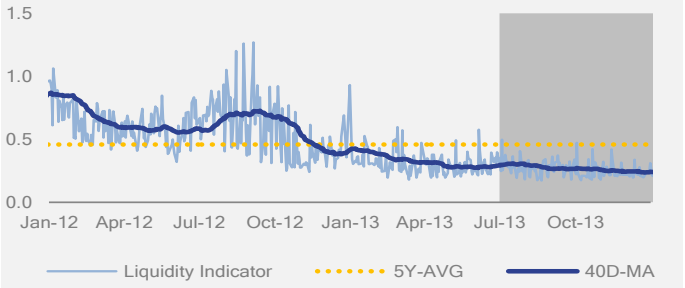
Note: Dispersion of yields on 10Y sovereign bonds, EU, in %. Scale truncated for readibility.
Sources: Thomson Reuters Datastream, ESMA.

Volatility: Marked decline on distressed markets T.18



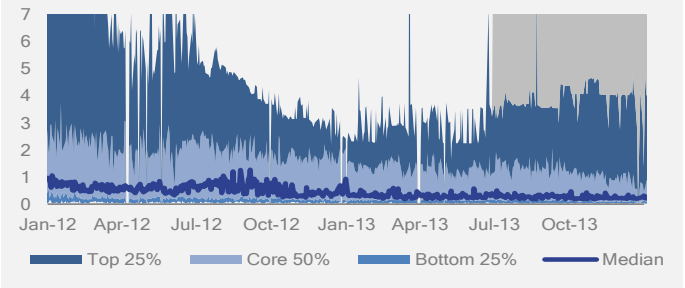
Note: 40D volatility of 10Y sovereign bonds, selected EU members, %. Series are smoothed exponentially. 5Y-MA = 5Y moving average of all bonds.
Sources: Thomson Reuters Datastream, ESMA .

Liquidity: Some further improvement at low bid-ask spreads T.19



Note: Liquidity measured as median bid-ask spread on 10Y sovereign bonds benchmarks, EU sovereigns, in %. 8Y bonds used for CY and SK.
Sources: Thomson Reuters Eikon, ESMA.

Liquidity: Slight increase in dispersion T.20



Note: Dispersion of percentage quote bid-ask spreads for 10Y sovereign bonds benchmarks, EU sovereigns, in %. 8Y bonds used for CY and SK. To remove outliers, the highest (lowest) quartile excludes the 99th (first) percentile. Scale truncated for readability.
Sources: Thomson Reuters Eikon, ESMA.

European sovereign CDS, fell by 34bps from 97bps to 63bps. That was well below its five-year average of 174bps. However, CDS spreads were still affected by political uncertainty, with temporary increases in July and September linked to political and economic struggles in some EU countries. CDS spreads in 2H13 fell to levels last observed in early 2010 prior to the EU sovereign debt crisis. The reduction was driven chiefly by a tightening of CDS spreads in distressed markets, also mirroring the easing in funding conditions in these markets.

Yield Dispersion: Dispersion in sovereign yields increased at the very beginning of 2H13, before starting to narrow later in the year. Lower yield dispersion reflected the asymmetric trend in sovereign yields between distressed and non-distressed markets. Yields decreased more markedly in distressed countries, whereas they either held stable or increased slightly in non-distressed countries.

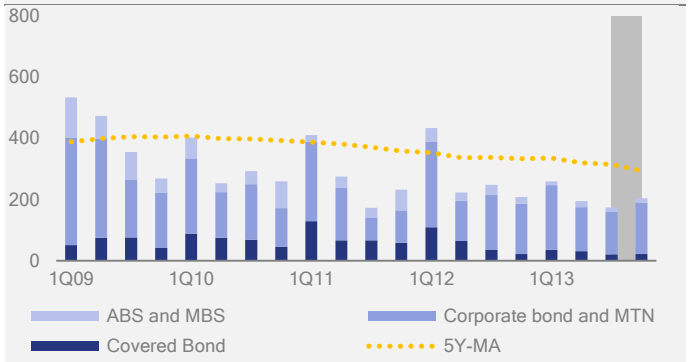
Volatility: Sovereign bond volatility in distressed markets picked up slightly at the beginning of 2H13, since when it has declined markedly to levels last observed in 1H11. Volatility levels in non-distressed markets also declined, but to a lesser extent after a temporary increase at the beginning of 2H13 in some countries. Volatility levels were below their five-year average for both distressed and non-distressed markets and, in general, at their lowest since 2010. Overall, volatility levels in EU sovereign bond markets became much more homogeneous in 2H13 compared to 2H11 and 2012 amid lower volatility in distressed EU sovereign bond markets.

Liquidity: EU sovereign bond market liquidity improved slightly in 2H13. Following a recovery at the beginning of the reporting period, spreads increased slightly, but subsequently narrowed again from the end of September. Levels at the end of the reporting period were slightly lower than in 1H13, and overall bid-ask spreads remain at their lowest since 2010. Volatility in the median bid-ask spread also remained low. For the time being, this points to continued normalisation in EU sovereign bond markets.

Liquidity dispersion: Liquidity dispersion across sovereign issuers increased in 2H13, although it remained below 2012 levels. The slight upturn was driven mainly by an increase in bid-ask spreads for the worst-performing 25% countries. Spreads in the core 50% remained broadly stable, while decreasing slightly in the best-performing 25% markets. Composition of the cohorts continued to be broadly stable, as stressed markets and markets with structural similarities, such as small market sizes, remained in the top 25% of observations.

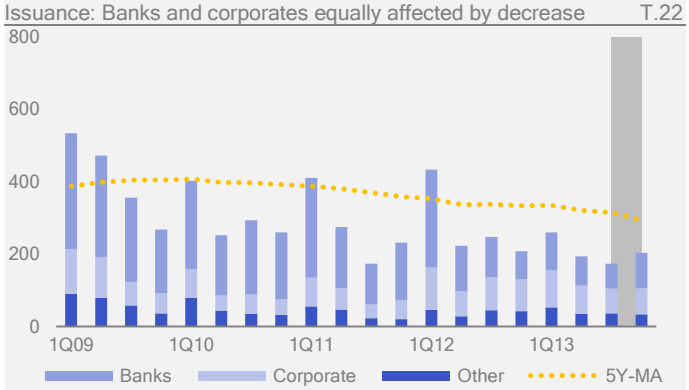
Corporate bond markets

Issuance: Further decrease T.21



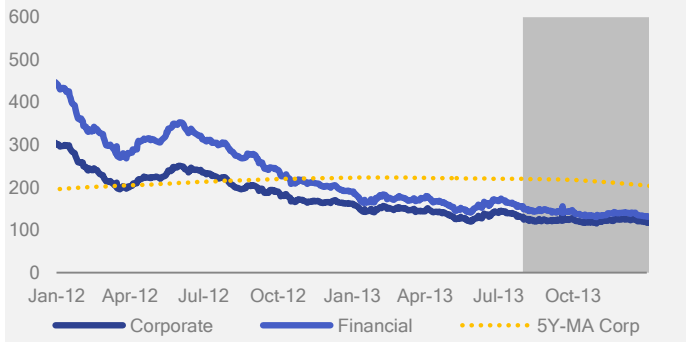
Note: Quarterly issuance of debt by deal type, EU, EUR bn.
Sources: Dealogic, ESMA.

Issuance: Banks and corporates equally affected by decrease T.22



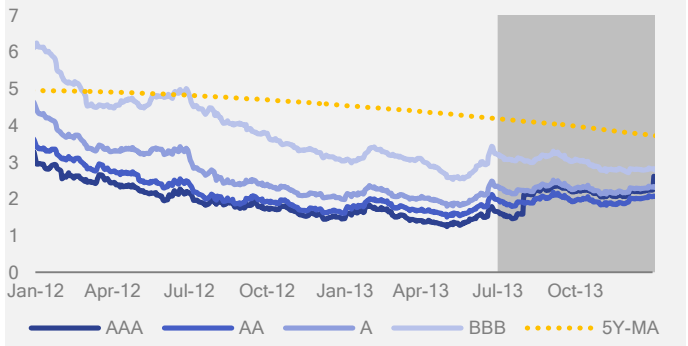
Note: Quarterly issuance of debt, EU, EUR bn.
Sources: Dealogic, ESMA.

Spreads: Narrowing initially, stable towards the end of 2H13 T.23



Note: Asset swap spreads on Barclays Pan-European bond indices, basis points. 5Y-MA Corp: 5Y moving average of corporate bond spreads.
Sources: Thomson Reuters Datastream, ESMA.

Yields: Increase for AAA rated bonds, decrease for BBB T.24



Note: Markit iBoxx euro corporate bond indices. %. 5Y-MA = 5Y moving average of all indices.
Sources: Thomson Reuters Datastream, ESMA.

Conditions on corporate bond markets were mixed in 2H13. Gross issuance decreased further in 2H13 to levels last observed in 2H02. ABS, MBS and covered bond issuance was at an all-time low. Spreads narrowed further at the beginning of 2H13, albeit not as strongly as in 1H13. Yields decreased slightly, except for AAA-rated bonds. The yield drop was higher for lower rated bonds, potentially reflecting a shift in risk assessment and continued search-for-yield behaviour on the part of investors.

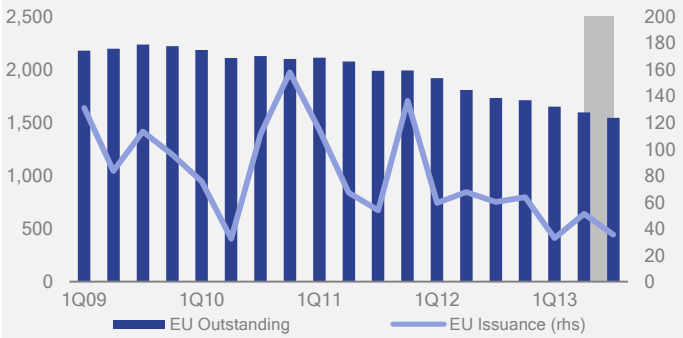
Issuance: EU gross corporate bond issuance decreased further in 2H13 and is well below the five-year average. In 2H13 a total of EUR 378bn was issued in bonds, covered bonds, asset-backed securities (ABS) and mortgage-backed securities (MBS). Similarly low issuance was last observed in 2H02, at EUR 361bn. Slack issuance in 2H13 may be due partly to seasonality, as issuance in 2H tends to be lower than in the first half of the year. ABS, MBS and covered bond issuance were at an all-time low. Issuance decreased both for banks and corporates.

Bond spreads: Bond spreads narrowed further in 2H13, albeit not as strongly as in 1H13. For corporates, spreads fell from around 140bps to around 120bps until mid-August, remaining broadly stable afterwards. Spreads for corporates were below their five-year average of around 205bps. For financials, spreads tightened from around 170bps to around 130bps until the end of October, broadly remaining at this level since. The decrease in spreads for financials was higher compared with spreads for corporates. Therefore the difference in spreads between the corporate index and the financials index decreased in 2H13.

Yields: The development in bond yields of investment-grade corporations in 2H13 was mixed. Yields decreased for BBB-rated bonds, were broadly stable for AA and A-rated bonds and increased for AAA-rated bonds. Yields remained well below those in peak-crisis periods and fell far short of their five-year average. BBB-rated bonds saw a steady narrowing by 50bps to around 280bps. AA-rated bond yields increased by approximately 10bps to around 205bps, yields for A-rated bonds were stable at around 230bps. For AAA-rated bonds the duration composition of the underlying basket used for the yield calculation changed. This was the main driver for the recent jump in AAA-rated corporate bond yields from 165bps to around 225bps. Over the last two years yields in lower-rated corporate bonds decreased relatively more than yields in higher-rated bonds. This may be due to a lower perception of risk or a perceived improvement in the economic outlook for large corporates resulting in a lower market price for risk. However, it may also potentially indicate a shift to riskier investments in search-for-yield behaviour due to the low interest rate environment. Since the beginning of 2012 the difference in yields between BBB-rated and AA-rated corporate bonds narrowed from around 280bps to around 75bps. The reduced yield differential between BBB-rated and AAA-rated corporate bonds – it narrowed from around 330bps at the beginning of 2012 to around 60bps – is due to a change in duration as mentioned above.

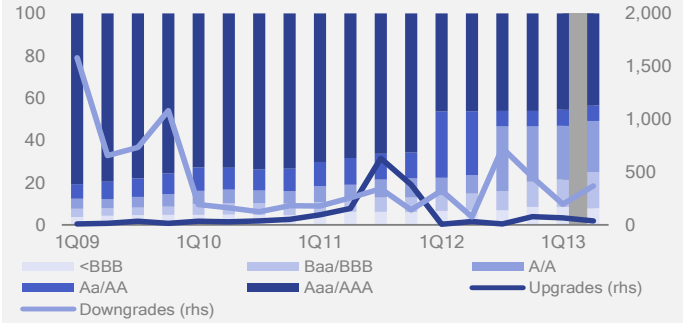
Securitisation and covered bonds

Securitised products issuance: Continued decline T.25



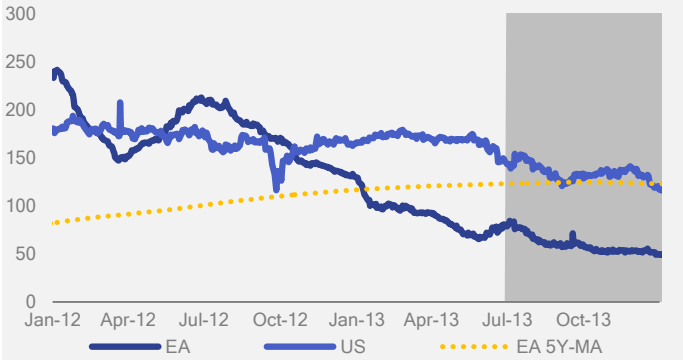
Note: 2008 outstanding figures potentially underestimated. EUR bn.
Sources:AFME, ESMA.

Securitised product ratings: Increase in BBB ratings T.26



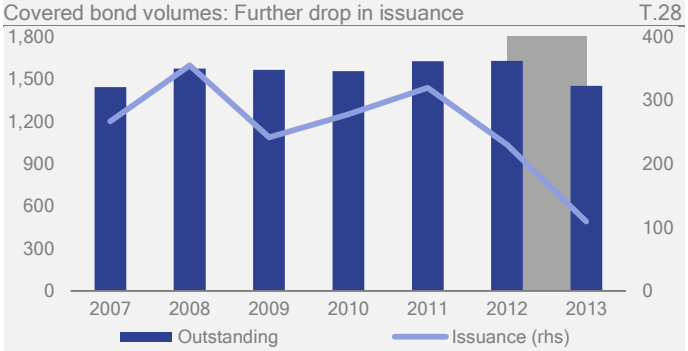
Note: Total EU outstanding, Moody's rated securities, %.
Sources: AFME, Moody's, ESMA.

ABS spreads: Continued decline in the EA T.27



Note: Asset swap spreads on Barclays Euro Area and US Securitized indices, basis points.
Sources: Thomson Reuters Datastream, ESMA.

Covered bond volumes: Further drop in issuance T.28



Note: The outstanding amount is the sum of covered bonds maturing after the reference date, EUR bn. 2013 data through November.
Sources: Dealogic, ESMA.

EU issuance of securitised products remained subdued in 2Q and 3Q13. Average credit ratings for new issues deteriorated due to an increase in Baa-rated products. ABS spreads continued to decline, possibly reflecting yield compression across markets. Covered bond issuance remained subdued during 2013, while outstanding volumes fell slightly on the previous year. Covered bond spreads narrowed across the rating spectrum, as spreads for lower-rated issues shrank further. Overall risk spreads (i.e. covering different rating categories) for covered bonds fell further below their five-year averages.

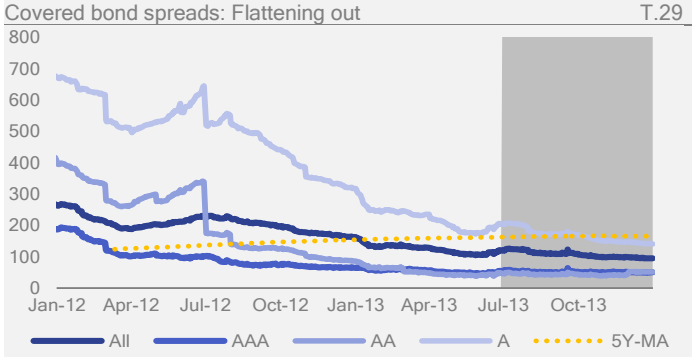
Securitised product issuance: In the EU, the issuance of securitised products totalled EUR 51bn in 2Q13, a 57% increase from 1Q13 but 24.6% below 2Q12. In comparison, the issuance of securitised products in the US amounted to EUR 426.4bn, led by agency MBS (EUR 359.8bn). The majority of products were retained, typically to be pledged as collateral for funding purposes, with only 36.4% placed in the market, compared to 51.4% in 1Q13. The amount of securitised products outstanding continued to decrease at a steady pace, with EUR 1,594.7bn outstanding in 2Q13, the lowest amount since 3Q08, down from EUR 1,710.5 at end-2012. The majority of securitised products issued were ABS and RMBS (40.2% and 34.6%, respectively), even though the outstanding amount of RMBS fell by 13.7% from 2Q12 to EUR 920.1bn.

Securitised product ratings: The average credit quality of EU securitised products decreased slightly, due to an increase in outstanding rated Baa by Moody's, from 13% in 1Q13 to 17% in 2Q, offsetting a similar fall in the share of products rated A or higher. The number of high-grade products continued to decline, with Aaa-rated products gradually decreasing to 43.5% in 2Q13 from 46.2% a year previously. On the other hand, the number of products rated lower than Baa stabilised at around 8% in the last two quarters, following a steady increase since end-2010.

ABS spreads: Spreads on EA AAA-rated securitised products narrowed further by 30bps between July and December 2013 to 49bps. This was linked to a drop in the yield of the ABS index rather than an increase in the risk-free rate during the reporting period, which explained most of the decrease in ABS spreads during 1H13. As a result, EA securitised spreads were around 75bps below their five-year moving average, underscoring improved confidence in high-grade securitised markets. In the US, spreads decreased by around 30bps to 117bps.

Covered bond volumes: The amount of covered bonds outstanding in the EU fell from EUR 1,630bn in 2012 to EUR 1,450bn as of end-December 2013. The decline in new issuance was even more pronounced, as year-to-date volumes almost halved compared to the same period last year. Due to national specificities, markets in covered bonds are more fragmented than other bond market segments. Issuance activity varies between the EU countries along with differences in credit growth, economic and housing market prospects.

Covered bond spreads: Flattening out T.29

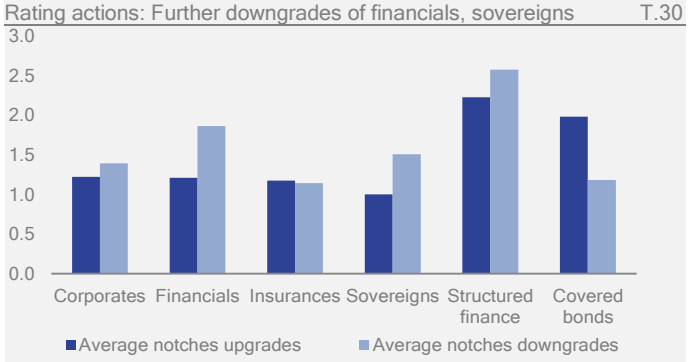


Note: Asset swap spreads based on iBoxx covered bond indices, basis points.
5Y-MA = 5Y moving average of all bonds.
Sources: Thomson Reuters Datastream, ESMA.

Covered bond spreads: The decline in covered bond spreads continued in 2H13, due mainly to the fall in spreads for lower-rated issues. Spread dispersion across the rating spectrum narrowed as a consequence. By the end of December, average spreads were more than 70bps below their five-year average. Average spreads (covering all rating categories) fell from 120 bps in June to below 100bps in December. The decline for A-rated bonds was even more pronounced, with the average spread for these issues dropping from 200 to 140bps since the end of June 2013. The decreasing trend in covered bond spreads squares with the decline in issuance activity, which indicates constraining factors were on the issuance rather than investor side.

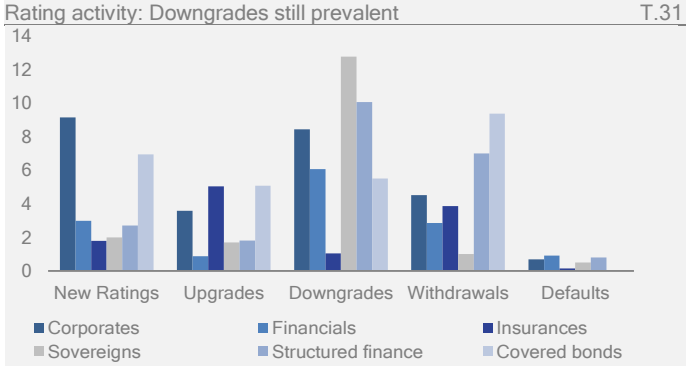
Credit quality

Rating actions: Further downgrades of financials, sovereigns T.30



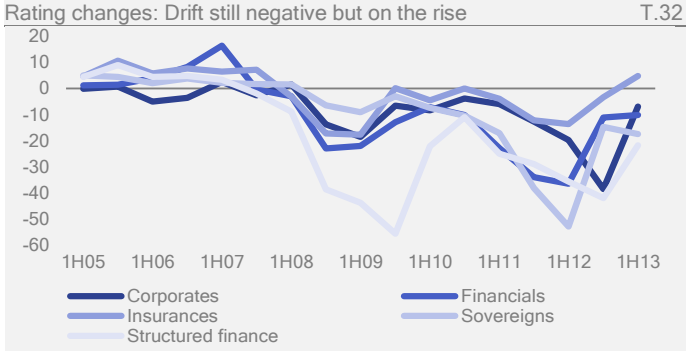
Note: Average size of upgrades and downgrades from all credit rating agencies by asset class for 1H13, average number of notches. Sovereign including public finance.
Sources: CEREP, ESMA.

Rating activity: Downgrades still prevalent T.31



Note: Rating activity of all credit rating agencies (CRAs) by asset class for 1H13, % of outstanding ratings. Sovereign including public finance.
Sources: CEREP, ESMA.

Rating changes: Drift still negative but on the rise T.32



Note: Drift of ratings from all credit rating agencies by asset class computed as percentage number of notch-weighted upgrades minus percentage number of notch-weighted downgrades.
Sources: CEREP, ESMA.

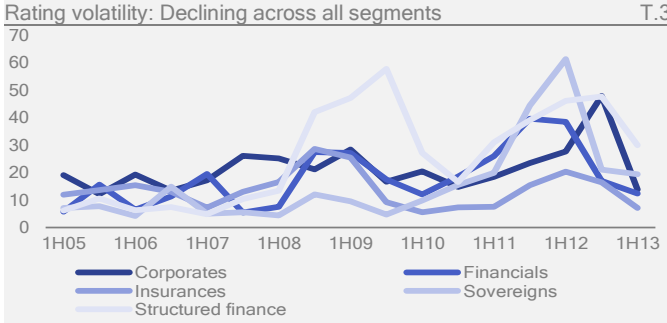
Rating activity in 1H13 was characterised by a notable slowdown in downgrading. But downgrades of financials, sovereigns and corporates still outweighed upgrades, as the notch-weighted changes in ratings remained negative, albeit less pronounced than in the previous reporting period. Rating in 1H volatility also decreased on the previous year. Especially for corporates, rating volatility ebbed as the number of corporate defaults decreased. In comparison to other issuers and instruments, ratings of sovereign debt issues were still the most volatile, as well as featuring the most negative notch-weighted drift.

Rating actions: In 1H13, the scale of downgrades remained flat or decreased for the main groups of issuers, except for financials. For these the average downgrade increased from 1.2 notches in 2H12 to 1.9 in 1H13. However, the scale of the downgrades still outweighed upgrades for most debt instruments, including issues by corporates, financials and sovereigns as well as structured finance products. For debt instruments issued by insurance companies, average ratings were trimmed by nearly 0.5 notches, with the average notch downgrade now matching the average upgrade. Covered bonds represented the only group for which the average notch upgrade was larger than the average downgrade.

Rating activity: 1H13 saw a general decline in rating activity across all groups of issuers. A number of developments stood out: First, the percentage of corporate defaults dropped from 6.7% to 0.7% of all outstanding corporate ratings, which also reduced rating volatility for corporates. Second, the percentage of insurer downgrades fell from 7.8% to 1.0%, against 5% upgrades. Third, rating downgrades for financials shrank 4 percentage points. By contrast, the percentage of sovereign downgrades increased during 1H13 from 9% to 13%.

Rating changes: The rating downshift that began in 1H11 was further reversed in 1H13 across most issuers and instruments. Downgrading activity slowed for all issuers except sovereigns, which saw a small downward drift in notch-weighted ratings. By contrast notch-weighted ratings for corporates improved substantially from their trough in 2H12. Even so, for most issuers the balance of ratings remained on

Rating volatility: Declining across all segments T.33



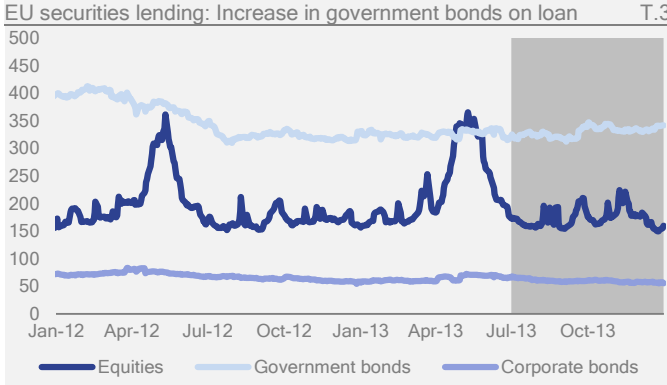
Note: Volatility of ratings by all credit rating agencies for corporates, financials, insurances, sovereigns and structured finance, computed as number of notch-weighted upgrades and downgrades over number of ratings outstanding.
Sources: CEREP, ESMA.

the downside with the exception of insurers, for which rating activity turned positive for the first time since end-2010.

Volatility: 1H13 saw a general lessening in rating volatility across the main groups of issuers and instruments. The drop in volatility of notch-weighted ratings was especially pronounced for corporates, mainly due to an easing in defaults from their previous 2H12 spike. Rating volatility was highest for sovereigns, reflecting continued political uncertainty and debt sustainability issues in some EU countries during 1H13.

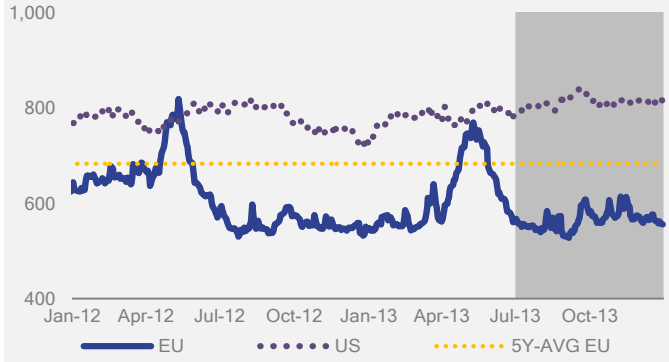
Securities financing transactions and collateral

EU securities lending: Increase in government bonds on loan T.34



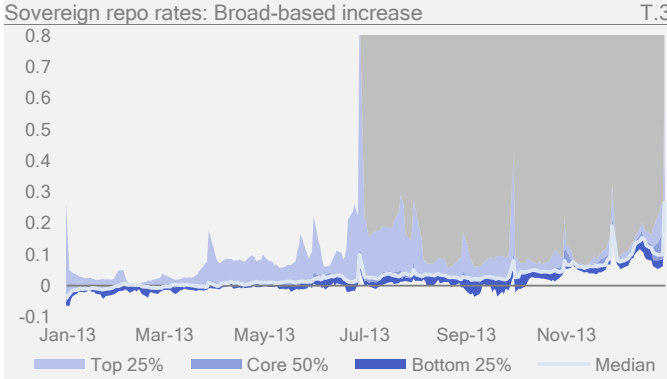
Note: Total value of securities on loan, in USD bn.
Sources: Markit Securities Finance, ESMA.

International securities lending: Stable in the US T.35



Note: Value of securities on loan, in USD bn. 5Y-AVG= 5Y average.
Sources: Markit Securities Finance, ESMA.

Sovereign repo rates: Broad-based increase T.36



Note: Dispersion of seven sovereign EUR repo markets (AT, BE, DE, FI, FR, IT and NL), volume-weighted average of fixed rates index value, in %.
Sources: BrokerTec, MTS, ICAP RepoFunds Rates, ESMA.

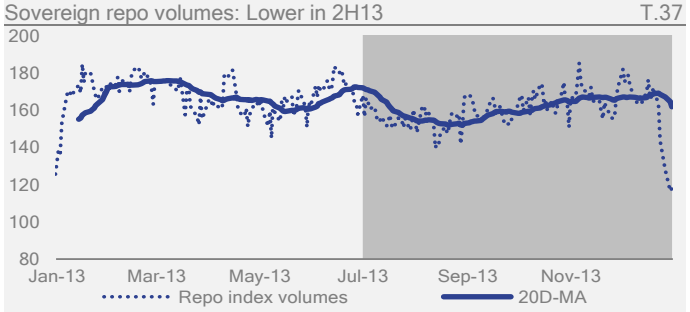
EU securities lending increased slightly on a yearly basis due to the higher value of government bonds on loan. However, the aggregate value of EU securities on loan is around 30% lower than for US securities, where a significantly larger amount of equities were on loan throughout the reporting period. Sovereign repo market rates were broadly stable, while repo volumes decreased slightly. The supply of collateral increased by EUR 420bn in 2013, down from a EUR 560bn increase in 2012.

EU securities lending: The total value of EU securities on loan fluctuated between July and December 2013 at around USD 560bn and increased by 1.4% on an annual basis. EU government bonds on loan, the main type of assets used in securities lending transactions, rose by 2% from an average USD 329bn in June to USD 336bn in December, and by 6% since December 2012. Equities on loan declined by 24% to average USD 160bn in December (down 4% from December 2012), although this was largely due to seasonal factors, with corporate action trading (i.e. lending for cross-country tax arbitrage on dividends) boosting securities lending volumes in 2Q13. The value of EUR and GBP corporate bonds on loan also fell a combined 2% to USD 57bn in December, with a 5% fall in EUR-denominated corporate bonds on loan.

International securities lending: The total value of US securities on loan increased by 3% since June and 10% since the end of 2012, with a peak at USD 843.9bn in September, the highest value since July 2011. US equities on loan rose 8% to average USD 354bn in December, or about 43% of all US securities on loan. US government bonds on loan fell 3% in value, to USD 385bn. There was no noticeable shift from short-term bills to longer-dated securities, despite the rising risk of default on short-term T-bills early October due to the debt ceiling standoff. The value of EU securities on loan is around 30% lower than in the US.

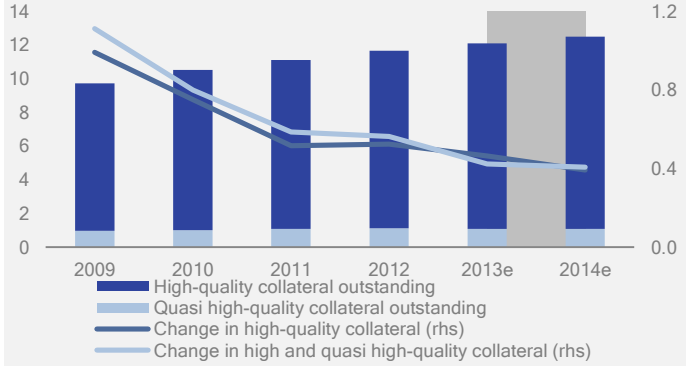
Sovereign repo rates: EU sovereign repo market rates increased in 2H13, with the median rate across seven countries rising 10bps between June and December. Repo rates dispersion within the top 25% remained at similar levels. The overnight jump of 33bps in one country on 30 September 2013 may be related to domestic political tensions. Repo rates in markets within the bottom 25% increased markedly across countries.

Sovereign repo volumes: Lower in 2H13 T.37



Note: 20D moving average of specific and general collateral transaction index volumes executed through CCPs on seven sovereign EUR repo markets (AT, BE, DE, FI, FR, IT and NL), in EUR bn. Index volumes are lower than overall market volumes due to the filtering out of atypical transactions.
Sources: BrokerTec, MTS, ICAP RepoFunds Rates, ESMA.

Supply of collateral: Steadily growing T.38



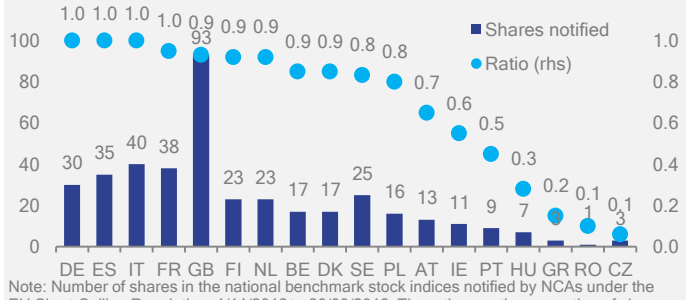
Note: Amounts outstanding and yearly changes, EUR tn. 2013 and 2014 are ESMA estimates.
Sources: Dealogic, Eurostat, AMECO, Standard&Poor's, ESMA.

Sovereign repo volumes: Daily volumes of EU sovereign repo markets executed through CCPs contracted during the reporting period, from an average EUR 213.2bn in 2Q13 to EUR 204.2bn in 2H13. This was mainly due to somewhat lower trading activity in the largest EU repo markets during the summer and to thinner trading activity across countries during the year-end holidays. An industry survey found that the size of the overall European repo market increased from EUR 5.6tn at the end of 2012 to EUR 6.1tn in June 2013, with the share of short-dated repos increasing to 57.2% from 50%, reflecting the steepening of money market yield curves.

Supply of collateral: The supply of high-quality collateral, proxied by outstanding sovereign debt rated investment grade or higher, is expected to increase by EUR 390bn in 2014, to amount to EUR 11.4tn. On the other hand, the supply of quasi high-quality collateral in 2014, proxied by amounts outstanding of corporate and covered bonds rated AA- or above, is estimated to be around EUR 1.1tn, in line with the previous year. Overall, the aggregate supply of collateral increased by EUR 423bn in 2013 and is expected to grow by 407bn in 2014, against an increase of EUR 560bn in 2012. The annual sovereign debt estimates for 2013 and 2014 are based on AMECO general government debt forecasts (high-quality collateral), and net issuance of corporate and covered bonds is assumed to remain stable in 2014 (quasi-high collateral).

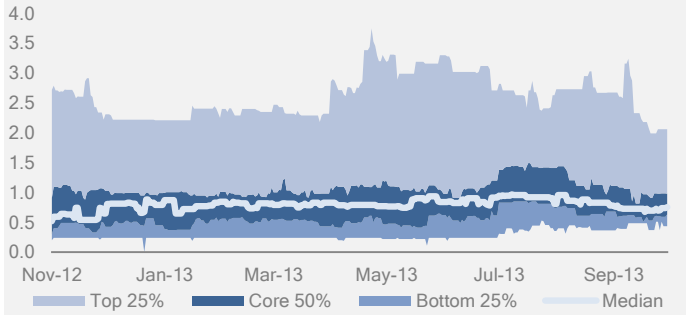
Short selling

Short positions: Notified positions T.39



Note: Number of shares in the national benchmark stock indices notified by NCAs under the EU Short-Selling Regulation, 1/11/2012 to 30/09/2013. The ratios are the proportion of shares notified compared to the total number of shares in the corresponding national index.
Sources: National Competent Authorities, ESMA.

EU shares dispersion: Fluctuation in 2Q13 and 3Q13 T.40



Note: Dispersion of the national median size of aggregated short positions held on stocks under NCAs' remit and belonging to EU national benchmark indices, in % of issuers' share capital. 17 EU Member States reporting.
Sources: National Competent Authorities, ESMA.

Over 70% of the shares in the main EU national stock indices were subject to reported short-selling activity. The number of shares subject to short-selling notifications increased since the beginning of 2013, and the median net short position on EU shares edged up. In contrast, the size of net short positions held on national sovereign debt gradually edged down over the reporting period as the stock of government debt grew faster than net short positions held on sovereigns. This was despite an uptick within the bottom 25% (i.e. short positions that were the smallest in percent of outstanding government debt).

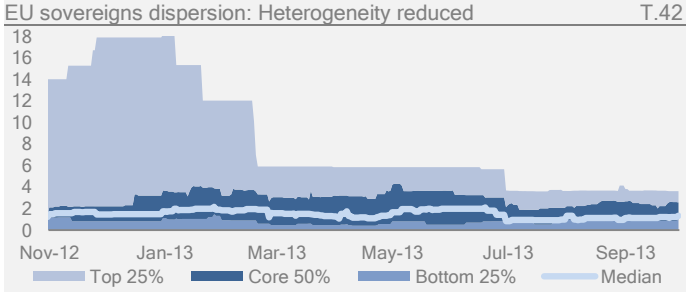
Shares: Between 1 November 2012, when the Short-Selling Regulation entered into force, and 30 September 2013 short sale notifications on 404 shares were made to 18 EU National Competent Authorities, out of the 550 shares included in the corresponding national indices. Short selling activity varied across EU Member States, with the percentage of shares shorted ranging between 6% and 100% of the shares composing national benchmark indices. As of the end of 2013, no short-selling bans on shares remain in the EU.

Shares dispersion: The median size of short positions reported across EU countries fluctuated in both 2Q13 and 3Q13, peaking at 0.97% of issued share capital in July before easing to 0.68% in September. Overall, the median size edged up slightly from an average 0.79% in 1Q13 to 0.83% in 2Q and 0.84% in 3Q. The size of net short positions within the top 25% (i.e. short positions that are the largest as a percentage of

EU sovereigns: Net short positions decreased T.41

Note: Net short positions held on selected sovereigns, % of gross general governement debt. Sample consists of eleven EU Member States that reported on the whole period. Debt data for 3Q13 extrapolated from Ameco 2013 forecast.
Sources: National Competent Authorities, Eurostat, Ameco, ESMA.

EU sovereigns dispersion: Heterogeneity reduced T.42



Note: Dispersion of net economic short positions held on selected sovereigns, % of gross general government debt. Eleven EU Member States reporting. Debt data for 3Q13 extrapolated from Ameco 2013 forecast.
Sources: National Competent Authorities, Eurostat, Ameco, ESMA.

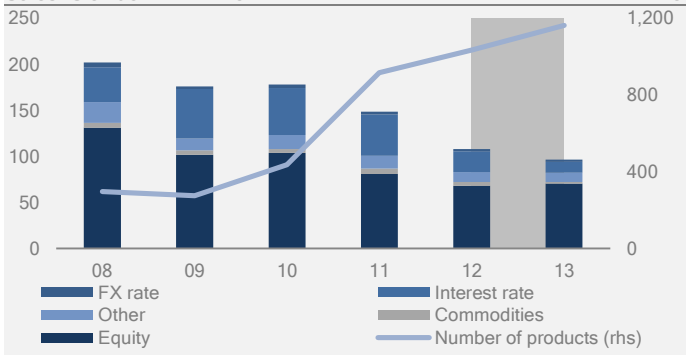
issued share capital) fell noticeably between 2Q and 3Q13, although this was mostly due to changes in one country. For net short positions within the bottom 25%, size also increased with the minimum value gradually rising from 0.24% of issued share capital at the end of March to 0.44% at the end of September. Overall dispersion therefore decreased during 2H13.

Sovereigns: Average aggregated net short positions on sovereign debt for the EU countries in our sample decreased in the second and third quarters of 2013. The quarterly average fell from 2.7% of outstanding government debt in the countries within our sample in 1Q13 to 2.1% in 2Q13 and 1.6% in 3Q13. The median size of net short positions also shrank, but more markedly so in 3Q13. These changes were caused partly by the stock of EU general government debt increasing faster than the total value of net short positions reported.

Sovereigns dispersion: Average net short positions within the top 25% (i.e. short positions that were the largest as a percentage of outstanding general government debt) decreased between March and September. For the bottom 25% net short positions increased while the minimum value remained below 0.1%.

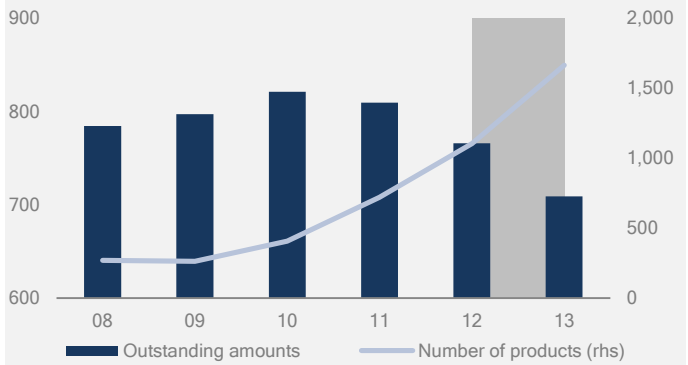
Structured retail products

Sales: Slowdown in 2H13 T.43



Note: Volumes of structured products sold to retail investors by asset class, EUR bn. Number of products sold, thousand. 2013 as of December 1.
Sources: StructuredRetailProducts.com, ESMA.

Outstanding: Continued fall T.44



Note: Outstanding amounts, EUR bn. Number of products, thousand. 2013 as of December 1.
Sources: StructuredRetailProducts.com, ESMA.

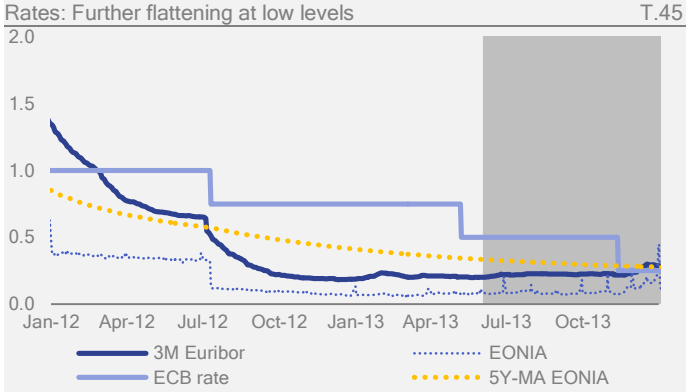
Volumes of structured products sold to retail investors decreased in 2H13 compared to 1H13. Equity products were on the rise, while sales of interest-rate products receded sharply. Outstanding volumes of structured retail products continued to fall steadily.

Sales: The volume of retail structured products sold to investors in 2013 amounted to EUR 96.7bn. This compared with EUR 108.1bn for 2012. Sales of equity products totalled EUR 70.6bn, up from EUR 68.1bn in 2012, while interest rate product sales dropped to EUR 11.8bn from EUR 22.6bn in the previous year. Inflation products also fell, from EUR 2.6bn in 2012 to EUR 0.7bn in 2013. Sales growth in the second half of 2013 stalled on 1H, especially for equity products, which added EUR 24bn from the end of June. On the other hand, sales of fund-linked products increased from EUR 1bn in 2012 to EUR 1.7bn in 2013 year-to-date, while sales of structured credit products totalled EUR 4.2bn in 2013, up from EUR 3.5bn in the previous year. The aggregate number of structured products sold to retail investors rose slightly, from over 1.04mn in 2012 to 1.16mn in 2013.

Outstanding: The amount of structured retail products outstanding continued to decrease in 2013, falling to EUR 709bn from EUR 766bn at the end of 2012, while the number of products on the market increased to 1.66mn, up from 1.1mn at the end of 2012. While the database used covers most of the EU market, it may not be fully representative of domestic markets in all EU countries.

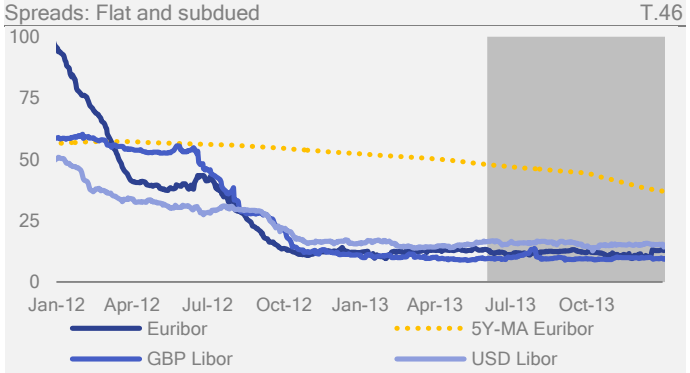
Money markets

Rates: Further flattening at low levels T.45



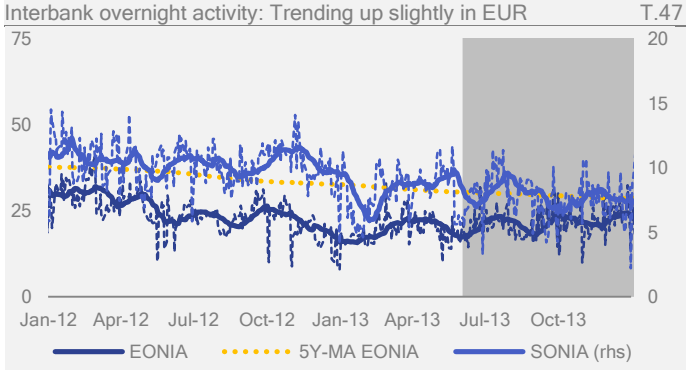
Note: Money market rates, in %.
Sources: Thomson Reuters Datastream, ESMA.

Spreads: Flat and subdued T.46



Note: Spread between 3M interbank rates and 3M Overnight Index Swap (OIS), in basis points. 5Y-MA of Euribor spreads.
Sources: Thomson Reuters Datastream, ESMA.

Interbank overnight activity: Trending up slightly in EUR T.47



Note: 20D moving average of daily lending volumes on Euro Overnight Index Average (EONIA) and Sterling Overnight Index Average (SONIA), EUR and GBP bn.
Sources: Thomson Reuters Eikon, ESMA.

2H13 was marked by a cut in the ECB's main refinancing rate from 0.5% to 0.25% in November. Interbank rates and spreads in the Euro initially remained flat but then increased towards the end of the reporting period, possibly reflecting window dressing effects at the end of the year and following central bank communication on asset purchasing. Despite the spike towards the end of the year, Euro interbank spreads remained at very low levels, with USD Libor spreads marginally elevated over spreads in Euribor and GBP Libor. Following a short increase at the beginning of 2H13, GBP Libor trended slightly downward.

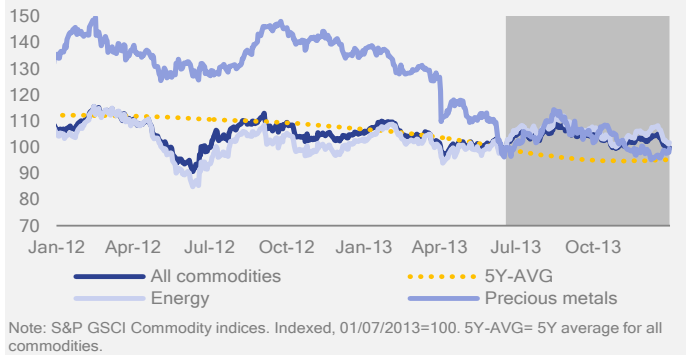
Rates: In November, the ECB cut its main refinancing rate by another 25 bps from 0.5% to 0.25%, leaving deposit rates at 0.0%. The main EUR interbank reference rates remained subdued following the ECB's rate cut, although they did tick up slightly by the end of the year. The three-month Euribor even climbed above the main refinancing rate, possibly due to year-end window dressing effects and following central bank communication on asset purchasing. The EUR overnight rate (EONIA) increased at the same time, displaying some volatility spikes towards the end of the year.

Spreads: Interbank spreads remained subdued during the second half of 2013. For most of the reporting period, three-month Euribor and three-month Libor spreads hovered 10bps above the respective OIS rates, still significantly below their five-year moving average. USD Libor spreads were marginally higher, about 2-3bps above their European counterparts. The Euribor spread edged up slightly towards the end of the reporting period. As in the previous reporting periods, spread levels on the interbank market should be interpreted with caution, as they may not be representative of the general risk premia paid across the Euro area in short-term bank funding.

Volumes: EUR interbank overnight activity increased marginally during the reporting period. By the end of the year, 20-day average daily volumes were back at EUR 24bn, recovering from the temporary low at the end of the previous period. Volumes were still below their five-year average of EUR 30bn and well down on their 2007 peak, when activity averaged EUR 50bn per day. In the GBP interbank market, volumes trended slightly downwards during the second half of 2013, following a short increase at the beginning of the reporting period. Average daily volumes first rose to 10bn in July and then fell again to below GBP 8bn in December.

Commodity markets

Price: Slight rebound T.48

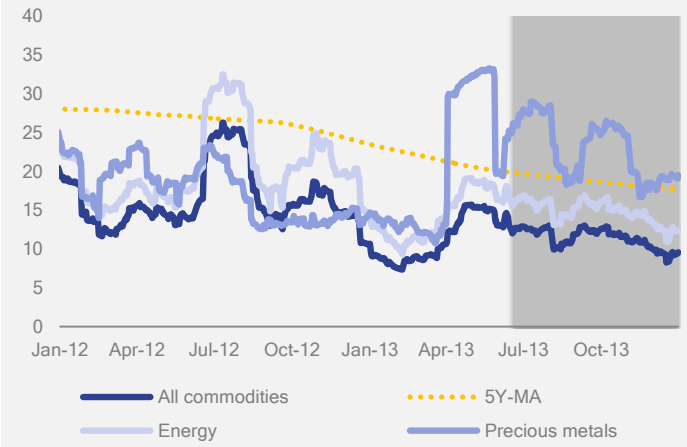


Note: S&P GSCI Commodity indices. Indexed, 01/07/2013=100. 5Y-AVG= 5Y average for all commodities.
Sources: Thomson Reuters Datastream, ESMA.

Commodity prices rose slightly in the second half of 2013, led by precious metals. The end of the price correction for precious metals was driven mainly by changes in expectations of US monetary policy, while energy markets were slightly impacted by rising geopolitical risk and supply disruptions. Agricultural prices continued their abrupt decline, although they make up only a small part of the overall commodities market.

Prices: Following a sharp decline during the first half of 2013, commodity prices rose in the first two months of 2H13 to stand 9% higher at the end of August. This was driven mainly by precious metals and investors' expectations of Federal Reserve monetary policy. Prices subsequently eased, returning

Volatility: Highly volatile precious metal markets T.49



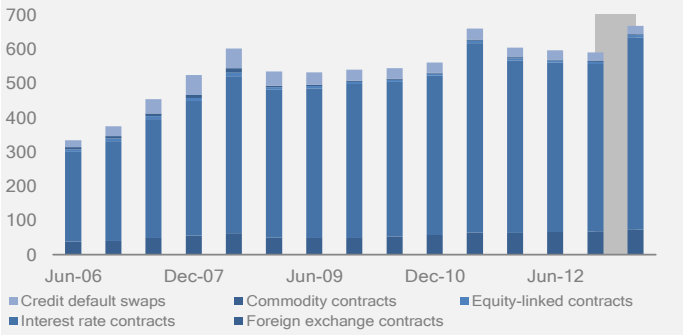
Note: 40D volatility of S&P GSCI Commodity indices, %. 5Y-AVG for all commodities.
Sources: Thomson Reuters Datastream, ESMA.

close to their level at the beginning of the period. Energy prices gained 2% as from June, the WTI-Brent spread further narrowing following new transportation infrastructures and less likelihood of military strikes in Syria. With global inventories continuing to build up, agricultural prices continued their decline, falling almost 12% since end-1H13. As a result, at the end of November 2013 the overall commodity price index stood only 3.6% above its end-June level, but still eight percentage points above its five-year average.

Realised volatility: Overall commodity price volatility remained broadly at its end-1H13 level. Nonetheless, precious metal price movements were erratic, with a 40-day volatility peak in mid-August at 29% driven mainly by changes in investor expectations following monetary policy announcements. Other commodity markets were stable, with volatility remaining below 20%, including energy prices, which displayed historically stronger volatility than other commodities.

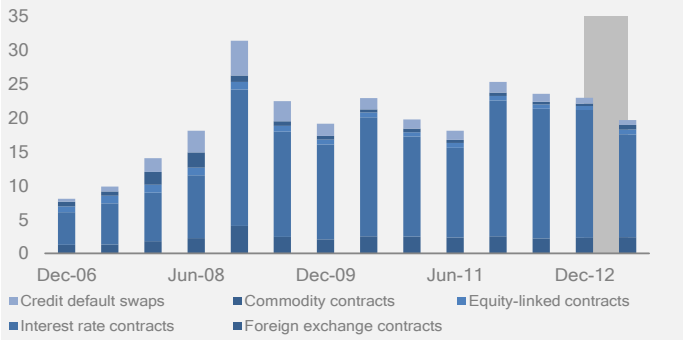
Derivatives markets

Notional outstanding: Higher volumes T.50



Note: Gross notional amounts of outstanding OTC derivatives by category, USD tn.
Sources: Bank for International Settlements, ESMA.

Market value: Sharp decline T.51



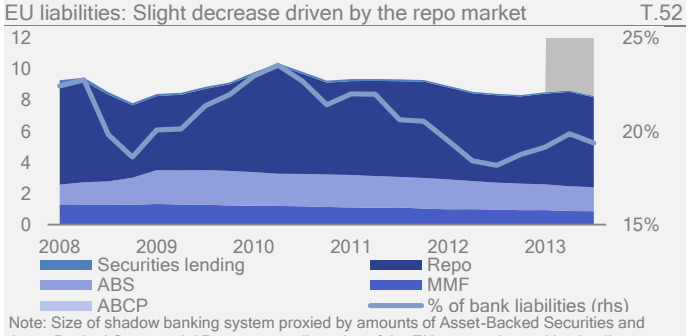
Note: Gross market values of outstanding OTC derivatives by category, USD tn. Gross market values represent the cost of replacing all open contracts at the prevailing market prices.
Sources: Bank for International Settlements, ESMA.

In 1H13, the outstanding volumes of OTC derivatives increased by 13%, while the actual risk as measured by outstanding market value decreased. The gross outstanding market value was down 14% to USD 19.7tn at the end of June 2013. Interest rate swaps continued to form the bulk of the OTC derivatives market with a share of 83% of total gross notionals in OTC derivatives as of end-2012.

Contracts outstanding: Global OTC derivatives markets expanded by 13% in notional volumes outstanding during 1H13, after gradually decreasing since 1H11. This is mostly due to double-counting effects of central clearing following implementation of the recent regulatory initiatives. Double-counting is a consequence of central clearing implying that a bilateral transaction is converted into two transactions of the same amount when cleared. At the same time, the market value of these open contracts receded sharply, shedding 14% in 1H13 to USD 19.7tn. Interest rate contracts accounted for the majority of the global OTC derivatives market, at 83% of the total. Gross notionals on CDS continued to decline, falling 10% from the previous year to USD 24.3tn due to portfolio compression in bilateral and centrally-cleared trades. In the process, economically redundant transactions among counterparties are terminated without changing their net positions in order to reduce the risk, cost, and inefficiency of maintaining unnecessary transactions on counterparty books.

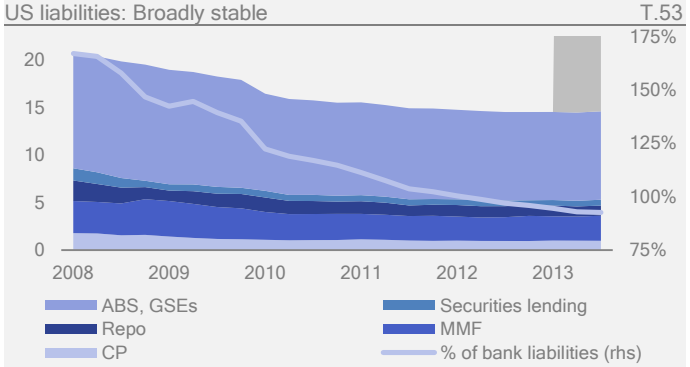
Shadow banking

EU liabilities: Slight decrease driven by the repo market T.52



Note: Size of shadow banking system proxied by amounts of Asset-Backed Securities and Asset-Backed Commercial Paper oustanding, size of the EU repo and securities lending (against cash collateral) markets, and liabilities of Money Market Funds, EUR tn. % of bank liabilities on rhs.
Sources: ECB, AFME, ICMA, Markit Securities Finance, ESMA.

US liabilities: Broadly stable T.53



Note: Size of shadow banking system proxied by liabilities of ABS issuers, GSEs and pool securities, open commercial paper , size of the US repo and securities lending (against cash collateral) markets, and liabilities of Money Market Funds, USD tn. % of bank liabilities on rhs.
Sources: Federal Reserve Flow of Funds, Markit Securities Finance, ESMA.

In 3Q13, EU shadow banking liabilities shrank by 1.5% year-on-year. At EUR 8.3tn, EU shadow banking liabilities amounted to 19% of EU bank liabilities, compared with 92% in the US.

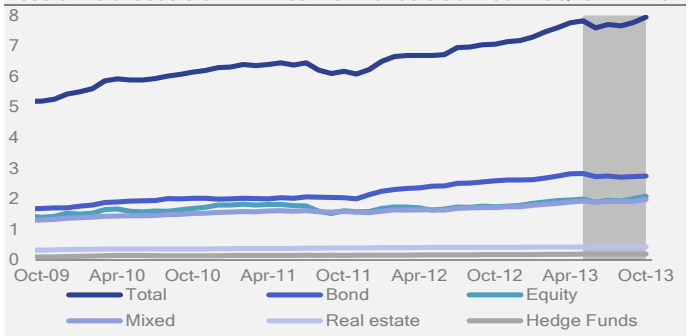
EU shadow banking: EU shadow banking sector liabilities expanded slightly in 1H13, before decreasing in 3Q13 by around EUR 350bn to reach a new low of EUR 8.3tn. These developments were driven mainly by changes in the size of repo markets, which account for 70% of EU shadow banking liabilities. Other shadow banking activities also decreased, with EU MMF liabilities and ABS markets declining by EUR 67bn and EUR 57bn respectively. EU shadow banking liabilities amounted to 19.4% of EU banking sector liabilities in 3Q13, up 1.2 percentage points from 3Q12 due to bank balance sheets shrinking by EUR 3.5tn over the same period. The share of short-term instruments (repos, MMFs and ABCP) in the shadow banking system was broadly stable at 80%, up from 73% in 2009.

International comparison: US shadow banking system liabilities were broadly stable in 1H13 at USD 14.5tn. Liabilities of ABS issuers and Government Sponsored Enterprises accounted for 64% of the total, followed by MMFs (18%), while repo and commercial paper markets were a combined 14% (compared with 20% in 2007). As of 2Q13, US shadow banking system liabilities were equivalent to about 92% of US banking sector liabilities, down from a peak of 169% in 1Q08. This was due to both the reduction in shadow banking liabilities (USD 6.1tn) and the rise in bank liabilities (USD 3.5tn).

Investors

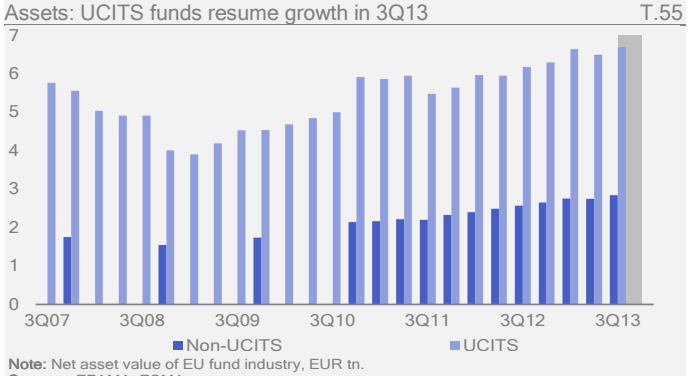
Fund industry

Assets: Total assets of EA investment funds stabilized in 3Q13 T.54



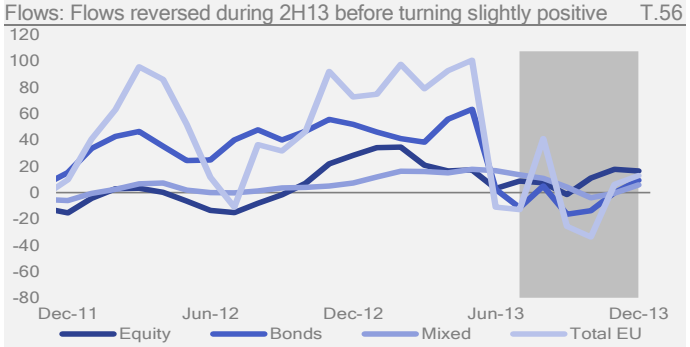
Note: Assets under management of euro area funds by fund market segments, EUR tn.
Sources: ECB, ESMA.

Assets: UCITS funds resume growth in 3Q13 T.55



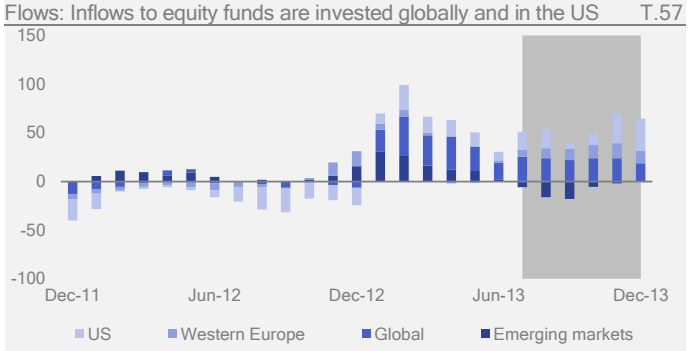
Note: Net asset value of EU fund industry, EUR tn.
Sources: EFAMA, ESMA.

Flows: Flows reversed during 2H13 before turning slightly positive T.56



Note: 2M cumulative inflows, for EU domiciled funds, EUR bn.
Sources: Thomson Reuters Lipper, ESMA.

Flows: Inflows to equity funds are invested globally and in the US T.57



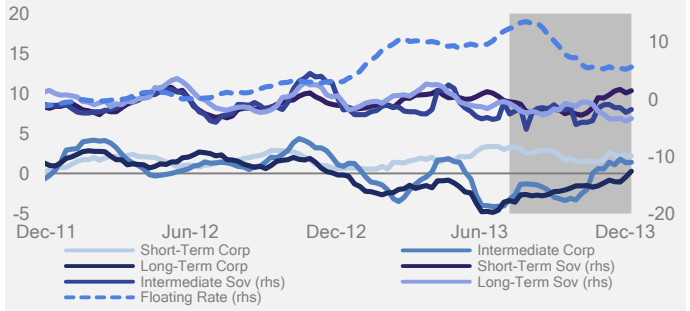
Note: 2M cumulative equity flows by regional investment focus, EUR bn.
Sources: Thomson Reuters Lipper, ESMA.

In 2H13 EU fund flows remained moderately positive after experiencing a substantial decline in late 2Q13. Despite recent improvements, uncertainty surrounding the macroeconomic outlook in the EU may have tempered investor appetite, while the low interest rate environment continued to weigh on fixed income assets. As a result, funds focusing on fixed income products experienced sizeable outflows. On the other hand, EU equity funds received positive inflows for several quarters, presumably supported by the positive development in stock markets. In aggregate, UCITS funds bore the brunt of the capital outflows from the EU fund industry, emphasizing that the underlying market fluctuations hit mutual funds harder than alternative funds. Leverage remained moderate for most fund types.

Assets: After a slight decline during late 2Q13, total assets under management at all EA funds rebounded to reach EUR 7.9tn in October (+2.3% since April 13). The positive trend was driven chiefly by equity funds and mixed funds, which both experienced a noticeable short-term decline in June before recovering (EUR 1.9tn and EUR 1.9tn; +6.3% and +4.0%). Bond funds still represent the bulk of assets under management, even though their combined balance sheet shrank (EUR 2.7tn; -2.7%). On the other hand, real estate funds continued to grow moderately (EUR 0.4tn; 1.1%). The temporary stagnation in assets under management in equity funds and mixed funds may have been triggered largely by valuation effects, following a sell-off in June in the context of political and economic uncertainty. UCITS still represent the vast majority of the EU industry, accounting for more than 70% of the entire fund industry's assets. This dominant market share remained stable over time, confirming the success of UCITS as a trusted label for investors in the EU. Nevertheless, the UCITS industry bore the brunt of the capital outflows from the fund industry in 2Q13, emphasizing that the underlying market fluctuations hit mutual funds harder than alternative funds.

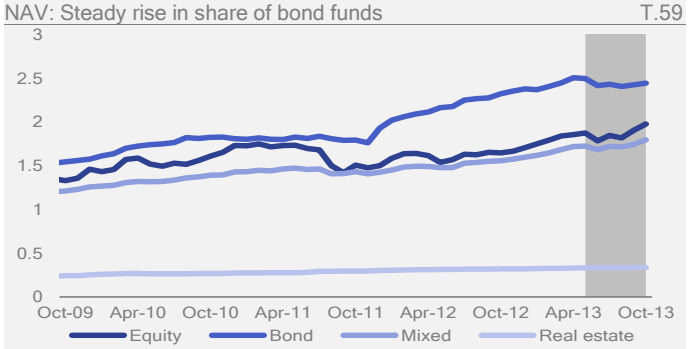
Flows: Net flows into EU funds stabilized in 2H13 at a lower level, with all fund types receiving inflows since November. Although monetary conditions remained favourable, uncertainty surrounding the macroeconomic outlook in the EU may have tempered investors' appetite, at least for funds focusing on fixed income products. Trends were thus not consistent throughout asset classes, with equity funds experiencing positive inflows in 2H13 (34.8bn EUR) while bond funds suffered outflows for most of that half-year. Investors appeared to avoid this asset class owing to the low yield environment. Mixed funds were influenced by both trends but continued to receive a steady stream of positive inflows for more than a year. With investors still shunning money market funds even after the substantial outflows in

Flows: Appetite for corporate bond funds tempered T.58



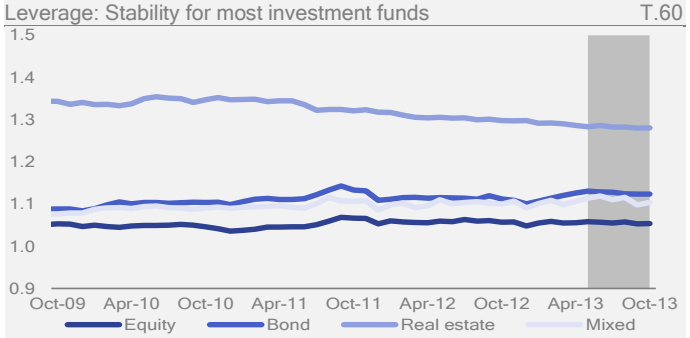
Note: 8W cumulative inflows for bond funds by maturity of the investment focus, EUR bn.
Sources: EPFR , ESMA.

NAV: Steady rise in share of bond funds T.59



Note: Net Asset Value, EUR tn.
Sources: ECB, ESMA.

Leverage: Stability for most investment funds T.60



Note: Leverage computed as the AuM/NAV ratio.
Sources:ECB, ESMA.

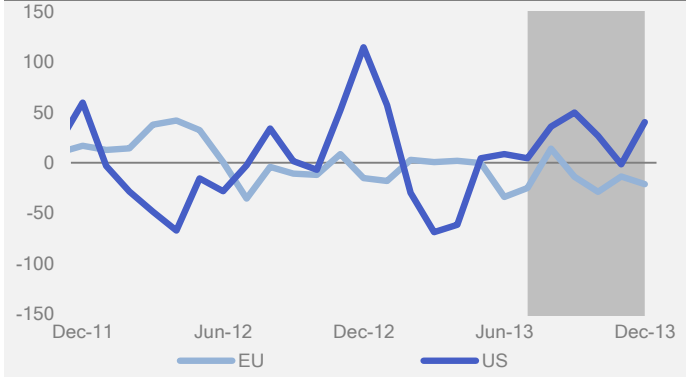
previous months, total flows decreased (see section on MMF).

Investments: In 2H13 investors showed their preference for funds pursuing a geographical diversification strategy (66bn EUR) and investing in US assets (65bn EUR). Previously neglected in favour of better performing economies, in 2H13 Western Europe equity funds received substantial inflows. US equity funds benefited from the same positive trend. In contrast, funds focused on emerging markets assets saw redemptions in 2H13, accentuating the declining trend in inflows observed in 2Q13. In the bond fund segment, investors similarly spurned fund categories investing in fixed income products issued by sovereigns and corporates. This phenomenon does not hold uniformly across all maturities, as investors tended to retain their short-term corporate bond positions. Moreover, the continued surge in floating rate bond funds established itself as a lasting trend in 2013. In the context of low interest rates, these funds may provide higher returns than other bond funds while still offering some protection against a potential rise in interest rates, because their underlyings are usually US high-yield assets, such as loans to corporates with high credit risks. Consequently, innovation in fund products currently appears to be driven by the search for yield behaviour of investors.

Leverage: Like assets under management, net asset values of most fund categories fell in June before subsequently rebounding. As of October 2013, the NAV of bond funds stood at EUR 2.4tn (down 2.5% since 1Q13), followed by equity (EUR 1.9tn; +6.5%), mixed (EUR 1.8tn; +4.5%) and real estate (EUR 0.3tn; +1.5%). For most fund types the growth rates in NAV approximately matched those in AuM. Accordingly, throughout 2H13 the leverage ratio between AuM and NAV held roughly stable for equity (1.05), bond (1.12) and mixed funds (1.10). Real estate funds' leverage continued the downtrend since 3Q11, although real estate funds were still more leveraged than the rest of the industry (1.28).

Money market funds

Flows: Flows positive in US and negative in EU T.61

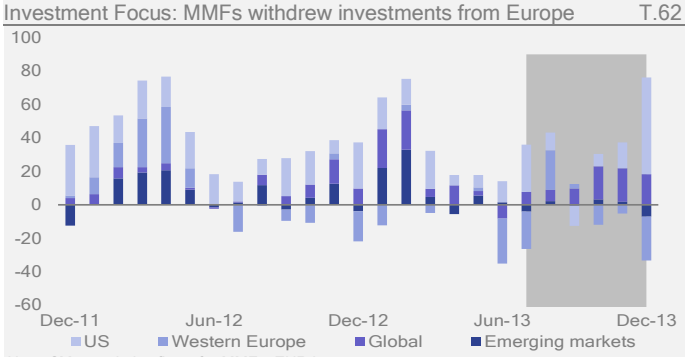


Note: 2M cumulative flows, EUR bn.
Sources: Thomson Reuters Lipper, ESMA.

After heavy outflows in 1H13, EU MMFs continued to track a downward path in share volume in 2H13, potentially still affected by uncertainty regarding the sovereigns and banks in which MMFs invest and by the low interest rate environment. Conversely, US MMFs received significant inflows that have, however, not yet entirely offset the cumulated outflows suffered in 1H 13. EU MMFs' leverage ratio remained well below its long term average. A future tapering of quantitative easing might pose some short-term risks to MMFs, as least insofar as they engage in maturity transformation.

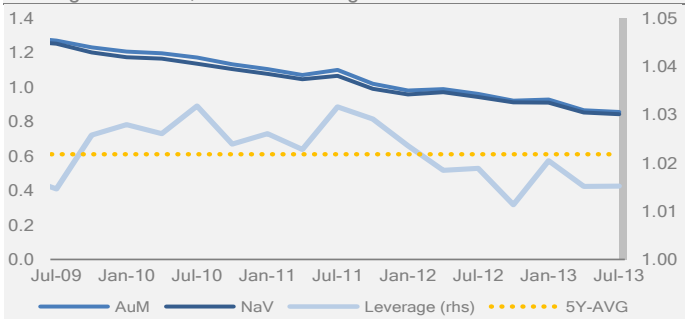
Flows: Net flows from EU MMFs were negative again in 2H13 (EUR -36bn). In this regard, funds may still be affected by uncertainty surrounding sovereigns and banks in the EA.

Investment Focus: MMFs withdrew investments from Europe T.62



Note: 2M cumulative flows for MMFs, EUR bn.
Sources: Thomson Reuters Lipper, ESMA.

Leverage: Constant, below 5Y average T.63



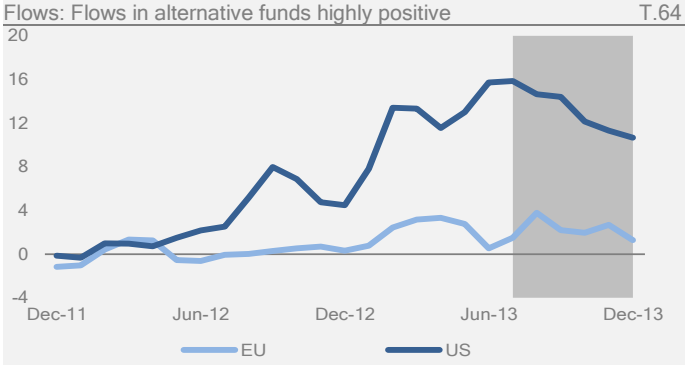
Note: Net Asset Value and Assets under Management of EA MMFs, EUR tn. Leverage computed as the AuM/NAV ratio.
Sources: ECB, ESMA.

In contrast, the trend was highly positive for US MMFs in 2H13 (EUR 103bn), although it did not yet offset the withdrawals in the first half of 2013. Although the inflows did not match the level seen in late 2012, the reversal observed in the US had already begun before the agreement on US debt and the announcement that the Federal Reserve would continue its bond buying programme. Both events could further bolster the recovery while the risk of a default on US Treasuries fades. Flows are therefore predominantly invested in US assets, which is consistent with a domestic bias. Nevertheless, in the long term the low yield environment weighs on MMFs' attractiveness, since it reduces not only their returns on assets but also exposes them to valuation risks in the event of an interest rate increase.

Assets: AuM at EA MMFs continued their long-term decline; indeed, in early 2013 this accelerated slightly, falling below EUR 0.86tn. The trend reflected the outflows observed over the same period. MMFs' leverage remained below its 5Y average, hovering in 3Q13 between 1.01 and 1.02. Again, this low leverage demonstrated MMFs' character as unleveraged funds, with their NAV always close to their asset value. However, the very nature of MMFs renders even small moves in their leverage very important, especially in times of elevated valuation risks.

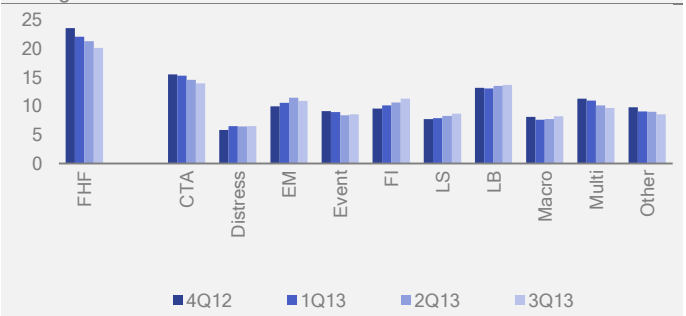
Alternative funds

Flows: Flows in alternative funds highly positive T.64



Note: 2M cumulative flows, EUR bn.
Sources: Thomson Reuters Lipper, ESMA.

Strategies: Asset allocation is diversified T.65



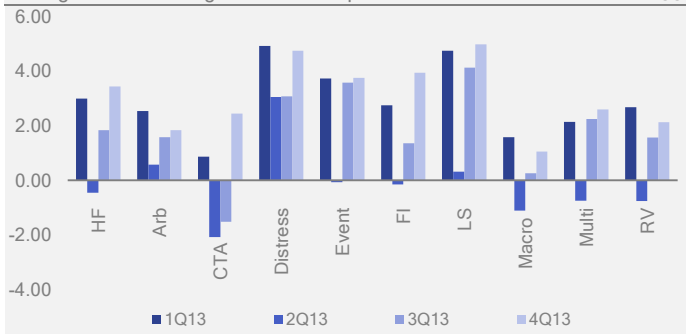
Note: Market share of hedge funds' AuM by strategy: Fund of hedge funds, Commodity Trading Advisor, distressed debt, emerging market, event driven, fixed income, long/short equity, equity long bias, macro, multi-strategy, other. Funds of hedge funds are not included in the total. % of total.
Sources:BarclayHedge, ESMA.

Alternative funds continued to enjoy steady capital inflows in 2H13 and positive returns. EU and US funds both displayed positive patterns, but the industry invested more in US or geographically diversified assets than in EU assets. Alternative funds' leverage remained significant, which, while allowing them to improve their performance, can also generate additional risk. Reacting to these incentives, AIFMD aims to improve the legal framework for EU markets by stepping up the obligations to disclose information to the public and supervisors.

Flows: Flows into alternative funds remained positive in 2H13. EU funds again experienced positive inflows (EUR 7bn), evidencing hedge funds' capacity to withstand episodes of greater macroeconomic uncertainty and take advantage of positive market trends. Unlike most of the other fund categories, they have been able to attract investors constantly. US funds exhibited a more pronounced pattern with inflows of EUR 37.4bn.

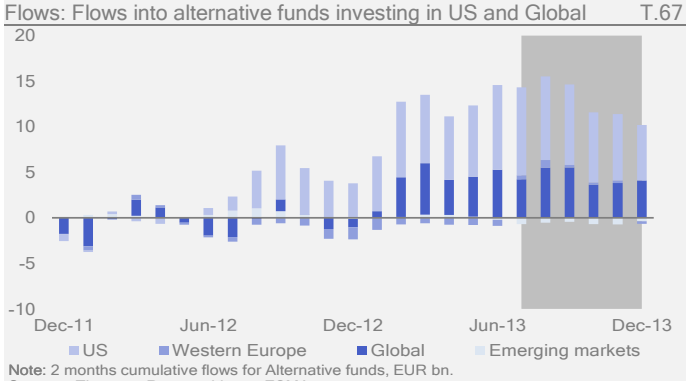
Investment focus: Assets invested in hedge funds are not dedicated to a single specific asset class but rather distributed between several strategies. Notably, a significant portion of the assets go to funds of hedge funds, whose AuM equal 20% of other hedge funds' AuM, even though their market share has been declining for several quarters. On the other hand, the

Strategies: Most strategies reverted to positive returns in 3Q13 T.66



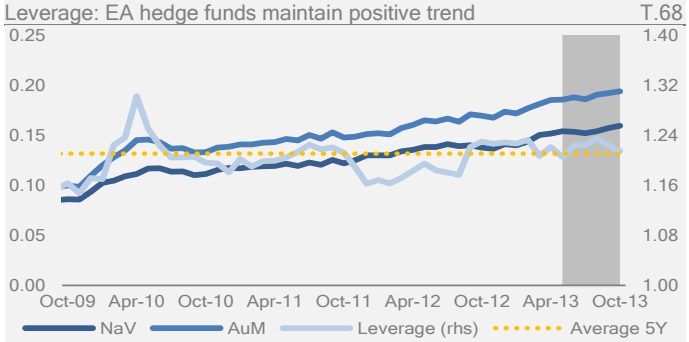
Note: Growth of hedge fund performance indices by strategy: Hedge fund index, arbitrage, Commodity Trading Advisor, distressed debt, event driven, fixed income, long/short equity, macro, multi-strategy, relative value; %.
Sources: Eurekahedge, ESMA.

Flows: Flows into alternative funds investing in US and Global T.67



Note: 2 months cumulative flows for Alternative funds, EUR bn.
Sources: Thomson Reuters Lipper, ESMA.

Leverage: EA hedge funds maintain positive trend T.68



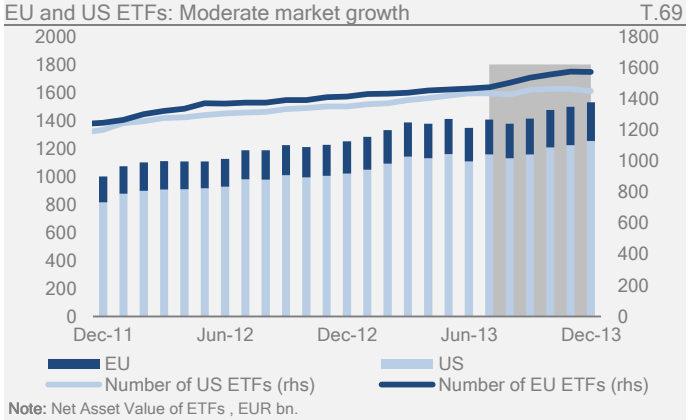
Note: Net Asset Value and Assets under Management of EA hedge funds, EUR tn. Leverage computed as the AuM/NAV ratio.
Sources: ECB, ESMA.

AuM of macro strategy (+9.1%), equity long bias strategy (+8.7%) and event driven strategy (+7.3%) increased in 3Q13. Overall, there is no dominant strategy in terms of assets, but funds investing in equity (long and long/short), fixed income and futures (CTA) capture nearly half of the AuM. Alternative funds' capacity to attract capital inflows also depends on their ability to generate returns. In this respect, most strategies registered positive performance in 2H13, implying an improvement versus 2Q13 for some strategies. Alternative funds benefited particularly from the general improvement in the macroeconomic outlook in the EU as well as monetary and fiscal policy developments in the US. Long/short equity funds reported the best semi-annual performance (+9.3%) followed by distressed debt funds (+8%). On a yearly basis, distressed debt funds posted the best yearly performance (+16.8%). In terms of geographical focus, throughout 2013 investors in alternative funds have shown a clear preference for funds that pursue a geographical diversification strategy and invest in US assets. In 2H13, 65% of alternative funds' capital inflows were invested into funds focused on the US, 37% of inflows went into funds picking global assets, and the remainder into funds focusing on Western Europe and Emerging Markets.

Assets: As of October 2013, assets managed by EA alternative funds accounted for EUR 193bn, compared to a NAV of EUR 159bn. Since alternative funds have recourse to external funding, their leverage remained higher than most other funds but held stable in 3Q13, at 1.22. However, this figure does not take into account off-balance sheet techniques that alternative funds may use to increase their leverage, e.g. derivatives. That is one of the reasons why AIFMD tightened up alternative funds' disclosure requirements and reporting duties to supervisory authorities, which also include information on the leverage embedded in financial derivatives. The reduction in the share of derivatives and remaining assets on EU hedge funds' balance sheets from 17% to 11% observed between 1Q09 and 3Q13 provides some corroboration for the effectiveness of this specific regulatory measure.

Exchange – traded funds

EU and US ETFs: Moderate market growth T.69

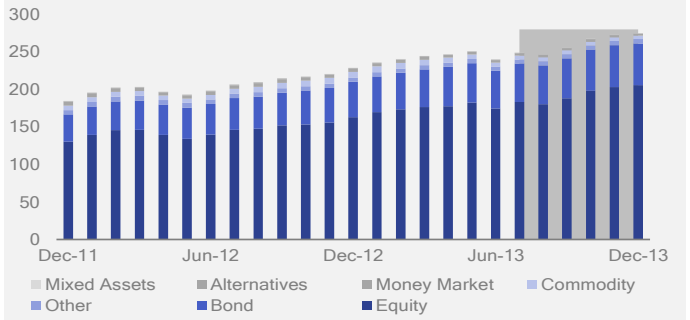


Note: Net Asset Value of ETFs , EUR bn.
Sources: Thomson Reuters Lipper, ESMA

In 2H13, the market value of EU ETF shares increased by EUR 35bn to EUR 275bn. The industry remains dominated by equity funds, which account for 75% of NAV. On average ETFs continue to replicate their respective benchmarks more accurately than other tracking funds.

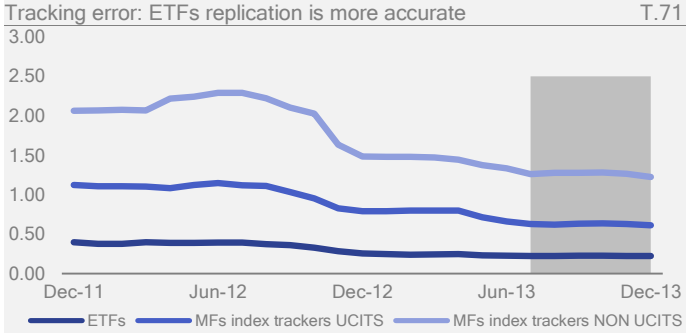
Assets: In 2H13, EU ETFs experienced a substantial increase of EUR 35bn in their NAV, pushing it up to EUR 275bn. The increase in NAV was not matched by the number of ETF funds, which rose by roughly 7%. On average, EU ETFs thus grew in size. The US ETF industry followed a similar pattern, with a EUR 148bn increase in NAV to EUR 1.2tn but numerical growth of less than 1%. Hence the trend to bigger, more mature funds continued in both regions, leading to economies of scale.

Investment focus: Equity funds dominate T.70



Note: Net Asset Value of EU ETFs by asset type , EUR bn.
Sources: Thomson Reuters Lipper, ESMA

Tracking error: ETFs replication is more accurate T.71



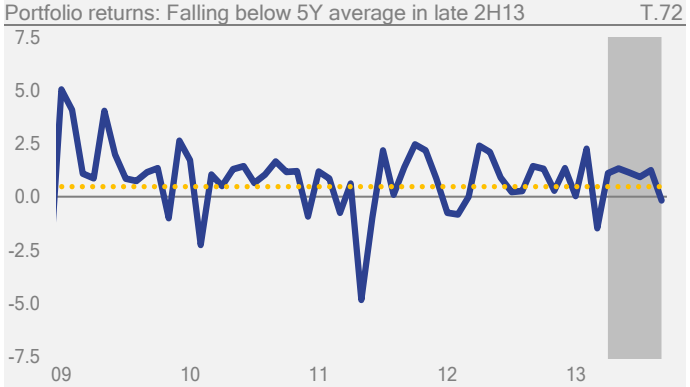
Note: Tracking error defined as the standard deviation of the excess returns of a fund from those of its benchmark . Yearly standard deviation reported on monthly frequency.
Sources: Thomson Reuters Lipper, ESMA

Investment focus: The EU ETF industry continued to focus on equity markets: in 2H13, 75% of the entire industry's NAV was represented by funds investing predominantly into equities and another 20% by those focusing on bonds. Other investment strategies remained the exception. In terms of market infrastructures, ETF trading in the EU remained highly concentrated, as more than 90% of total trading took place on four trading venues (Deutsche Borse, London Stock Exchange, NYSE Euronext and SIX Swiss Exchange).

Tracking accuracy: In 2H13, ETFs continued to demonstrate a high level of accuracy in tracking their respective benchmarks. On average they did not follow the example of other trackers, which experienced higher tracking errors throughout the period under review. The stability in ETFs' tracking accuracy in recent periods of market turmoil reflected a higher proportion of passive strategies in their investment approach relative to those of other trackers. In addition, their greater tracking accuracy may be due to cost advantages in their replication technology, such as the absence of a need to insure against higher redemption costs in times of elevated market stress. The steady upward trend in ETFs' tracking accuracy may indicate efficiency gains in the sector and disciplining effects from increasing liquidity in secondary markets for ETFs.

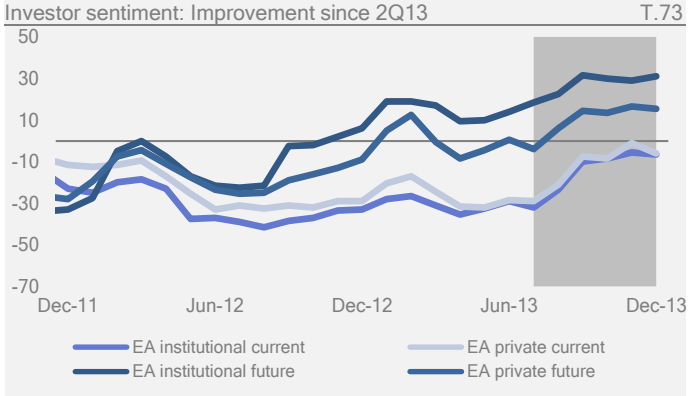
Retail investor trends

Portfolio returns: Falling below 5Y average in late 2H13 T.72



Note: Monthly returns on a portfolio composed of 47% stocks (Stoxx600), 42% deposits (1Y Euribor) and 11% bonds (Barclays Euro Aggregate 7-10Y).
Sources: Thomson Reuters Datastream, EIOPA, ESMA.

Investor sentiment: Improvement since 2Q13 T.73

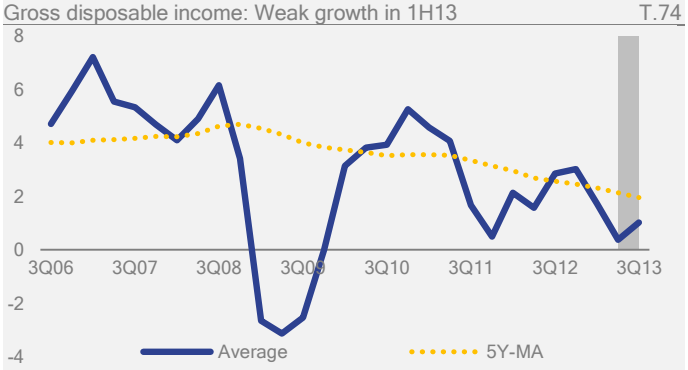


Note: Sentix Sentiment Indicators for Euro Area private and institutional investors for a 10 - year horizon. The zero benchmark marks a risk-neutral position. Monthly frequency.
Sources: Thomson Reuters Datastream, ESMA

In 2H13, returns on a representative retail investment portfolio fell below their long-term average. Simultaneously, the previously strong improvement in investor sentiment slowed. In 2Q13 EU households were still feeling the effects of the crisis: Average income growth was weak and households' real asset values continued to decline. Positive growth in the value of EU households' financial assets was concentrated mainly in equity-market-related investments (shares, mutual funds, pension/insurance), although few households actually held such investments. Consumer protection indicators signalled some light at the end of the tunnel, with retail investors reporting fewer problems with investment products and saying they trusted investment providers more than they did two years ago.

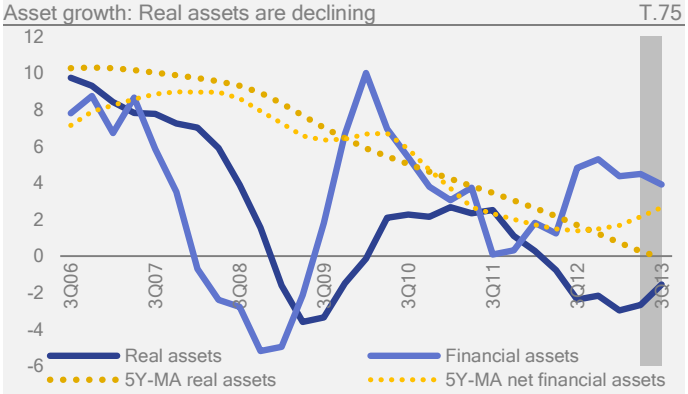
Portfolio returns: In 2H13 the monthly returns on a representative portfolio of retail investors' financial wealth initially hovered around 1.1% and fell towards the end of the year from 1.26% to -0.17%, the latter value lying markedly below the 5Y average of 0.48%. The rapid contraction in late 2H13 was driven mainly by losses in stock markets experienced around early December. The weights used for each component of the portfolio are based on an average computed over the 2007-2010 period. Currency and deposits account for 33% of the average household's financial wealth, insurance and pension fund technical reserves 29%, shares 27% and other instruments 11%. The insurance and pension fund technical reserves can be decomposed into 50% shares, 35% bonds with an average maturity of 7 to 10 years and 15% deposits. Accordingly, shares represent 47% of total household financial wealth, currency and deposits account for 42% and bonds for 11%.

Gross disposable income: Weak growth in 1H13 T.74



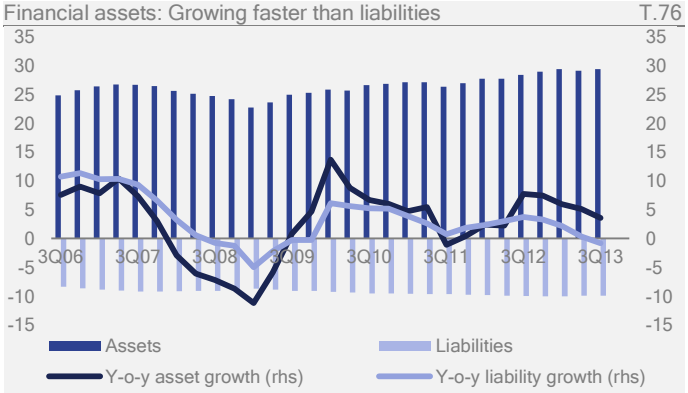
Note: Annualized growth rates of average gross disposable income in 14 EU countries (BE, CZ, DK, DE, ES, FR, IT, NL, AT, PL, PT, FI, SE, UK), %.
Sources: ECB, ESMA

Asset growth: Real assets are declining T.75



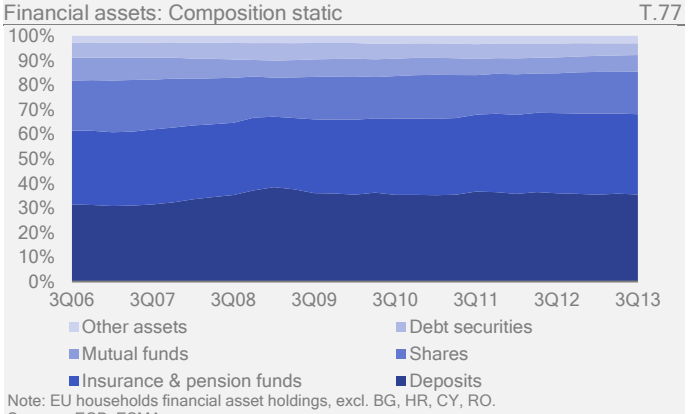
Note: Annualized growth rates of EA households' real and financial assets, %.
Sources: ECB, ESMA

Financial assets: Growing faster than liabilities T.76



Note: EU households' financial assets and liabilities, excl. BG, HR, CY, RO, EUR tn/%(rhs).
Sources: ECB, ESMA

Financial assets: Composition static T.77



Note: EU households financial asset holdings, excl. BG, HR, CY, RO.
Sources: ECB, ESMA

Investor sentiment: In early 2H13 private and institutional investor sentiment in the EA started to increase sharply. In late 2H13 this rise levelled out. Aside from the delay in the anticipated tapering of US monetary policy, investors' initial optimism in 2H13 can be traced back to EU finance ministers' agreement on the Banking Union in the Euro Area. However, the wave of investor optimism was somewhat moderated after September 2013, presumably due to mounting political risks in the EA, the looming US government shutdown and renewed uncertainties around monetary policy. Institutional investor sentiment behaved similarly to that of private investors, whereby private investors continued to be more pessimistic about the future but slightly more optimistic about the current situation.

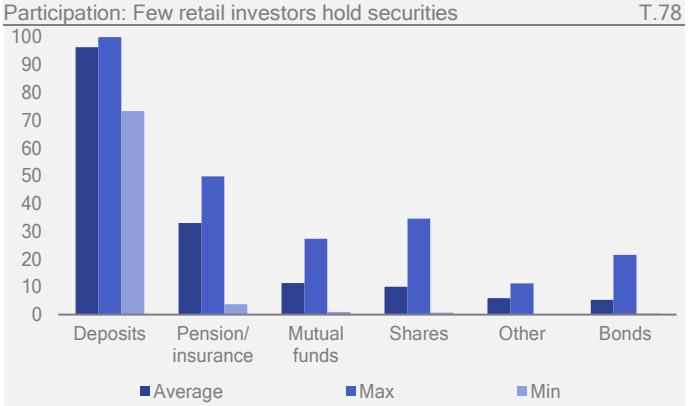
Disposable income: On average gross disposable income in EU countries picked up little compared to recent quarters. The still low average level was driven by a contraction in gross disposable income in five countries. Net compensation of employees and property income grew slightly and relatively low growth in taxes contributed to the higher year-on-year growth rate in 3Q13. Households use their income to save and invest or for consumption. EA households saved on average 13% of their income in 3Q13, which compares to EU27 households' 11% share. Household saving rates peaked in 2H09 and are now back to pre-crisis levels or even lower.

Asset growth: On average, the value of households' real assets is contracting in the EA, due mainly to the ongoing decline in property prices in certain EA countries. The compound annual growth rate of real assets owned by EA households has fallen -0.5% over the last five years. Financial assets continued to grow above their five-year moving average in the last five quarters. EA households' aggregate financial assets have climbed 3.2% per annum during the past five years. Considering that real assets make up 58% of households' total assets, the negative growth weighs on total asset growth which stood at 0.7% y-o-y in 3Q13.

Financial assets: EU households held EUR 29.4tn in financial assets and EUR 9.9tn in financial liabilities in 3Q13. The EU's average liabilities to assets ratio stood at 34% in 3Q13, currently slightly lower than its 5Y moving average of 36%. This is because households' aggregate liabilities are on average stable or falling, while financial assets are increasing slightly. Since the beginning of the financial crisis growth in EU households' financial assets and liabilities has been below average for the most part. While average growth in liabilities is still very low, financial assets have been increasing at a faster rate since 3Q12. However, this development is far from uniform across the EU: Households' financial asset growth (y-o-y) has been above average in EE, LV,PL and SE over the last year , whereas asset growth has fallen short of the EU average over the same period in IT, LU, AT, PT and SI. For the first time since 1Q10, Greek retail investors' financial assets increased year-on-year in 1H13 and even above average in 3Q13.

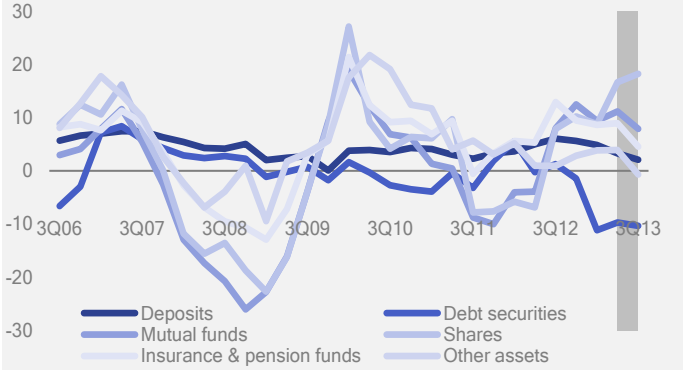
Asset composition: In 3Q13 EU households held around EUR 9.2tn in deposits, which made up 35% of their total financial assets. Insurance and pension funds came a close second to deposits in volume terms, amounting to EUR 8.5tn.

Participation: Few retail investors hold securities T.78



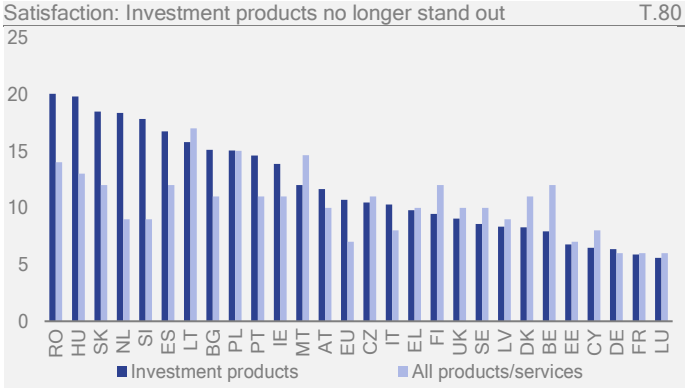
Note: Participation in financial assets of EA households excluding EE and IE, 2008-2011.
Sources: ECB HFCS, ESMA

Growth: Shares and mutual funds assets on the rise T.79



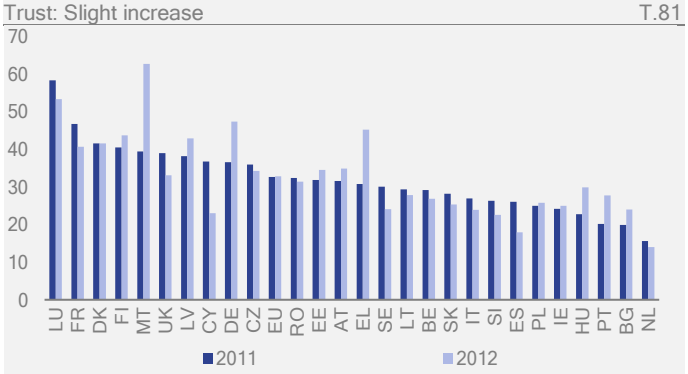
Note: Weighted average annualized growth in EU households' financial assets, excl. BG, HR, CY, RO and IE regarding mutual funds and DE regarding insurance
Sources: ECB, ESMA.

Satisfaction: Investment products no longer stand out T.80



Note: % of individuals surveyed answering "yes" to the question: "Did you experience a problem with that product/service or the supplier of that product/service?" in 2012.
Sources: European Commission DG SANCO Market Monitoring Survey 2012, ESMA

Trust: Slight increase T.81



Note: % of individuals surveyed who responded "8-20" to the question on investment products, pensions and securities: "On a scale from 0 to 10 to what extent do you trust suppliers to respect the rules and regulations protecting consumers?"
Sources: European Commission DG SANCO Market Monitoring Survey 2011/12, ESMA.

EU households held shares worth EUR 4.5tn. The proportion of deposits and insurance and pension funds relative to total financial assets rose in comparison to the pre-crisis period. In contrast, the value of shares accounted for 20% of total financial assets in 2Q06 and has since fallen to 17% of EU households' aggregate financial portfolios. EU households held mutual fund shares worth EUR 1.7tn in 3Q13, representing 7% of their total financial assets. The share of debt securities in aggregate household portfolio fell to 5% in 3Q13; at a mere EUR 1.2tn, it was the lowest since 2Q02. Other financial assets held by EU households were worth EUR 790bn in 3Q13, representing 3% of total financial assets.

Participation rates: The participation rate measures how many households in a country hold a financial asset. Across all countries, the likelihood of holding financial assets increases with income, wealth and education. Except for deposits, participation rates in financial assets differ significantly: while deposits are held by more than 95% of EA households on average, the next highest asset ranking is for life insurance and private pensions, at 33%. On average, only around 10% of EA households own mutual funds or shares. Even fewer EA households hold debt securities or other financial assets. Life insurance and private pensions exhibit the largest dispersion: whilst every second household in the Netherlands has life insurance and private pensions, only 4% of Greek households do so. The dispersion is similarly large for shares and mutual funds.

Growth: Average growth in EU household assets held in shares and mutual funds is above the 5Y average (influenced by the significant outflows in 2008 and early 2009). The growth in aggregate net household financial wealth results mainly from changes in financial asset prices and, to a lesser extent, from net acquisitions of financial assets. EU household deposits grew below their 5Y average in 3Q13. The increase in debt securities and other assets fell short of the 5Y average, while insurance and pension fund growth was just on that benchmark. Since Italian households hold around 50% of all debt securities owned by EU households, their (negative) impact on y-o-y change is high. However, even without IT, the average y-o-y change in debt securities is still negative.

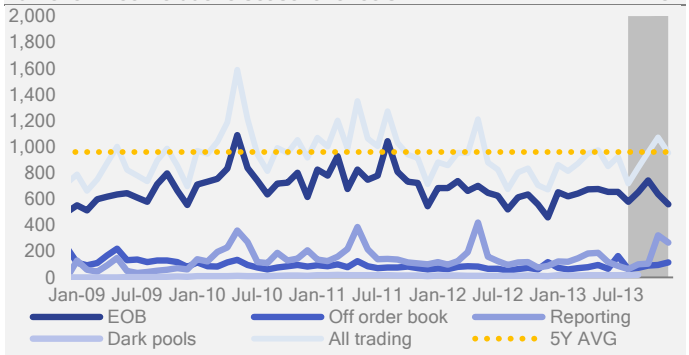
Satisfaction: The percentage of individuals having problems with investment products or services in the EU27 fell between 2010 and 2012. In 2010, 20% of survey respondents said they had experienced a problem with an investment product or provider. In 2012, that number had decreased to 12%. In 12 out of 27 countries in 2012, the share of respondents reporting problems with investment products or providers was higher than for other products or services. In 2011, the share had been higher in 21 of 27 countries.

Trust: On average, trust in financial services providers grew in the EU27 between 2010 and 2012. In 2010, 30% of survey respondents in the EU27 said they trusted investment services providers to respect consumer protection rules. In 2012, that number had increased to 33%. However, the range between the top and bottom values across Member States has increased as well: In 2010 the difference between the lowest and highest proportion of respondents in a country trusting providers to respect the rules was 14% and 54%; in 2012, the figures were 14% and 63%. The proportion of respondents having problems is negatively correlated with the proportion of respondents trusting investment services providers.

Market infrastructures

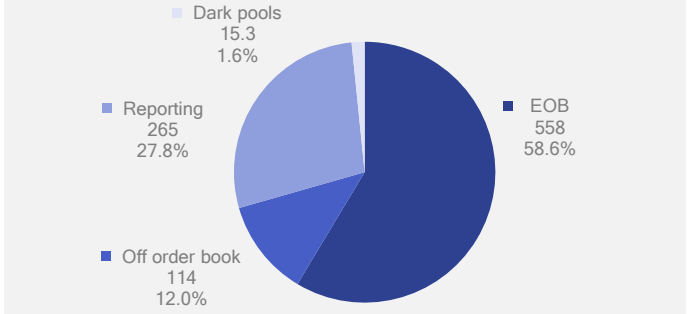
Trading venues

Turnover: Decline due to seasonal effects T.82



Note: Turnover on trading venues by category, in EUR bn. 5Y-AVG= 5Y average of all trading.
Sources: FESE, ESMA.

Equity trading: Turnover by transaction types T.83



Note: EUR bn and in %. Data as of December 2013, EOB= Electronic Order Book.
Sources: FESE, ESMA.

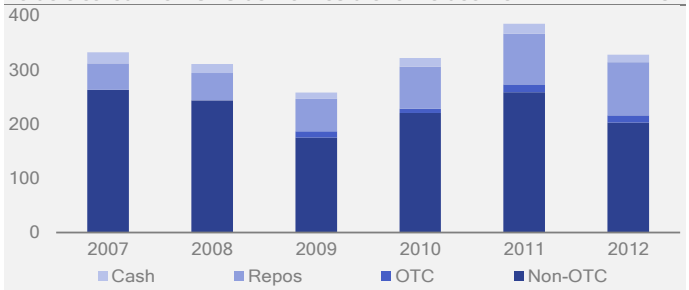
In 3Q13, EU trading venue turnover declined due to slack trading activity in August. Excluding seasonal effects, overall trading was in line with 1H13. Equity trading continued to be conducted mainly through electronic order books, although dark trading remained on the increase, ranging between 2% and 10%.

Turnover: Reaching approximate monthly turnover of EUR 900bn, activity increased slightly in 2H13, despite low trading activity in August. This was mainly due to higher off-order-book activity on trading venues during the semester. A significant increase in trading activity was observed in November 2013, surpassing its five-year average (EUR 1,071bn versus EUR 960bn). The main driver was reporting activity, which reached EUR 322bn versus a monthly average of EUR 145bn. The reporting category refers to OTC trades reported by only one counterparty. Activity on dark pools increased slightly to a monthly average of EUR 18bn versus EUR 15bn in the previous semester.

Transaction type: Equity trading continued to be transacted mainly through electronic order books (around 60% of total turnover in December 2013), although the share decreased due to a bout of activity in the reporting category. Trading on dark pools remained limited, at 1.6% of total turnover, but has increased steadily from less than 1.5% a year ago. This figure refers only to exchanges and some MTF-operated dark pools. If Broker Crossing Networks were considered, plus the other Dark Pool MTFs, the share of dark trading would inevitably be higher: Thomson Reuters' estimates it at 10.2% for 2H13.

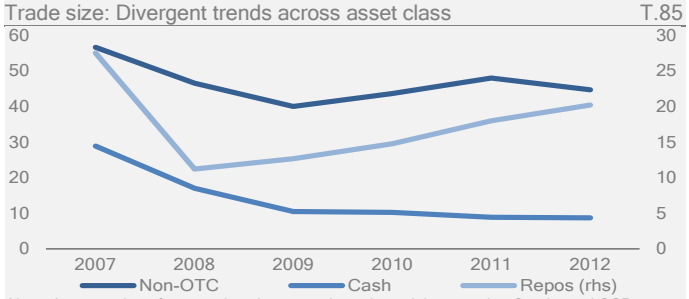
Central counterparties

Value cleared: Non-OTC derivatives drove the decline T.84



Note: Volume of transactions by asset class cleared by reporting Continental CCPs. Annual data 2007 - 2012; EUR tn: Cash, Repos, non-OTC and OTC derivatives. Uneven reporting across years and CCPs. Includes CCP Austria, Eurex Clearing A.G.; LCH Clearnet S.A.; EMTE; CC&G; Hellenic Exchanges Holdings S.A.; KDPW CCP S.A.; KELER CCP.
Sources: ECB and ESMA

Trade size: Divergent trends across asset class T.85



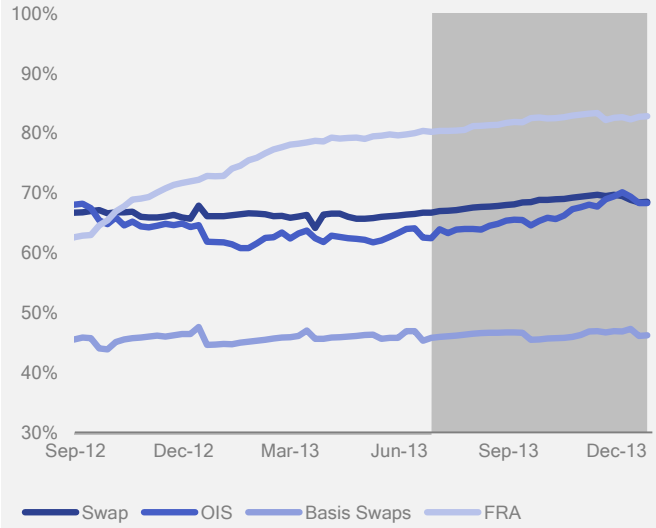
Note: Average size of transactions by asset class cleared by reporting Continental CCPs. Annual data: 2007 - 2012 EUR mn (rhs scale bn): cash, repos and non-OTC derivatives. Uneven reporting across years and CCPs. Includes: CCP Austria Eurex Clearing A.G.; LCH Clearnet S.A.; EMTE; CC&G; Hellenic Exchanges Holdings S.A.; KDPW CCP S.A.; KELER CCP.
Sources: ECB, ESMA.

At a global level, the percentage of interest rate swaps that were centrally cleared continued to increase during the reporting period. In 2012, the cumulative value of trades cleared through Continental European CCPs across the spectrum fell for the first time since 2009, after having recovered to above 2007 levels in 2011. This decline was led by non-OTC derivatives, with cumulative values of contracts in all other areas remaining broadly stable; the share of OTC trades in all cleared trades increased marginally. Meanwhile, the average trade size developed quite heterogeneously across asset classes in 2012, with repos continuing to rebound while non-OTC seem to have plateaued and cash transactions continue to shrink.

Value cleared: According to annual ECB data, the cumulative value of transactions cleared by Continental CCPs contracted by EUR 60tn in 2012, falling back to EUR 200tn. The proportion of non-OTC derivatives, which constitute the largest part of values cleared, declined in 2012, from 80% in 2007 to 60%. Meanwhile, the share of repos doubled to 30%. As a percentage of all cleared trades reported to the ECB, the share of OTC derivatives increased slightly again in 2012 to 4.2%.

Trade size: The average size of centrally cleared transactions on the Continent varied by asset class, as did their development. Repos – the asset class displaying by far the largest average transaction size – experienced the most

Interest Rate Swap clearing: Broad increase T.86



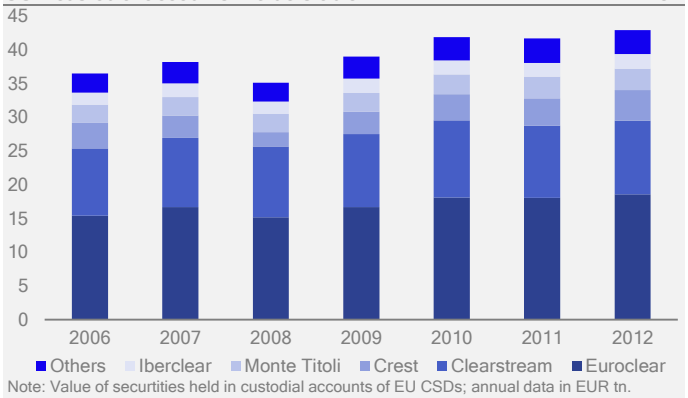
Note: Share of OTC interest rate derivatives cleared by CCPs based on notional amounts.
Sources: DTCC, ESMA.

pronounced fall with the subprime crisis, while achieving an immediate and persistent rebound. Non-OTC derivatives stabilized at around 75% of their pre-crisis average size of EUR 57mn in 2007, reaching about 45mn in 2012.

Interest Rate Swap clearing: According to DTCC data, in terms of gross notionals the share of centrally cleared IRS contracts rose in 13H2 by USD 30tn to USD 290tn. The increase was broad-based, with only Basis Swaps remaining flat around 47%. The share of centrally cleared Forward Rate Agreements (FRA) edged up from 80% to 83%, continuing the trend established in 1H13, while Overnight Index Swaps (OIS) jumped six percentage points to 68%. However, a temporary decline in the share of IRS being cleared by CCPs was observed during the last two weeks of 2013, dropping from 64% to 53%. This is explained by a surge in activity for cross currency swaps, which are not currently cleared by CCPs, with an increase in notional from USD 17tn on 13 December to USD 105tn on 20 and 27 December. Most of this activity was linked to Turkish lira swaps, possibly due to political turmoil end-December. Early January 2014, amounts outstanding declined back to USD 30tn.

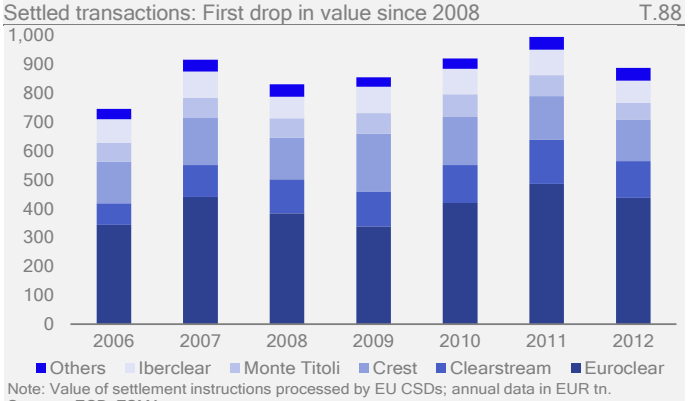
Central securities depositories

CSD custodial accounts: Value stable T.87



Note: Value of securities held in custodial accounts of EU CSDs; annual data in EUR tn.
Sources: ECB, ESMA.

Settled transactions: First drop in value since 2008 T.88



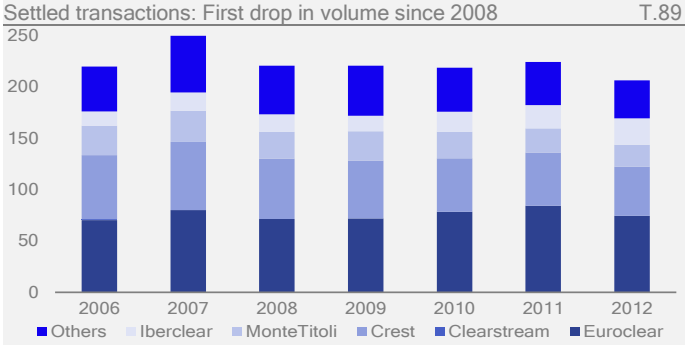
Note: Value of settlement instructions processed by EU CSDs; annual data in EUR tn.
Sources: ECB, ESMA.

EU settlement activity fell in 2012, both in terms of value and transactions, even as the recovery in asset prices saw the value of assets held in custody resume its rise. Concentration remains a significant feature of a market typically exhibiting a monopolistic structure, with markets often delineated along national borders. Leading to further concentration is the continued growth of ICSDs. In this regard, market shares appear to reflect greater concentration over the past five years.

CSD custodial accounts: The value of securities held in custodial accounts by CSDs increased by roughly EUR 1.25tn to EUR 43tn in 2012. After a marginal reduction in 2011, this increase represents a continuation of the upward trend established following the marked contraction in 2008. The relative shares held in larger centres remained fairly stable, as they have tended to since 2006. While the relative shares prior to the subprime crisis have broadly been re-established, a couple of larger markets have shown considerable fluctuation since, especially those with large financial centres.

Settled transactions: In 2012, the value of settlement instructions processed by CSDs in the EU totalled EUR 887tn. This constitutes a drop of about 11tn – the first since the value of transactions began rising steadily as from 2008, following a similar descent from its 2007 high. In terms of relative shares, the two largest Continental CSDs concentrate around 65% of transactions, measured in value, between them – up from 55% in 2006; meanwhile, the value of transactions in two large and

Settled transactions: First drop in volume since 2008 T.89

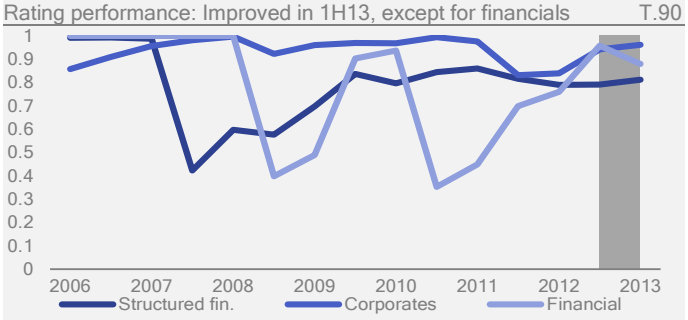


Note: Number of settlement instructions processed by EU CSDs; annual data in mn transactions.
Sources: ECB, ESMA.

vulnerable MS has fallen; the value of transactions processed in a large MS with a large financial sector has been distinctly volatile, with its market share fluctuating between 16% and 25% since 2009. As with the value, the number of annual transactions settled by EU CSDs receded in 2012 for the first time since 2008. A drop of five million transactions was recorded, leaving 317mn transactions settled in the EU. Again, the relative share of the two largest Continental CSDs increased from 2006, reaching nearly 60%; the share settled in a large Member State with a large financial sector continued to decline to just over 15%.

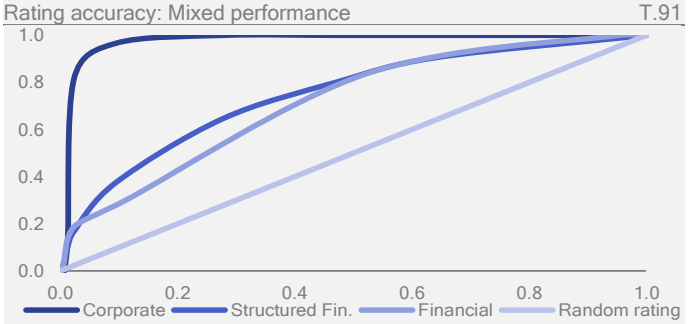
Credit rating agencies

Rating performance: Improved in 1H13, except for financials T.90



Note:Cumulative Accuracy Profile (CAP) coefficients measure the accuracy of ratings. The coefficient is derived from average defaulter position (AP), then computed as follows: CAP = 2*AP -1. The closer the coefficient is to 100% the higher the accuracy of the ratings (i.e. defaults occur among low credit ratings).
Sources: CEREP, ESMA.

Rating accuracy: Mixed performance T.91



Note:Cumulative accuracy profile (CAP) curves for the 3 largest credit rating agencies. 2008-2013H1. The CAP curve plots the cumulative proportion of issuers by rating grade (starting with the lowest grade on the left) against the cumulative proportion of defaulters by rating grade.
Sources: CEREP, ESMA.

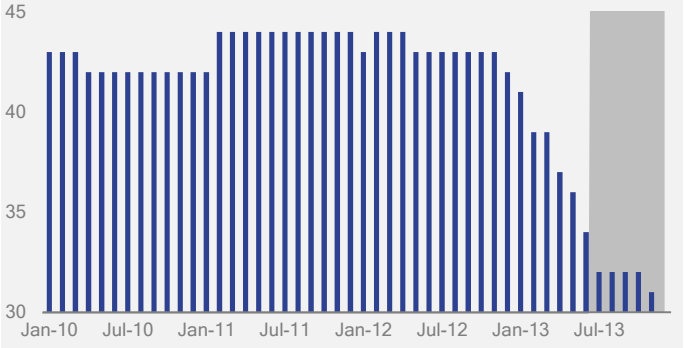
The operative efficiency of CRAs as gauged by the CAP coefficients shows uneven performance with respect to the asset class rated, with better rating accuracy for structured finance and corporates in 1H13 and less so for financials.

Rating performance: Overall rating performance improved in 2013 for corporates, due chiefly to fewer defaults in the financial asset class. The one-year CAP coefficient measuring rating performance per asset class over one year increased from 94.2% to 96.2% for all corporates and from 79.2% to 81.2% for structured finance. Rating performance for financials decreased slightly, from 95.7% to 87.9%. Ratings performed very differently across asset classes over the period 2008 to 2013H1, as evidenced by the cumulative accuracy profile (CAP) curves. The closer the CAP curve is to the random curve, the lower the performance of the ratings, i.e. defaults occurring independently of the rating grade. Corporate rating accuracy was higher than for financials and structured finance issuers, with defaults mostly concentrated on low-rated corporate bonds, as illustrated by the shape of the CAP curve.

Rating accuracy: The financials CAP curve was impacted mainly by the relatively large number of defaults in the AA and A rating classes, although the small size of the sample (30 defaults) may affect the robustness of the results. The structured finance CAP curve indicates that defaults occurred even in the highest rating classes.

Financial benchmarks

Euribor continuity: Bank withdrawals halted T.92

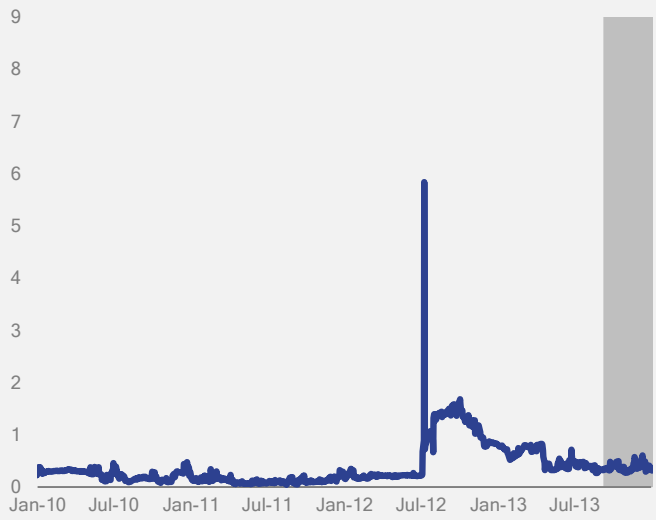


Note:Number of banks participating in the Euribor panel.
Sources: Euribor-EBF, ESMA.

The quality and continuity of key financial benchmarks in the EU remains a key concern for ESMA. Even though withdrawals by submitting banks from interbank interest reference rate panels have dwindled, the panels remain weakened, and the USD Euribor benchmark was discontinued on 1 September 2013. The European Commission published a Proposal for a Regulation of financial benchmarks on 18 September 2013, and the Financial Stability Board continued its work on key conceptual issues on interest rate benchmarks.

Benchmark continuity: The continuity of benchmarks remains a key concern for ESMA, in particular with respect to submission-based interbank reference interest rates. Compared to 1H13, withdrawals by submitting banks from interbank reference rate panels dwindled. For the Euribor

Euribor submissions: Lower dispersion of contributions T.93



Note: For each of the 15 Euribor tenors, the difference between the highest and lowest contributions submitted by panel banks is computed and normalized by the corresponding Euribor rate. The chart shows the maximum of those differences across the 7 tenors, in percentage points. The increase in the series since July 2012 is linked to technical factors such as the low level of Euribor rates. The lower the rate, the higher the impact of a given dispersion in the contributions.

Sources: Thomson Reuters Eikon, ESMA.

Minimum number of panel banks in Euribor EBF benchmarks T.94

Benchmark	Minimum	Current
USD Euribor		Discontinued
EONIA Swap Index	8	8
Eurepo Index	12	13
Euribor	12	31
EONIA	Not specified	34

Note: Minimum required number of banks submitting to, and current number of banks on respective benchmark panels.
Source: Euribor-EBF.

Panel the situation stabilised, after the number of submitting banks had fallen 28% between November 2012 and June 2013 from 43 to 32 (chart T.91), although there was one withdrawal in 4Q13. Other panels administered by Euribor-EBF experienced similar trends, with significant withdrawals in 1H13 and relative stabilisation since. As panels remain weakened from earlier withdrawals, the USD Euribor benchmark was discontinued by the administrator on 1 September 2013. There was no discernible market impact, as the rate had been little used in the markets since its inception. Some Euribor-EBF benchmarks have approached or reached the minimum number of panel banks required to compute the relevant benchmark, and the administrator and panel banks have been called upon to ensure the continued availability of the relevant rates (Table T.93).

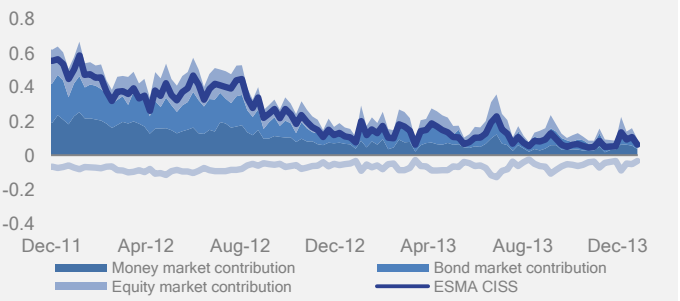
Quality of contributions: Enhanced scrutiny of benchmarks by supervisory authorities for irregularities in submission and calculation focuses, among other factors, on the quality of contributions by submitters to quote-based reference rates, especially the potential submission of manipulated quotations. Investigations by competent authorities in the EU and elsewhere into potential manipulations of interbank interest reference rates, derivatives prices, oil price benchmarks and exchange rates are ongoing. In addition to manipulation, erroneous quote submissions were identified as a second source of potential benchmark inaccuracies. The incidence of obviously erroneous submissions – i.e. quotes that deviate abnormally from other submissions, including so-called fat finger errors – seems to have declined in response to the heightened scrutiny by supervisory authorities. Patently erroneous submissions have become rare in recent months, as indicated by the dispersion in rate submissions. For example, the dispersion of contributions by Euribor panel banks has declined since January 2013. In particular, abnormal deviations did not occur in 2H13 (chart T.92).

Policy measures: The European Commission published in 18 September 2013 a proposal for a Regulation on indices used as benchmarks in financial instruments and financial contracts. The Financial Stability Board continued its work on key conceptual issues on interest rate benchmarks.

Trends
Risks
Vulnerabilities

ESMA Risk Dashboard

Systemic stress: Continued relaxation R.1



Note: ESMA version of the ECB-CISS indicator measuring systemic stress on securities markets. A detailed explanation is provided in the technical annex to the Risk Dashboard.
Sources: ECB, ESMA.

Main risks: Sources R.2

Economic environment	Change since 3Q13
Macroeconomic conditions	→
Interest-rate environment	↗
Sovereign-bank nexus	→
Securities markets conditions	
Risks in EU sovereign debt markets	→
Market clustering	→
Funding risk	→
Valuation risk	↗
Market functioning	↗

Note: Assessment of main risk sources under ESMA's remit. Change since the last assessment. Upward arrows indicate an increase in the contribution to risks, downward arrows indicate a decrease in the contribution to risks.
Source: ESMA.

Main risks: Categories R.3

Risk category	Systemic risk	Change since 3Q13	Outlook for 1Q14
Liquidity risk	●	→	→
Market risk	●	→	→
Contagion risk	●	→	→
Credit risk	●	→	→

Note: Assessment of main risk categories for markets under ESMA's remit since last quarter and outlook for following quarter. Systemic risk assessment based on categorisation of ESMA Systemic Risk Heat Map, green=low, yellow=moderate, orange=high, red=very high. Systemic RIsk Heat Map measures current risk intensity. Upward arrows indicate a risk increase, downward arrows indicate a risk decrease.
Source: ESMA.

Tensions in EU financial markets further eased during 4Q13. Synthetic stress indicators fell to levels experienced before 2007. This is associated with the combination of improved macroeconomic prospects for some EU economies, easing pressure on EU sovereign debt markets, and continuing monetary policy and liquidity support measures. Risks nevertheless remained high. With regard to market risk, we detect increased signs of search-for-yield behaviour, potentially related to the ongoing low interest-rate environment. This may sustain risky investment strategies and lead to the build-up of growing valuation risks. Liquidity, credit and contagion risks were broadly stable at an elevated level and are expected to remain so in the short run.

Systemic stress: At the EU level, all components of the systemic stress indicator reached lows in 4Q13, with the ESMA CISS indicator at its 2007 level despite some volatility. Markets were especially responsive to brightening macro-economic prospects and continued monetary policy support. Even so, the possibility of a sudden risk reassessment should be carefully considered, given the still weak – albeit improving – macroeconomic outlook and the market uncertainty surrounding future economic policies, both fiscal and monetary.

Economic environment

Macroeconomic conditions: The macroeconomic outlook in the EU improved in recent quarters, with the EA as a whole no longer in recession. Activity picked up for several major advanced economies, as policy makers and central banks gave clear indications that they would support the recovery. Nevertheless, significant risks persist. Within the EU, performance remained mixed with some countries still labouring under negative or zero growth and concerns lingering over high unemployment and significant levels of both public and private debt. A combination of the subdued macroeconomic environment and debt servicing pressures is likely to affect profitability for corporates, especially smaller and medium companies in more stressed economies. Outside the EU, emerging economies continued to show signs of weakness, with noticeable capital outflows potentially leading to pressure on wider financial markets. In the US, market speculation persists over the future of monetary support measures, and following the budget standoff in fall 2013 important deliberations on fiscal policy continue into 2014.

Interest-rate environment: Following the announcement that the Federal Reserve would continue its asset purchasing programme, in November the ECB cut its main policy rate to the historically low level of 0.25%. The current period of low interest rates is therefore set to continue. In this environment yield curves in major currencies flattened, reversing the steepening observed in 3Q13. These conditions support markets but increase the risks attendant on future interest-rate hikes. Discreet nominal increases from low interest-rate levels result in large percentage moves, with correspondingly greater tension related to sudden revaluation and increased credit risk for both financial and non-financial corporations.

Main risks: Summary assessment R.4

Category	Summary
Liquidity risk	Market signals of liquidity risk in 4Q13 were mixed. On the one hand, volatility in equity markets decreased further to its lowest levels since the start of the financial crisis. Nor did any major changes take place in liquidity in sovereign bond markets. On the other hand, heterogeneity persisted across regions and market segments. Developments in bond market volatility were mixed, with an increase for shorter maturities and a decrease for longer maturities. Overall, liquidity risk developments should be treated with caution as liquidity support measures remain in place and shifts in yield curves could significantly alter liquidity risks.
Market risk	Market risk, although still high, stabilised in 4Q13. Equity valuations rose in the EU and the US. In Europe price-earnings (PE) ratios remained well below their long-term average, whereas in the US PE ratios remained above their long-term average, leading to future valuation risks. Corporate bond spreads in lower-rated bonds continued to decline, potentially reflecting a shift in risk assessment and continued search-for-yield behaviour on the part of investors. US fund flows were volatile and bond market outflows continued in the US and emerging markets (EM) areas.
Contagion risk	The level of contagion risk in sovereign debt markets remained broadly stable, concentrating on the most vulnerable group of MS. However, the potential for systemic events remained substantial. After a period of high co-movement among sovereigns in 3Q13, in 4Q13 the most vulnerable countries first started to disentangle, possibly signalling a return to the core-periphery clustering in the EU. MS then realigned, and the correlation among sovereigns as well as between sovereign and corporate bonds rose to reach levels close to unity in November. Nevertheless, uncertainty around the Fed's tapering programme prompted a return to higher dispersion at the end of the period.
Credit risk	The assessment of credit risk was broadly unchanged in 4Q13. Although debt issuance was globally subdued in EU, sovereigns and corporates were able to issue debt at longer maturities, taking advantage of the relatively low long-term interest rates. Banks continued orderly reduction of their wholesale funding needs, but a substantial proportion of debt outstanding has to be rolled over in the coming quarters. Since the improvement in conditions relies heavily on buoyant monetary policy measures, a rise in the interest rate could potentially trigger heightened credit risk, especially in countries with high public indebtedness or vulnerable corporate sectors, both non-financials and financials.

Note: Qualitative summary of assessment of main risk categories in markets under ESMA remit.

Market functioning: Risk summary R.5

Risk	Summary
Bench-marks	Panel withdrawals appeared to have come to a halt, although concerns over the stability of benchmarks remained. There was also growing unease surrounding potential forex manipulation, and the discontinuation of a non-EU equity benchmark showed that benchmarks remain vulnerable to operational risks.
Market infra-structures	As in previous quarters, the operational stability of market trading venues and systems was tested on several occasions in 4Q13. The risk of cyber-attacks recently moved to the forefront with a US exercise illustrating the vulnerability of market infrastructures to this type of threat.
Shadow banking	The shadow banking system expanded slightly, although some specific segments continued their gradual contraction, with securitisation issuance at an all-time low and leverage ratios in the non-bank financial sector staying below pre-crisis levels. On the other hand, we observe renewed market interest in instruments based on loans, such as CLOs, in the context of search-for-yield strategies. Exposure of MMFs, Hedge Funds (HF) and other fund types to credit and funding risk remained a concern. Systemic risks from high degrees of interconnectedness, credit risk concentration, and liquidity flows remain under surveillance.

Note: Qualitative summary of assessment of main risks to the functioning of markets under ESMA remit.

Sovereign-bank nexus: Macroeconomic conditions improved, mitigating immediate risks to some Member States of a deterioration in fiscal or banking sector conditions. Monetary conditions alleviated pressures on sovereigns and banks, enabling the former to reduce fiscal imbalances and giving the latter time to adjust their balance sheets. Nevertheless, uncertainties around weak long-term economic prospects and the slow pace of structural reform in some countries remain. This may increase tensions, considering the sizeable potential effects on the banking system. Notwithstanding recent reductions, domestic sovereign debt holdings by EU banks are still significant in several economies.

Conditions in securities markets

Risks in EU sovereign debt markets: Spreads on vulnerable EU sovereigns' 10Y bonds relative to Bunds generally remained within the range observed in the first three quarters of 2013 and were back at the low levels observed in 1Q13 and early-2011. Spreads for the most vulnerable sovereigns at the longer end of the curve continued to converge. One vulnerable sovereign, however, exhibited higher volatility from the beginning of 3Q13. Within this broad harmonisation of spreads to levels not witnessed since early 2011, investors therefore remained vigilant vis-à-vis risks in vulnerable Member States.

Market clustering: Sovereigns and corporates show potential signs of re-clustering, with stronger correlation of yields within groups of countries and weaker correlation between groups. A comparable, albeit less pronounced, development is apparent between corporate and sovereign bonds. In particular, the 25% most vulnerable sovereigns tend to be less correlated with their corporate bonds than the top 75% countries.

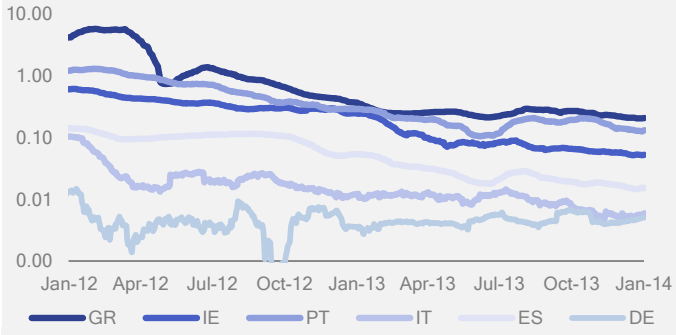
Funding risk: Evidence on funding risk was mixed. On the one hand debt issuance was subdued in the EU. On the other, sovereigns and banks were able to issue debt at longer maturities in 4Q13, taking advantage of the relatively low long-term interest rates. Although banks continued to deleverage, their future funding needs remain fairly high and a substantial fraction of debt outstanding has to be rolled over in the coming quarters.

Valuation risk: The low interest rate environment continued to steer market behaviour, fostering search-for-yield strategies. Equity markets performed strongly, and both corporate and covered bond spreads tightened at the lower end of the investment grade spectrum. These developments may potentially lead to asset overvaluation and expose investors to the risk of sudden re-pricing and divestment from some asset classes. Search-for-yield behaviour may also incentivise financial innovation and investment in less standardised products (i.e. loan funds). Whilst this can be beneficial to the economy, it may channel investment into risky or leveraged asset classes.

Market functioning: Key structural issues that may become relevant to EU financial markets' stability relate to benchmarks, market infrastructures and shadow banking. For a summary risk assessment see textbox R.5.

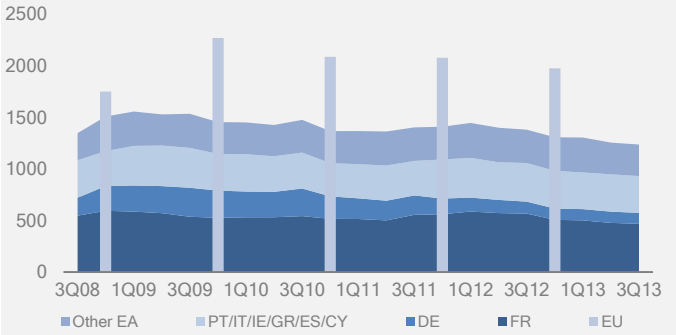
Liquidity risk

Sovereign bid-ask spreads: Small decrease R.6



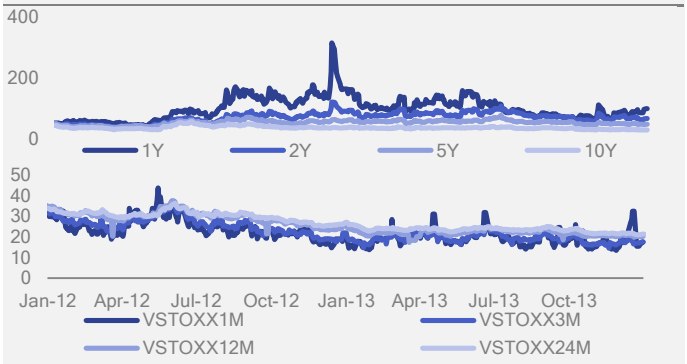
Note: 10Y EA sovereign bond bid-ask spread in percentage points; logarithmic scale, 30D moving average.
Sources: Thomson Reuters Eikon, ESMA.

Short-term issuance: Continuing decline R.7



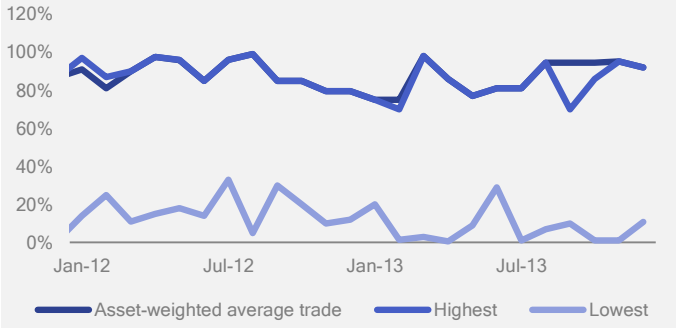
Note: Volume of short-term securities issued, EU; EUR bn., stacked data. DE issues Euro paper since 2011 only. Only yearly data available for non-EMU countries.
Sources: ECB, ESMA.

Volatilities: Further calm R.8



Note: Stoxx50 implied volatilities measured as indices; per cent. 3 month forward Euro-Euribor swaptions implied volatilities on top.
Sources: Thomson Reuters Datastream, ESMA.

Hedge fund shares: Reduced liquidity premia R.9



Note: Monthly price index for hedge fund shares on secondary markets, computed as the asset-weighted average trade in percent of the net asset value.
Sources: Hedgebay, ESMA.

Market signals of liquidity risk in 4Q13 were mixed. On the one hand, volatility in equity markets decreased further to its lowest levels since the start of the financial crisis. Nor did any major changes take place in liquidity in sovereign bond markets. On the other hand, heterogeneity persisted across regions and market segments. Developments in bond market volatility were mixed, with an increase for shorter maturities and a decrease for longer maturities. Overall, liquidity risk developments should be treated with caution as liquidity support measures remain in place and shifts in yield curves could significantly alter liquidity risks.

Sovereign bond bid-ask spreads: Bid-ask spreads for EA sovereign 10Y bonds decreased slightly compared to 3Q13 levels with no major movements within the quarter. Spread developments were comparable across all markets. However, liquidity conditions remained mixed across markets, reflecting country-specific differences.

Short-term issuance: Issuance of short-term debt declined in both non-distressed and distressed economies. The reduction in the volumes of short-term securities outstanding continued in 3Q13 (latest data available), with outstandings at their lowest levels for the past two years. As overall levels of government debt in the EA continue to rise, the ongoing reduction in short-term debt issuance could indicate that issuers are able to use the low interest rate environment to extend maturity profiles. This observation is also consistent with an easing in funding conditions.

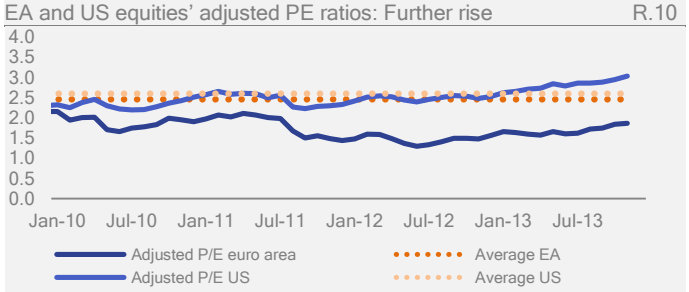
Bond volatility: After a marked fall in 3Q13, bond volatility initially continued to decrease in 4Q13, the decline being less pronounced at the shorter end of the spectrum. But from the end of October the trend started to differ between shorter and longer maturities. A sharp increase in volatility characterised the short end of the curve, whereas for longer maturities it remained broadly stable. Overall, one-year volatility rose by around 35 percentage points, whereas volatility for longer maturities decreased (e.g. two-year volatility decreased by eight percentage points and ten-year volatility increased by around 17 percentage points).

Equity volatility: Implied equity volatility increased slightly at the beginning of 4Q13 but then declined compared to the levels observed in 3Q13. The initial increase reflected concerns over the US debt ceiling standoff. However, peak volatility remained below the levels during spikes before 4Q13. The reduction in volatility was observed across the shorter and longer end of the spectrum. For example one-month implied volatility decreased from 19.7% to 17.4% and two-year implied volatility from 23.3% to 21.3%. In a historical context, implied short-term and long-term volatilities in 4Q13 were at their lowest levels since the start of the crisis.

Hedge fund shares' liquidity premia: In 4Q13, hedge fund secondary market liquidity discount remained broadly stable, with the average discount to NAV at 92%, a level higher than mid-2013, signalling investors' expectations of higher performance for hedge funds. The market, however, is still characterised by significant volatility: during 4Q13 the lowest and highest trades on the market were recorded, respectively, at 1% and 95%, possibly signalling market uncertainties regarding future macroeconomic trends and the possibility of policy interventions affecting liquidity.

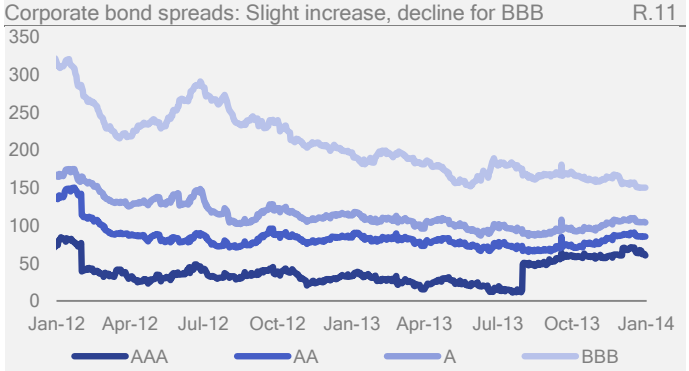
Market risk

EA and US equities' adjusted PE ratios: Further rise R.10



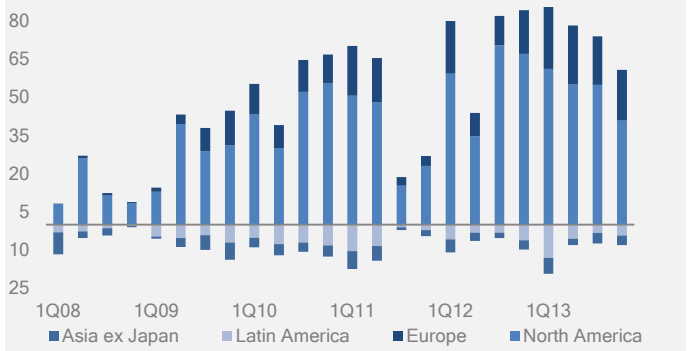
Note: Monthly earnings adjusted for trends and cyclical factors via Kalman filter methodology based on OECD leading indicators; units of standard deviation; averages computed over 2M73-10M13.
Sources: Thomson Reuters Datastream, ESMA

Corporate bond spreads: Slight increase, decline for BBB R.11



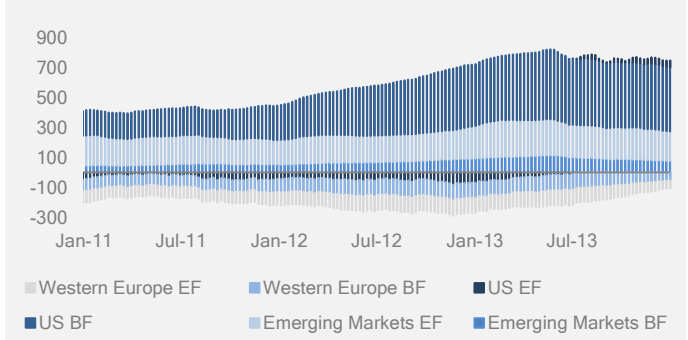
Note: Non-financial corporate bond spreads by rating grades; EA, basis points. Data discontinuity for AAA-rated bonds due to a change in the basket of AAA eligible assets.
Sources: Thomson Reuters Datastream, ESMA.

HY corporates: Stable in EU, decline in North America R.12



Note: Quarterly data on high-yield corporate bond issuance by region of issuer; EUR bn.
Sources: Dealogic, ESMA.

Investment fund flows: Bond fund outflows in US and EM R.13



Note: Net flows into bond and equity funds cumulated over time since 2004 (BF and EF, respectively) by regional investment focus; USD bn.
Sources: EPFR, ESMA

Market risk, although still high, stabilised in 4Q13. Equity valuations rose in the EU and the US. In Europe price-earnings (PE) ratios remained well below their long-term average, whereas in the US PE ratios remained above their long-term average, leading to future valuation risks. Corporate bond spreads in lower-rated bonds continued to decline, potentially reflecting a shift in risk assessment and continued search-for-yield behaviour on the part of investors. US fund flows were volatile and bond market outflows continued in the US and emerging markets (EM) areas.

Equity price-earnings ratios: EA equity price-earnings (PE) ratios rose, although remained well below their long-term average. This contrasts with the US, where price-earnings ratios also continued to rise but remained above their long-term average. As the measure is based on an EA stock index, it may fail to capture heterogeneity in markets across the EA, which was reflected in the continued increase in dispersion of national equity price indices. Countries in the bottom 25% lost ground slightly, whereas the top 75% national equity price indices saw their gains increase.

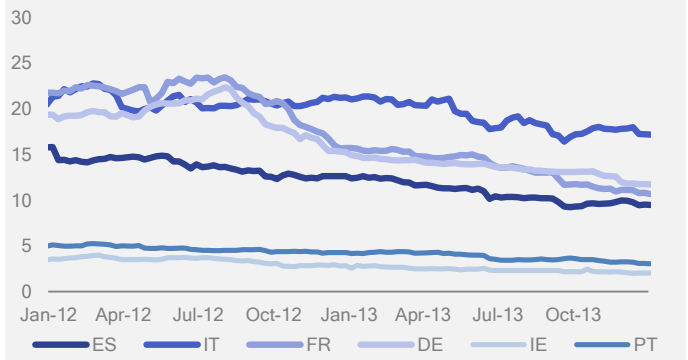
Corporate bond spreads: Bond spreads for investment-grade non-financial corporations in the EA increased slightly in 4Q13, except for a slight decline in spreads for BBB-rated corporations. The previous 3Q13 jump in AAA-rated bond spreads is mainly due to a change in the duration composition of the underlying basket used for the yield calculation. Overall, spreads were still slightly higher versus their pre-crisis levels, although well below the levels observed during the crisis. It is worth noting that over the last two years spreads in lower-rated corporate bonds narrowed comparatively more than spreads in higher-rated bonds. This may be due to a lower perception of risk or a perceived improvement in the economic outlook for large corporates. It may, however, also indicate a potential shift to riskier investments in the search for yield prompted by the low interest rate environment. Since the beginning of 2012 the difference in spreads between BBB-rated and AA-rated corporate bonds narrowed from around 180bps to around 65bps. The difference in spreads between BBB-rated and AAA-rated corporates narrowed from around 240bps at the beginning of 2012 to around 90bps.

High-yield corporate bond issuance: In 4Q13, HY corporate bond issuance again declined in North America, but remained broadly stable in the EU, Latin America and Asia.

Investment fund flows: In 4Q13 EU equity and bond funds saw net inflows. Lower perceived pressure from the EU sovereign debt crisis and positive news on the economic environment in a number of EU countries may have made EU funds appear more attractive. Fund flows were extremely volatile in the US, presumably because of uncertainty related to the debt ceiling standoff. After an agreement had been negotiated, there were high inflows into US equity funds. For US bond funds, post-agreement inflows were temporary, followed by large outflows towards the end of 4Q13. For EM, outflows from bond funds continued. EM equity fund flows were volatile, with initial inflows reversed later in 4Q13, leading to a net outflow.

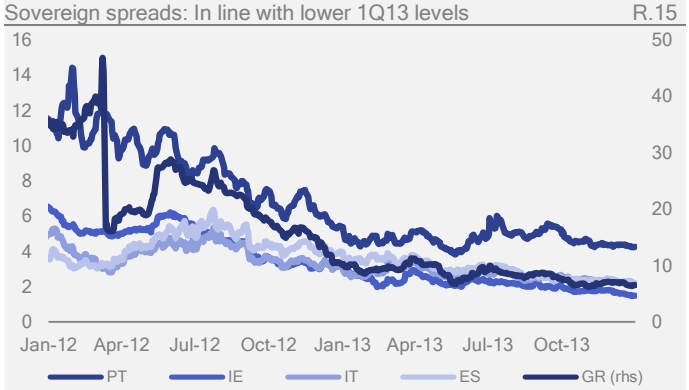
Contagion risk

Outstanding EU Sovereign CDS: Declining volumes R.14



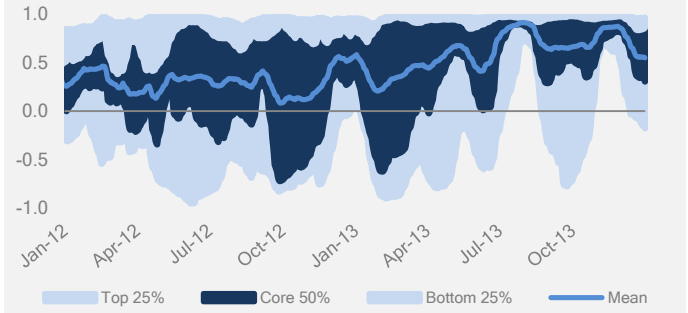
Note: Outstanding net notional amounts for selected countries; USD bn.
Sources: Thomson Reuters Eikon, ESMA.

Sovereign spreads: In line with lower 1Q13 levels R.15



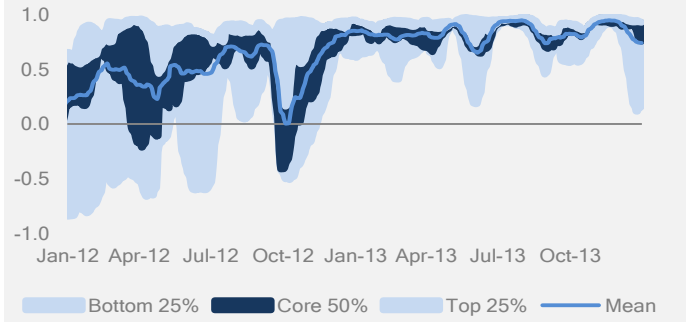
Note: Selected 10Y EA sovereign bond risk premia (vs. DE Bunds); percentage points.
Sources: Thomson Reuters Datastream, ESMA.

Sovereign bond yield correlation: Elevated comovement R.16



Note: Dispersion of the correlations over 60D rolling windows of 10Y DE Bunds and other EU countries' sovereign bond redemption yields.
Sources: Thomson Reuters Datastream, ESMA.

Sovereign-corporate yield correlation: Narrow dispersion R.17



Note: Dispersion of the correlation between Barclays Aggregate for corporate and 10Y sovereign bond redemption yields for BE, FI, FR, IT, NL, PT.
Source: Thomson Reuters Datastream, ESMA.

The level of contagion risk in sovereign debt markets remained broadly stable, concentrating on the most vulnerable group of MS. However, the potential for systemic events remained substantial. After a period of high co-movement among sovereigns in 3Q13, in 4Q13 the most vulnerable countries first started to disentangle, possibly signalling a return to the core-periphery clustering in the EU. MS then realigned, and the correlation among sovereigns as well as between sovereign and corporate bonds rose to reach levels close to unity in November. Nevertheless, uncertainty around the Fed's tapering programme prompted a return to higher dispersion at the end of the period.

Outstanding EU sovereign CDS: The reduction in net notional outstanding CDS volumes seemed to have come to a halt in 3Q13, stabilising or slightly rebounding in 4Q13. In the case of one larger and more vulnerable sovereign the volume ticked up more distinctly. This may reflect less use of portfolio compression among market participants due to higher central CDS clearing in the context of the new regulatory environment in derivative markets – possibly confirmed by the fact that CDS market activity did not decline over the period.

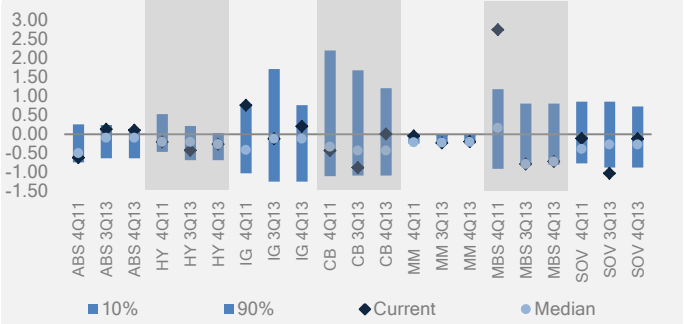
Sovereign spreads: Spreads on vulnerable EU sovereigns' 10Y bonds relative to Bunds generally remained within the range observed in the first three quarters of 2013, reverting to the low levels observed in 1Q13 and early 2011. Spreads for most vulnerable sovereigns at the longer end of the curve continued to converge. One vulnerable sovereign, however, exhibited higher volatility from the beginning of 3Q13. Within this broad harmonisation of spreads to levels not witnessed since early -2011, investors did, however, remain vigilant vis-à-vis risks in vulnerable MS.

Sovereign bond yield correlation: Having peaked at the beginning of 3Q13, coming close to parity at times, correlations between Bunds and other EU 10Y sovereigns broadly remained above the relatively high levels seen in 2Q13. During 4Q13, yield correlation seemed to signal a return to the market behaviour seen in the first half of 2013, when the top 75% countries displayed high comovement with Bunds and the 25% most vulnerable sovereigns showed negative correlation, potentially signalling market reclustering. The only exception is November, when countries somehow realigned around the ECB's rate cut. These developments seem to have been driven mainly by monetary policy, specifically the rate cut by the ECB and uncertainty over Fed tapering in December.

Sovereign-corporate yield correlation: On average, in 4Q13 correlations between the yields on selected 10Y benchmark EA sovereign bonds and respective corporate bonds followed the trend characteristic of sovereigns, albeit less markedly. Having approached unity in 3Q13, they started to diverge at the end of the quarter and the beginning of 4Q13, with the bottom 25% sovereigns less correlated to their corporate bonds than core countries. In November, sovereign-corporate bond correlation climbed back to its 2013 highs, close to unity. Market clustering resurfaced in December, with the bottom 25% countries poorly correlated to the others amid uncertainties around the Fed's tapering programme.

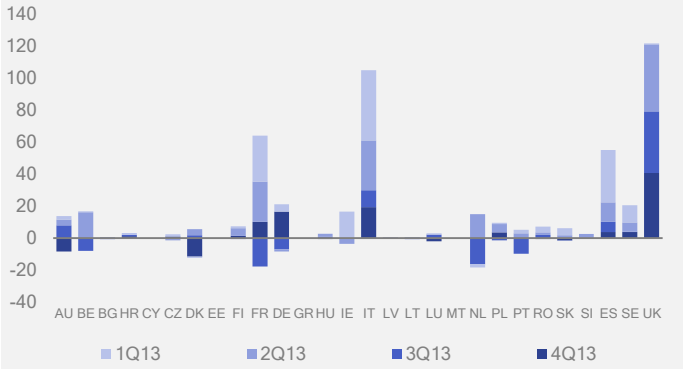
Credit risk

Debt issuance: Issuance subdued, especially for sovereigns R.18



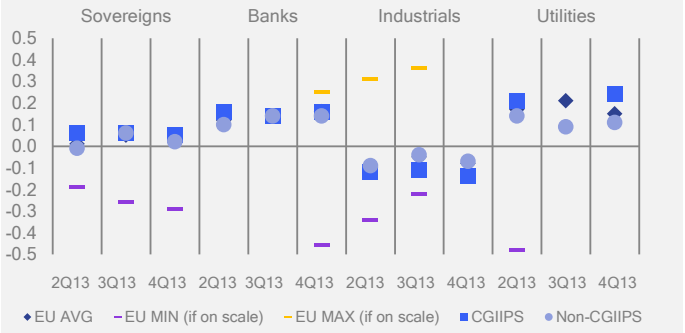
Note: Growth rates of issuance volume in per cent normalised by standard deviation for different bond classes. Computations over a rolling window of length 11. All data include securities with a maturity higher than 18 months. Bars denote the range of values between the 10th and 90th percentiles.
Sources: Dealogic, ESMA

Sovereign debt: Low issuance activity R.19



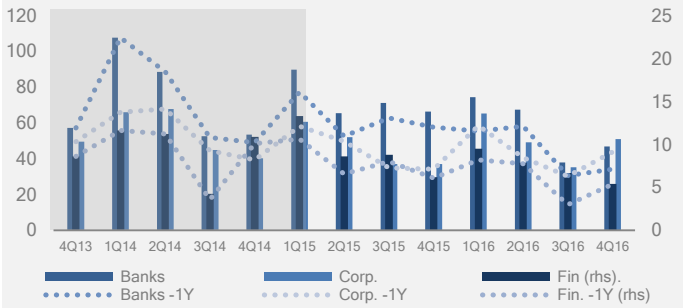
Note: Quartely Net Issuance of EU sovereign debt by country, EUR bn.
Sources: Dealogic, ESMA.

Debt maturity: Slight increase in most sectors R.20



Note: Quartely change in maturity of outstanding debt by sectors and country groups. EU, years. CGIIPS include CY, GR, IT, IE, PT and ES.
Sources: Dealogic, ESMA.

Debt profile: Reduction in total bank debt outstanding R.21



Note: Quarterly current and future redemptions by European private corporates (banks, non-bank financials, and non-financials), current and 1-year lagged data, EUR bn. Excluding bank redemptions to central banks (expiry of LTRO between Dec-12 and Mar-15). Sum over grey shaded area indicates additional financing needs for banks of about EUR 1,018bn.
Sources: Dealogic, ESMA.

The assessment of credit risk was broadly unchanged in 4Q13. Although debt issuance was globally subdued in EU, sovereigns and corporates were able to issue debt at longer maturities, taking advantage of the relatively low long-term interest rates. Banks continued orderly reduction of their wholesale funding needs, but a substantial proportion of debt outstanding has to be rolled over in the coming quarters. Since the improvement in conditions relies heavily on buoyant monetary policy measures, a rise in the interest rate could potentially trigger heightened credit risk, especially in countries with high public indebtedness or vulnerable corporate sectors, both non-financials and financials.

Debt securities issuance: The overall issuance of debt securities with maturities of more than 18 months recovered slightly in 4Q13 after two quarters of decline. However, this may differ across market segments. Sovereign debt issuance clawed its way back from its historical 3Q13 low but remained subdued. In the corporate sector, the rebound was more pronounced for investment-grade than for high-yield bonds, while the former still represent the majority of new issues. Finally, the downward trend observed in 3Q13 for all types of collateralised issues was partially reversed. Issues of ABS and covered bonds more than compensated the decline in MBS, which seems to indicate that financial institutions are able to meet their external financing needs.

Net sovereign debt issuance: As a result of reduced issuance activity, some countries recorded a negative balance between new and maturing debt in 4Q13. Overall net issuance was thus also negative in the EU for the second consecutive quarter.

Debt maturity: The average maturity of outstanding sovereign debt increased slightly in 4Q13. Although the volume of issues was reduced in absolute terms, some countries issued securities with an increased maturity compared to the previous quarter, possibly taking advantage of the relatively low long-term interest rates. Other countries, however, may still have had difficulty issuing longer-term securities. The average maturity of bank debt has been increasing for several quarters now, although banks in one country experienced a serious drop in 4Q13. This may create future short-term funding pressures, which can be exacerbated in a subdued macroeconomic environment.

Debt redemption profile: The outstanding debt of financials, other than banks, and corporates maturing during the next two years increased by 2.7% on average compared with 4Q12. In contrast, the total outstanding bank debt maturing in the same period decreased by 2.4%. The bank debt redemption profile also indicates that without new issuance wholesale short-term funding may be reduced significantly by the end of 2014. Banks' figures, however do not include longer-term refinancing operations (LTRO) provided by the ECB in December 2011 (EUR 489bn) and March 2012 (EUR 530bn). For 4Q13, the ECB reported early repayment of EUR 93.41bn, bringing the remaining LTRO balance down to EUR 610bn. These operations are to be repaid before the end of 1Q15, in addition to the EUR 449bn of wholesale funding that matures before that date. Although the banks do have time to close this funding gap, it is nonetheless substantial.

Trends
Risks
Vulnerabilities

High-frequency trading activity in EU equity markets[1]

Contact: Antoine Bouveret (antoine.bouveret@esma.europa.eu)

The objective of this report is to shed further light on high-frequency trading (HFT) on EU equity markets. For this we use unique data collected by ESMA, based on a sample of 100 stocks traded in nine EU countries. Overall, HFT activity accounts for around 22% of value traded and 60% of orders, as measured for the sample in the period May 2013. Empirical estimates show that HFT activity is positively related to volumes traded, fragmentation, prices and tick sizes and negatively to volatility. These results are mostly based on correlations, even though results remain robust – with the exception of fragmentation – using an instrumental variable approach.

Over the last few years, financial markets have undergone a series of significant changes. Of particular note is the rise of technology and algorithms, while on the regulatory side entry into force of the Market in Financial Instruments Directive (MiFID) in 2007 has led to the fragmentation of trading across venues in the EU. At the same time, a series of events such as the May 2010 Flash Crash in the US or the loss of USD 420mn by Knight Capital in August 2012 due to malfunctioning of an algorithm, have called into question the benefits and risks linked to algorithmic and high-frequency trading. In particular, the impact of high-frequency trading on market quality (liquidity and price efficiency) and volatility is still subject to debate among academics and policymakers.

While several reports and academic articles focusing on the US markets have been published, there are very few analyses of EU equity markets, and even these usually focus on a specific EU country and/or trading venue. The objective of this article is to shed further light on high-frequency trading (HFT) on EU equity markets using unique data collected by ESMA.

Definition and identification of high-frequency trading

General features of HFT

Total trading can be divided into algorithmic trading (AT) and non-algorithmic trading, depending on whether market participants use computer programs that implement pre-designed trading decisions without human intervention (Gomber et al. (2011)[2]). HFT is a subset of AT with the following features:

— proprietary trading;

— low-latency requirement;

— very short holding periods; and

— use of colocation and proximity services.

However, as there is no generally agreed proxy of HFT that can be used operationally, several approaches are employed to identify it (Table V.1). They fall into three broad categories:

— the direct approach;

— the indirect approach; and

— the identification of strategies.

The direct approach relies on the identification of market participants, based on their primary business or use of colocation. The indirect approach uses patterns in trading and quoting as a proxy for HFT. The identification of strategies uses orders and trades to classify algorithms (market making, statistical arbitrage, momentum ignition etc.). In this article we use only the direct approach based on a list of HFT firms.

Identification of HFT V.1

The main features of the three identification approaches outlined above are developed below. Threshold values are purely indicative.

Direct approach

A list of firms that engage in HFT has been established with reference to the market participants' primary business based on the information available on their websites, on business newspaper articles and on industry events. In certain cases the flagging of firms was also discussed with supervisors; 22 firms (out of a total of 572) were classified as HFTs in this way. One drawback of this approach is that it does not include investment banks with HFT desks. Trading venues were also asked to provide flags for market members that use colocation. However, some trading venues in the sample did not have colocation facilities or these were outsourced to third parties and the data was not collected. Overall, there were 63 groups that used colocation services in our sample.

Indirect approach: inventory

For each market participant, the inventory (volumes bought less volumes sold) is computed at one-second horizons for each stock and trading day. Augmented-Dickey Fuller (ADF) tests could then be run for each participant using daily data[3]. For example, if the inventory is stationary around zero on at least 90% of the days, the participants are flagged as HFTs. One drawback of this approach is that it focuses mainly on market-making strategies, excluding other strategies such as statistical arbitrage and momentum ignition which do not give rise to similar patterns in the firm's inventory.

Indirect approach: lapse

For each participant, the duration between switching from a buy (sell) trade and a sell (buy) trade could be measured. One option is to flag participants if, for instance, the 5% quickest lapse trades occur in less than 100 milliseconds.

Indirect approach: order lifetime

For each participant, the duration of orders (i.e. the time before the order is cancelled or modified) is computed. Participants could be flagged HFT if, for example, their 10% quickest orders have a lifetime of less than 50 milliseconds.

Each market participant has been flagged as either HFT, investment bank or others. Table V.2 shows the number of market participants flagged as HFT in our sample[4].

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1 This article was authored by Antoine Bouveret (ESMA) and Cyrille Guillaumie (ESMA).

2 Gomber, P., B. Arndt, M. Lutat and T.Uhle (2011), "High-Frequency Trading", Report commissioned by Deutsche Börse Group.

3 ADF tests assess whether a series is stationary, i.e. fluctuates around its average.

4 The identification of firms is based on a stratified approach: i) for each market participant a Unique ID has been created for each venue of which it is a member, ii) if a participant has multiple accounts at the same venue, each account will have a separate ID but the same Account ID, iii) if a market participant is a member of multiple venues, all these accounts will have the same Group ID, and iv) a Master ID has been created to include all market members linked to the same entity. All data has been anonymized.

Classification of market participants V.2

Proxy	HFT	Investment Banks	Others
Prirmary business of firms	22	64	486
Use of colocation (in %)	82%	28%	5%

Note: Figures refer to Group IDs.
Source: ESMA.

Dataset

Sample of stocks

A sample of 100 stocks listed on Regulated Markets in BE, DE, ES, FR, IE, IT, NL, PT and UK has been chosen using a stratified sampling approach. For each country, stocks have been split by quartile according to their market value, value traded and fragmentation (measured by the Herfindhal-Hirschman index[5]), using December 2012 data. As in Degryse et al. (2011)[6], fragmentation ($Frag_{i,t}$ of stock i on day t) is defined as:

$$Frag_{i,t} = 1 - HH_{i,t}$$

where $HH_{i,t}$ is the Herfindahl-Hirschman index.

A random draw was performed to select stocks for each quartile. In order to account for the relative size of the markets, greater weight has been placed on larger countries, while at the same time each country in the sample has at least five different stocks (Table V.3).

Sample of stocks by country V.3

Country	Number of stocks	Country	Number of stocks
BE	6	IT	11
DE	16	NL	13
ES	12	PT	5
FR	16	UK	16
IE	5	All sample	100

Note: Number of stocks in the sample.
Source: ESMA.

The sample includes stocks with very different features. During the observation period, average value traded ranged from less than EUR 0.1mn to EUR 526mn and shares traded from 1,000 shares per day to close to one billion (Table V.4). In terms of market capitalization, values ranged from EUR 17mn to EUR 122bn during the observation period (average at EUR 8.7bn and median at EUR 2.9bn). The degree of fragmentation is also very different. The high heterogeneity of the stocks in the sample can be used to analyse the extent to which HFT activity is correlated with market value, turnover and fragmentation.

Sample stocks statistics V.4

Country	Value traded (EUR mn)			Shares traded (mn stocks)			Fragmentation Index		
	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min
All sample	33	526	<0.1	7	1,000	<0.1	0.4	0.7	0
BE	46	357	<0.1	1	5	<0.1	0.4	0.7	<0.1
DE*	NA	NA	NA	NA	NA	NA	NA	NA	NA
ES	43	526	3	7	153	0.3	0.3	0.5	<0.1
FR	35	497	<0.1	2	187	<0.1	0.4	0.7	0
IE	5	185	<0.1	18	1,000	<0.1	0.2	0.6	0
IT	33	301	<0.1	11	165	<0.1	0.2	0.6	0
NL	37	351	0	6	117	<0.1	0.4	0.7	0.1
PT	17	143	<0.1	30	353	<0.1	0.3	0.6	0
UK	29	290	0	2	21	<0.1	0.5	0.7	0.1

Note: Monthly average for May 2013. For DE, statistics may be biased, as only data from MTFs was used. The fragmentation is measured using the Herfindahl Hirschmann Index, which is computed based on the sum of squared market share (volumes) per trading venue. A value of 1 indicates no fragmentation (all trading is on one venue), whereas lower values indicate that trading is fragmented across several trading venues..
Source: ESMA.

The data collected covers 11 trading venues: the Regulated Market (RM) for each country[7] as well as the three main Multilateral Trading Facilities (MTFs) in the EU: BATS, Chi-X and Turquoise.

Data collected and timespan

Data was collected by ESMA and National Competent Authorities for the month of May 2013 (20 to 21 trading days per stock). The dataset covers all orders and trades executed on the aforementioned trading venues as well as some additional information for market members (use of colocation, market making, provision of Direct Market Access etc.). The dataset includes around ten million trades and 420 million messages (new, modified and cancelled orders).

HFT activity on European equity markets

HFT activity by trades

Overall, HFT firms (HFTs hereafter) accounted for around 22% of value traded in May 2013 (Chart V.5). This estimate is broadly in line with existing assessments at the European and national level[8]. By trading venues, HFT

5 The Herfindahl-Hirschman index is computed on the basis of the sum of squared market share (value traded) per trading venue. A value of 1 indicates no fragmentation (all trading is on one venue), whereas lower values indicate that trading is fragmented across several trading venues.

6 Degryse, H., F. de Jong and V. van Kervel (2011), "The impact of drak trading and visible fragmentation on market quality", CEPR discussion paper 8630, November.

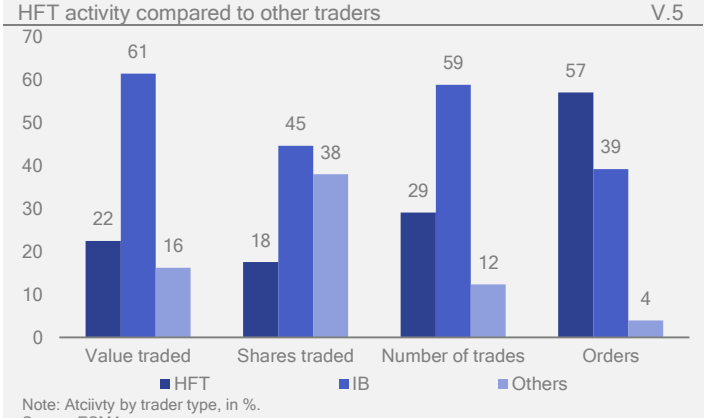
7 NYSE Euronext Amsterdam (XAMS), Brussels (XBRU), Lisbon (XLIS) and Paris (XPAR), Borsa Italiana (MTAA), London Stock Exchange (XLON), Irish Stock Exchange (XDUB) and the Spanish Stock Exchange (XMAD). For Deutsche Börse, no data was delivered.

8 According to TABB Group (2012), HFT firms accounted for 39% of traded value in European cash markets, against 22% in this report. Brogaard et al. (2013) found that HFT accounted for around 20% of traded volumes for FTSE 250 stocks in 2008-2010 (see Brogaard, J., T. Hendershott, S. Hunt, T. Latza, L. Pedace and C. Ysusi (2013), "High-Frequency Trading and the Execution Costs of Institutional Investors", Financial Services Authority Occasional Paper in Financial Regulation No. 43, January). Hagströmer and Nordén (2013) found that HFT activity ranged from 25% to 30% of all trades in 2011-2012 on OMXS 30 stocks (Hagströmer, B. and Lars Nordén (2013), "The diversity of high frequency traders", Journal of Financial Markets, Vol. 16(4), November).

activity ranged from 8% to 39%[9], with a higher share for MTFs (Table V.6). Trading venues can be split into three categories depending on HFT activity: i) high HFT activity (around 40% for MTFs), ii) medium HFT activity (between 20% and 25% for MTAA, XAMS, XLON[10], XBRU and XPAR) and iii) low HFT activity (XLIS and XDUB) The same classification would apply using data on volumes traded or number of trades. However, since HFT firms can also access the venues through Direct Electronic Access[11], the estimates may be lower than actual HFT activity, but the data available did not allow us to take those aspects into account.

Across all venues, HFT share by volumes was smaller (18% overall, from 6% to 43%) than the share by value traded, while the share by number of trades was higher (29% overall, from 9% to 44%).

HFT activity compared to other traders V.5

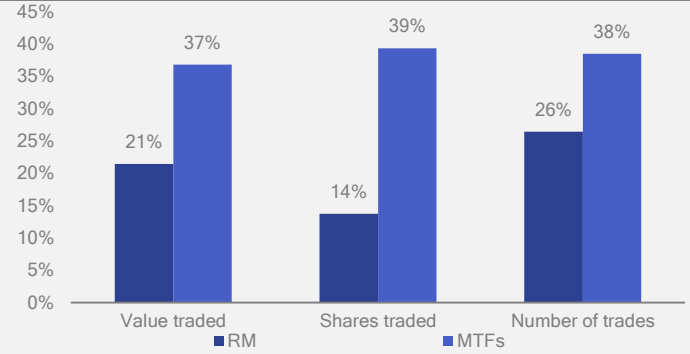


Note: Atciivty by trader type, in %.
Source:ESMA.

As evidenced in Chart V.6, HFT activity was higher on MTFs than on RMs, with figures close to 40% for the former and around 20% for the latter.

Most of the trading activity is linked to market participants using colocation services: they account for 80% of value traded and number of trades. However, colocation is an imperfect proxy for HFT as firms trading on behalf of their clients are also users of colocation (brokers and investment banks for example).

HFT activity by RMs and MTFs V.6



Note: Share of trading by HFTs, in %. One trading venue was excluded due to the lack of HFT activity.
Source: ESMA.

HFT activity V.7

Trading venue	Value traded	Shares traded	Number of trades	Number of orders
All venues	22	18	29	58
All venues (colocation)	77	53	77	91
Regulated Markets (RMs)				
MTAA	25	22	26	47
XAMS	24	19	28	51
XLON	21	20	26	43
XPAR	21	21	30	49
XBRU	18	17	23	36
XLIS	11	6	17	27
XDUB	8	10	9	41
XMAD*				
Multilateral Trading Facilities (MTFs)				
BATE	39	43	44	72
CHIX	38	37	39	57
TRQX	34	40	36	71

Note: Figures are weighted by value of trades (value traded), shares traded and number of trades, in %. For trades on UK stocks, value traded has been converted into EUR using end-of-day exchange rates. German stocks were excluded from computations as no data was available for the Regulated Market. XMAD, BATS and CHIX are excluded from the computation of colocation activity due to data unavailability.

*No HFT firms were direct members of XMAD during the observation period.
Source: ESMA.

An interesting feature is that HFT activity tends to be quite low during auctions, as illustrated in Table V.8. While HFTs account for 22% of value traded, during auctions their share totals a scant 4%. This could be explained by their inventory management, with its tendency to intraday position management. Consequently there may be no need to trade during auctions to flatten net positions. Excluding auctions, HFT activity would therefore be around 30% for value traded and 33% for the number of trades.

HFT activity V.8

Trading venue	Value traded	Shares traded	Number of trades
All venues	22	18	29
All venues auction only	4	3	4
All venues excluding auctions	30	23	33

Note: Figures are weighted by value of trades (value traded), shares traded and number of trades, in %. For trades on UK stocks, value traded has been converted into EUR using end-of-day exchange rates. German stocks were excluded from computations due to data unavailability for the Regulated Market.
Source: ESMA.

9 BME is excluded from the computation since no market members were flagged as HFT in the sample period and data for German stocks relies on trades on MTFs only.

10 For stocks traded in GBP, end-of-day exchange rates were used. Robustness checks were run using intraday high and intraday low, which yielded the same results.

11 This can be achieved by using Direct Market Access (DMA) or Sponsored Access (SA). According to ESMA's Guidelines, DMA is "*an arrangement through which an investment firm that is a member/participant or user of a trading platform permits specified clients [...] to transmit orders electronically to the investment firm's internal electronic trading systems for automatic onward transmission under the investment firm's trading ID to a specified trading platform*", while SA is a form of DMA "*without the orders being routed through the investment firm's internal electronic trading systems*". For further details, see ESMA (2011), "Guidelines on systems and controls in an automated trading environment for trading platforms, investment firms, and competent authorities".

In contrast, investment banks' activity amounted to around 60% of value traded, ranging from 21% to 75% (Table V.9), while other trading firms' activity was around 15%.

Investment bank activity V.9

Trading venue	Turnover	Volumes	Number of trades	Number of orders
All venues	61	45	59	38
Regulated Markets (RMs)				
MTAA	42	43	39	39
XAMS	65	67	60	45
XLON	73	73	69	46
XPAR	71	70	62	50
XBRU	75	74	69	61
XLIS	58	30	58	64
XDUB	21	18	29	24
XMAD	59	54	62	69
Multilateral Trading Facilities (MTFs)				
BATE	56	52	52	27
CHIX	57	56	56	41
TRQX	64	58	62	28

Note: Figures are weighted by value of trades (value traded), shares traded and number of trades, in %. For trades on UK stocks, value traded has been converted into EUR using end-of-day exchange rates. German stocks were excluded from computations due to data unavailability for the Regulated Market.
Source: ESMA.

HFT activity by orders

Most orders are originated by HFTs (around 60% of all orders). By trading venues, the share of orders sent by HFTs ranged from 27% to 72% (Table V.7). Even for trading venues on which HFTs' trading activity was limited, they still accounted for a significant share of the orders. As for trading activity, the share of orders inserted by HFTs was higher on MTFs, especially on BATS and Turquoise where they inserted more than two-thirds of orders (while they account for less than 40% of trades).

From a trading venue perspective, around 60% of all orders were sent to MTFs, against 40% for RMs. This could be explained by the fact that all the stocks in our sample are traded on the three MTFs and only one RM, and also by higher HFT activity on MTFs in terms of order messaging.

Users of colocation services account for more than 90% of all orders inserted on trading venues for which colocation data is available. Investment banks accounted for 38% of all orders, ranging from 24% to 69%.

As indicated previously, the share of orders sent by HFTs is far larger than their actual share of trading, unlike investment banks and other traders. As a result, HFTs have a higher order-to-trade ratio[12] than other market participants, as Table V.10 illustrates. This is in line with market-making strategies that rely on frequent quote updates.

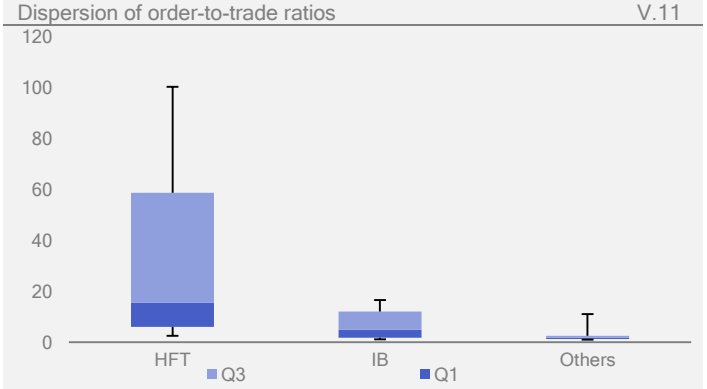
Order-to-trade ratios V.10

Trading venue	HFT	Investment banks	Others
All venues	82	28	14
All venues (colocation)	36	-	12
Regulated Markets (RMs)			
MTAA	52	14	6
XAMS	38	16	6
XLON	58	24	52
XPAR	44	22	4
XBRU	24	14	4
XLIS	14	10	4
XDUB	256	48	34
XMAD*	-	18	12
Multilateral Trading Facilities (MTFs)			
BATE	172	54	32
CHIX	84	44	24
TRQX	114	26	26

Note: Order-to-trade ratio by trader type. XMAD, BATS and CHIX are excluded from the computation of colocation activity due to data unavailability.
*No HFT firms were direct members of XMAD during the observation period.
Source: ESMA.

However, HFTs exhibit significant heterogeneity. The median unweighted order-to-trade ratio is 15, while the first quartile is around 6 and the third quartile close to 60. This indicates that HFTs are not a homogeneous category, probably due to the different strategies implemented. For investment banks and other traders, however, order-to-trade ratios centre more around the median, as illustrated in chart V.11.

Dispersion of order-to-trade ratios V.11



Note: Distribution of order-to-trade ratios by traders by quartile and 10% and 90% percentiles .
Source: ESMA.

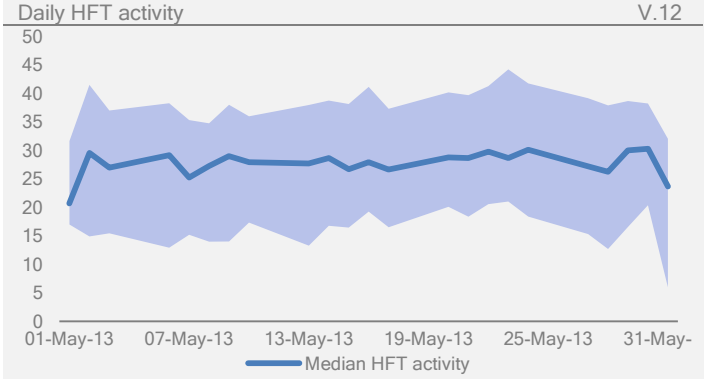
Patterns in HFT activity

HFT activity was relatively stable during the observation period. Indeed, daily HFT activity ranged from 15% to 40%, as shown in Chart V.12. The only exceptions were at the beginning and end of the month, when HFT activity dropped from 30% to 23%[13].

[12] Defined as the number of orders by ID divided by the number of trades.

[13] The lower HFT activity on 1st May can be explained by the fact that most trading venues were closed due to a bank holiday, with the exception of XLON and most particularly XDUB, where HFT activity is very low.

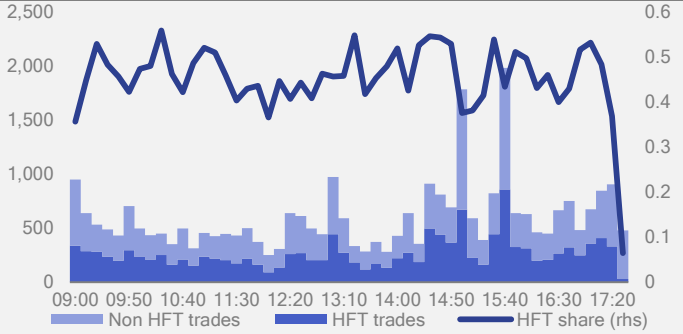
Daily HFT activity V.12



Note: Median, maximum and minimum HFT activity on 28 stocks with monthly average HFT activity higher than 20%, in %.
Source:ESMA.

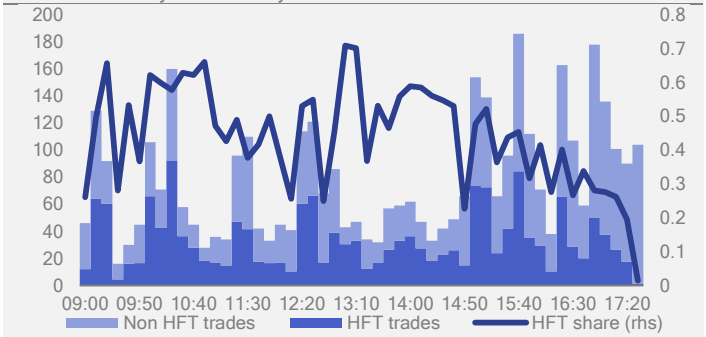
On an intraday basis HFT activity can differ quite considerably, depending on the stock and day. In Chart V.13, HFT activity is relatively stable during the trading day at around 45% of total turnover, while in Chart V.14, HFT activity is very volatile, increasing from 25% to 70% around 12:30, for example. However, some patterns can be identified in intraday activity. A bout of trading activity can be seen at 14:30 CET, when US statistics are usually published, and at 15:30 CET with the opening of US markets. While HFT activity increases significantly around this time, the HFT share tends to drop as trading by other market participants increases relatively more. Another feature is the big drop-off in HFT activity at the end of the trading day, indicating that HFT firms are more likely to avoid auctions, which squares with results from previous studies.

Stable intraday HFT activity V.13



Note: Number of trades by HFT and non-HFT firms in one liquid stock for one day, consolidated across venues and aggregated every 10 minutes. HFT share in number of trades, in %.
Source: ESMA.

Volatile intraday HFT activity V.14



Note: Number of trades by HFT and non-HFT firms in one liquid stock for one day, consolidated across venues and aggregated every 10 minutes. HFT share in number of trades, in %.
Source: ESMA.

HFT activity and underlying stock features

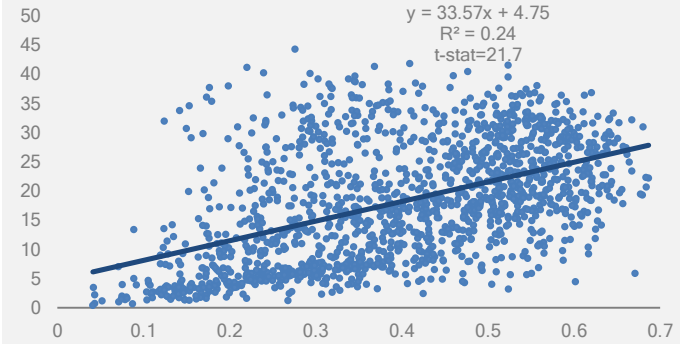
Is HFT activity linked to fragmentation?

One consequence of the fragmentation of EU equities markets has been an increased reliance on Smart Order Routing Technology (SORT) by market participants seeking to find the best liquidity in the market by comparing the order books of individual venues[14]. Following Gresse (2010), Degryse et al. (2011)[15] distinguish between global and local traders: due to fixed trading charges and the cost of adopting this trading technology, local traders do not employ SORT while global traders do.

Fragmentation may be more likely to attract HFTs, as they are able to implement cross-venue arbitrage strategies. Moreover, as indicated previously HFTs in our sample tend to be members of more trading venues than non-HFTs.

Chart V.15 flags up a significant positive relationship between HFT activity and fragmentation[16].

HFT activity and fragmentation V.15



Note: Fragmentation (x-axis) and HFT activity (y-axis, share of value traded in %). Daily data per stock. Stocks with less than 1,000 trades per day are excluded.
Source: ESMA.

Are HFTs more likely to trade blue chips?

Empirical work on HFT indicates that HFTs tend to trade very liquid stocks with high market values ('blue chips')[17]; this could be captured by including volumes, market value and spreads as potential drivers of HFT activity. Moreover, HFTs performing cross-market arbitrage are also more likely to trade in highly fragmented stocks. Another potential driver of HFT activity could be tick size relative to prices, as smaller tick sizes might lead to more HFT activity for HFTs using market making strategies. Finally, a price variable is added as a control variable, since our sample includes stocks with very low prices that may generate very high volumes, as well as a volatility variable.

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14 A Smart Order Router is a facility that will compare prices across trading venues and will route the orders to the venue with the best prices.

15 See Gresse, C. (2010), "Multi-Market Trading and Market Quality", mimeo, and Degryse, H., F. de Jong and V. van Kervel (2011), "The impact of dark trading and visible fragmentation on market quality", CEPR discussion paper 8630, November.

16 One limitation of the analysis is that only data on lit markets is included in the analysis, as no data was gathered on dark pools.

17 See for example Brogaard, J., T. Hendershott and R. Riordan (2013), "High Frequency Trading and Price Discovery", mimeo.

The relationship between HFT activity and stock features is analysed in a panel framework using daily data:

$$HFT_{i,t} = \alpha + \lambda_t + \delta_j + \beta_1 VOLAT_{i,t} + \beta_2 VOL_{i,t} + \beta_3 FRAG_{i,t}$$
$$+\beta_4 MV_{i,t} + \beta_5 TICK_{i,t} + \beta_6 PRICE_{i,t} + \beta_7 SPREAD_{i,t} + \varepsilon_{i,t}$$

where $HFT_{i,t}$ is a measure of HFT activity (value traded, shares traded or number of trades) on stock i on day t, α is a constant, λ_t are period fixed effects, δ_j are country fixed effects[18], $VOLAT_{i,t}$ is the price range (high minus low during the trading day) in percent of the mid price, $VOL_{i,t}$ the logarithm of shares traded, $FRAG_{i,t}$ the fragmentation index, $MV_{i,t}$ the average market value during the month, $TICK_{i,t}$ the tick size in percent of the mid price, $PRICE_{i,t}$ the mid price of the stock, $SPREAD_{i,t}$ the bid ask spread in percent of the mid spread and $\varepsilon_{i,t}$ is an error term[19]. The equation is estimated using ordinary least squares (OLS) and errors are clustered using period weights and White robust covariances to allow for heteroskedasticity and serial correlation across time.

The results of the estimation are shown in Table V.16: HFT activity is positively related to fragmentation, volumes, tick sizes and prices and negatively to volatility. Market value and spreads were found to be non-significant and therefore dropped from the estimation.

Blue chip stocks with high volumes and prices are indeed more likely to feature higher HFT activity, as previously established in the literature[20]. More fragmented stocks are also more likely to be traded by HFT due to cross-venue arbitrage strategies. The interpretation of the tick size coefficient is more difficult as a higher tick size compared to price would imply larger profits from market making strategies but would also reduce the ability to insert orders close to the best prices, which is common for such strategies. The results show that the former effect may be greater than the latter. Finally, volatility is linked to lower HFT activity. One explanation could be that high volatility (on a daily basis) is more likely to be driven by fundamental traders with directional positions that HFT may try to avoid. The results are robust with respect to the measure of HFT activity as almost all coefficients are of similar magnitude.

Analysis of HFT activity V.16

Variable	HFT value traded	HFT shares traded	HFT number of trades
VOLAT	-0.87***	-0.87***	-0.85***
VOL	3.33***	3.33***	3.99***
FRAG	10.96**	10.96**	9.99*
TICK	5.73***	5.73***	6.51***
PRICE	3.22***	3.22***	3.85***
Obs.	1767	1767	1767
Adjusted R^2	0.66	0.66	0.67

Clustered errors using White robust covariances with period weights.

***, ** and * indicates that the coefficient is significant at the 1%, 5% and 10% level respectively.
Source: ESMA.

The estimates cannot be interpreted as causal impact coefficients of explanatory variables on HFT activity due to the possibility of endogeneity arising from simultaneity. For example, HFT activity can be driven by high volumes on a given stock and at the same time lead to higher volumes on a given stock. Therefore, an instrumental variable (IV) approach can be used to address the endogeneity issue.

A good instrument should be correlated with the explanatory variables and uncorrelated with the error term. Exogeneous shocks such as IT systems changes could be used, as in Brogaard et al. (2013), but there was no such event in the sample. Following Benos and Sagade (2012)[21], lagged values of the explanatory variables were used due to their autoregressive behaviour[22].

The results of the IV estimation (V.17) show that all the estimates remain significant, with the exception of fragmentation. In other words, HFT appears to be driven by volumes, prices and tick sizes, while volatility tends to reduce HFT activity.

Some further analysis is needed to draw robust conclusions from the econometric analysis. In particular, the econometric approach can be improved by i) using intraday rather than daily data, ii) disentangling between aggressive and passive HFTs and iii) using other sets of instruments.

18 Cross section fixed effects were not included as the analysis focuses on cross-sectional variation across and not within stocks.

19 Explanatory variables may be highly correlated with each other, implying a potential multicollinearity bias. Variance inflation factors (VIFs) used to assess the severity of multicollinearity among the explanatory variables indicated that this was low, since VIF values for pairwise variables were lower than three.

20 See for example Brogaard, J., (2010), "High Frequency Trading and its impact on Market Quality", mimeo.

21 Benos, E. and S. Sagade, (2012), "High-frequency trading behaviour and its impact on market quality: evidence from the UK equity market", Bank of England working paper No. 469, December.

22 Alternative instrumental variables were also tested. Following Haasbrouck and Saar (2013), instruments were constructed using the average of volatility, volumes, fragmentation, tick size and price for the other stocks in the sample, as they should be correlated with the explanatory variables. To ensure that the instruments are uncorrelated with the error item, stocks from the same industry were excluded. However, the instruments were found to be very weak and not therefore used. For more information on this instrumental variable approach, see Haasbrouck, J. and G. Saar, (2013), "Low-latency trading", Journal of Financial Markets, Vol. 16, May 2013

Analysis of HFT activity using instrumental variables V.17

Variable	HFT value
VOLAT	-1.25***
VOL	3.99***
FRAG	2.08
TICK	7.24***
PRICE	3.92***
Obs.	1651
Adjusted R^2	0.64

Clustered errors using White robust covariances with period weights.

***, ** and * indicates that the coefficient is significant at the 1%, 5% and 10% level respectively.
Source: ESMA.

Conclusion

This article provides initial empirical evidence on HFT activity on EU equity markets. HFT firms account for one-quarter of traded volumes (60% for investment banks) and around 60% of all order messages. HFT activity is significantly higher on MTFs than on RMs. Moreover, HFT firms are members of more trading platforms than other types of participant, which may indicate that they are more likely to perform cross-venue arbitrage. HFT activity is positively correlated with fragmentation, volumes, tick sizes and prices and negatively with volatility. These results remain valid when using an instrumental variable approach, with the exception of fragmentation, implying that those variables are likely to be drivers of HFT activity, although further analysis is needed to ensure the robustness of these conclusions.

Looking ahead, further analysis is needed to

— improve the identification of HFT using the indirect approach,

— assess the actual contribution of HFT to liquidity, and

— analyse potential risks and benefits linked to HFT activity.

In particular, ESMA is investigating the topic of 'ghost liquidity', whereby liquidity in the order book vanishes before transactions can be executed on the opposite side, and its relationship with HFT activity.

Structural vulnerabilities stemming from the low interest rate environment

Contact: Frank Hespeler (frank.hespeler@esma.europa.eu)

Low interest rates over a prolonged period of time may be accompanied by valuation risks caused through distorted price signals favouring particular asset market segments such as fixed income products. In addition, increased liquidity and funding risks stemming from reduced profitabilities and changes in risk attitudes potentially contribute to higher systemic risks. On the other hand, exit strategies may also be accompanied by increased risks. Uncoordinated and abrupt exit strategies are associated with increases in valuation, funding and credit risks driven mainly by temporary volatile portfolio adjustments, and unguided market expectations. But even coordinated and gradual adjustments raise credit risk, while informational and regulatory asymmetries, as well as already fragmented asset markets, have the potential to generate additional contagion risks and further intensify liquidity risks. For all types of exits, the withdrawal of indirect subsidies to particular market segments weakens the business models of the institutions affected and hence implies revaluation, liquidity and additional counterparty risks.

Introduction

As partially illustrated in V.1, in recent years policy rates of the major central banks around the world, overnight interest rates on the interbank market and multiple other benchmark interest rates at the shorter end of the term structure have held unprecedentedly low levels for a prolonged period of time. Monetary policy authorities supported these low levels in order to safeguard financial stability and kick-start growth in their respective economies after the great recession.

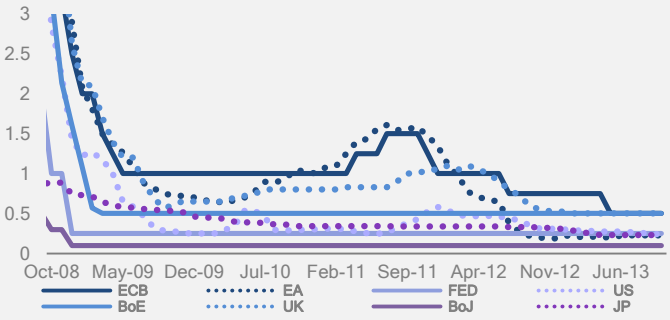
Without going into detail on the undoubted virtues of those policies, this contribution focuses exclusively on some of their potential undesired side-effects for financial markets. We attempt to deliver a descriptive analysis of these policies' potential impacts on the economic risks and vulnerabilities associated with the wide area of securities markets. For this purpose potential effects are categorized into those risks generated by or associated with a persistence of the low interest rate environment and those generally linked to an eventual exit from the low interest rate environment, i.e. a scenario of policy rate hikes and reduction in liquidity supply by central banks.

Risks associated with a prolonged low interest rate environment

Search for yield increases valuation risks and the risk of capital misallocation.

Notwithstanding the macroeconomic virtues of any policies behind the low interest rate environment, low interest rates and cheap refunding possibilities affected conditions within financial markets and securities markets significantly. Beginning with central banks, these effects can be observed in the expansion of their balance sheets (V.2) and compositional changes thereto, notably the rising proportion of long-term assets, securitized assets and non-investment-grade sovereigns. Both developments reflect the substitution of private sources of short-term liquidity by central bank lending and direct central bank interventions in various types of asset markets. In most market segments directly affected, asset prices were stabilized and interest rates experienced downward pressure.

Central bank reference rates and 3M interbank rates at low levels. V.1



Note: Reference rates for ECB, FED, BoE, BoJ, 3M interbank rates for EA, US, UK, JP., percentage points.
Sources: Datastram, ESMA

For investors, this improvement in funding conditions has lowered price risks in the short-term but also reduced expected yields in the longer run. Consequently, investors started to search for yield in a bid to maintain their portfolio returns. Typically, investors substituted part of their portfolios with assets carrying higher risks, longer maturities or lower liquidity. This is evident in high issuance of, and price increases for, high-yield products and in lower average credit quality (V.3, T.28-31). Consequently, the yields on assets used as new portfolio components were compressed towards the lower levels persisting in market segments in which yields were effectively fixed by policies supporting the low interest rate environment. For investors, this implied new incentives to engage in a search for yield and to enter even riskier market segments, even if such incentives have been somewhat moderated by recent regulatory measures.[1]

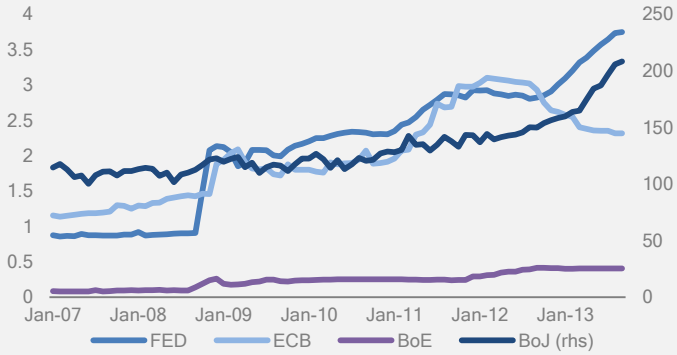
The search for yield began spreading to more and more asset markets, including emerging markets, equities, covered bonds and hedge funds (T.27, T.62, T.64).[2] However, in structural terms, this portfolio adjustment process implied incentives for investors to take inappropriate risks in order to meet formal or informal target values for portfolio returns. This likelihood was even

[1] E.g. ESMA (2013): "Short Selling Regulation in the EU: Initial evidence after entry into force of the Regulation", in Report on Trends, Risks and Vulnerabilities, No. 2 2013, p.35.

[2] Effectively, this chain reaction constitutes the very core of the transmission to the real economy of a monetary policy based on quantitative easing.

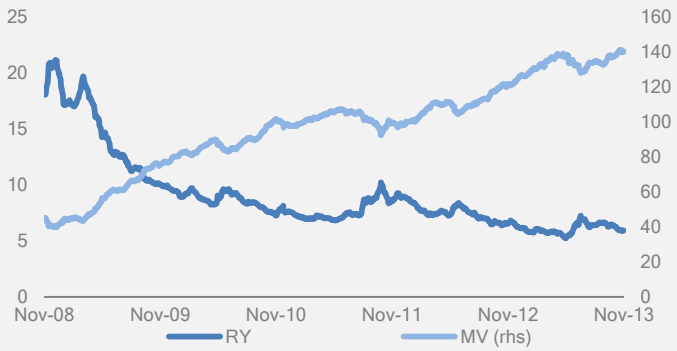
greater for asset markets characterized by asymmetric information between borrowers and creditors stemming from opacities in the financial products traded and complexities in assessing their risks. In general, the search for yield generated economic risks in the form of potential capital misallocation, also showing up in more frequent capital reallocations due to shorter planning horizons.[3] It has also given rise to financial risks such as heightened valuation risk, especially for assets of relatively low credit quality supported by dedicated policies, including contingent policies, and for assets serving as safe havens for excess liquidity.

Central bank balance sheets increased substantially. V.2



Note: Weekly total assets of the central banks of EA, US, UK and JP. Respective currencies tn.
Sources:National data, ESMA

Yields on HY products decline, market volume rises V.3



Note: Redemption yield and market value of Barclays high yield bond index, right scale normalized to 1/1/2012, %.
Sources: Datastream, ESMA.

Yield compression generates higher risks in respect of funding, liquidity, maturity mismatch, fragmentation and valuation.

For institutional investors and other financial intermediaries the compression in yields observed throughout asset markets generated risks for new business models. In particular, the squeeze in available margins tended to drag down profitabilities,[4] while incentives to increase risk exposures in order to counterbalance reduced revenues diminished the attractiveness of these entities to final investors. However, increases in risk exposures were contained by various ongoing regulatory reforms. The reduced competitiveness resulted in higher funding and liquidity risks for entities unable to access central bank liquidity.

Similarly, the portfolio adjustment process discussed above led to higher average maturities for institutional investors' assets. Due to legal minimum standards on redeemability, e.g. for UCITS fund shares and bank deposits, coupled with the risk aversion of final investors,[5] increased maturities could not always be passed on entirely to the latter. This put additional upward pressure on maturity mismatch risks and funding risks in general. In this context, the asymmetric eligibility of entities to access backstop architectures generated market distortion which, while it certainly helped to limit systemic risks, also increased the risk of market fragmentation and resultant allocation deficiencies.

Finally, low refinancing rates, at least for entities with ample access to refunding, lessened the immediate need for possible repairs to their balance sheets, corrections in dubious asset valuations and the build-up of provisions for possible future defaults on assets. Thus, whilst obtainable margins might still have covered the reservation income for final investors even after allowing for balance sheet losses, immediate balance sheet losses could still be avoided, or at least delayed, by forbearance practices or equivalent tolerance in the valuation of assets, e.g. of CDOs or other structured finance products. Both mechanisms, however, have stored up substantial valuation risks for the future.

Low interest rates reduce transparency and efficiency incentives, thereby increasing credit and macroeconomic risks.

Focusing on borrowers, low interest rates generated low capital costs, at least as long as borrowers had access to capital markets or alternative funding sources. Low capital costs reduced the urgency to implement measures in order to improve revenues or reduce operational costs, thereby generating risks of efficiency loss in use of the funds obtained, e.g. in the form of over-investment and bringing forward investments originally planned for the future.

Simultaneously, the low level of capital costs signalled low risk tolerance by final, in particular retail, investors, as also demonstrated by the eligibility criteria in the various central bank liquidity programmes or facilities in place.[6] Lower acceptance of risk exposure implied that borrowers either sought financing for low-risk investment projects or had to be prepared to pay substantial risk premia when venturing into high-risk investments. However, EU borrowers choosing the latter strategy have, in recent years, met with stiff competition from issuers in faster-

3 E.g. ESMA (2013): "Short Selling Regulation in the EU: Initial evidence after entry into force of the Regulation", in Report on Trends, Risks and Vulnerabilities, No. 2 2013, p.35.

4 As also indicated by the IMF in various Global Financial Stability Reports (GFSR), for banks reduced profitability is also driven by high non-performing loan ratios and similar factors.

5 Structurally, final investors tend to be more risk-averse than institutional investors, as they are less sophisticated and more restricted in their risk diversification.

6 Most central banks' programmes take the form of repo transactions in which eligibility criteria are specified for collateral or asset purchase programmes for which, again, eligibility criteria must be met.

growing emerging markets featuring similar risk levels (R.11 and R.12).

This meant that domestic borrowers' access to funding was fragmented along the risk dimension, leading to a shortage of funding in the high-risk sector. Existing incentives to misrepresent individual risk profiles were reinforced, potentially diminishing asset quality, which in turn drove up risk premia even further. The credit quality of financial instruments and demand for them consequently declined. Credit risks for investors and economic risks for borrowers rose. Distributional side-effects of low interest rates shifted income from households to sovereigns and non-financial corporates[7], implying macroeconomic risks for the sustainability of current and future demand, and also for individual asset market segments such as real estate. Substantial risks also stemmed from lower returns on life insurance and retirement plans, weakening not only the sustainability of this sector but also consumer demand from a substantial section of the population.

Risks stemming from prolonged low interest rate levels V.4

Risk Type	Determinants	Affected entities	Risk Category
Valuation	Search for yield	All investors	Market
Capital misallocation	Search for yield High risk premia	Borrowers	Macroeconomic
Demand effects	Distributional side-effects	Households	Macroeconomic, Market
Credit quality intransparency	High risk premia	Banks, hedge funds	Credit
Funding	Yield compression	Institutional investors	Liquidity
Liquidity	Yield compression	Institutional investors	Liquidity
Maturity mismatch	Yield compression	Institutional investors	Credit
Valuation	Yield compression	Institutional investors	Market
Capital misallocation	Asymmetric access to backstop mechanisms	Institutional investors	Market

Sources: ESMA.

Risks associated with an exit from the low interest rate environment

As illustrated by the massive market fluctuations in May and June 2013 following uncertainties regarding Fed tapering, an exit from the low interest rate environment in the form of rising central bank policy rates, reductions in their provision of liquidity – or even only increased expectations of one of the two – could be accompanied by substantial risks to financial markets.

Internationally uncoordinated and abrupt changes in the low interest rate environment tend to increase valuation, funding and credit risks.

An abrupt change in the level of policy rates would have the potential to trigger a cascade of portfolio adjustments by financial intermediaries and other market participants, implying volatile capital flows between asset market segments and different geographies.[8] In particular, changes in domestic interest rate environments without close international coordination may be accompanied by heightened volatility on foreign exchange markets and in cross-border capital flows. This implies increased valuation, funding and credit risks for domestic investors. Market movements in summer 2013[9] and initial signs of deteriorating credit quality suggest that international coordination might be particularly important for emerging markets in order to avoid exchange rate pressures and fluctuations in their capital balances. However, differing macroeconomic conditions may limit the scope for cross-border interest-rate alignment and could potentially generate sequences of abrupt portfolio adjustment cascades, temporarily further intensifying valuation risks and market volatility.

Even gradual adjustments tend to increase credit risks.

Even coordinated, well-communicated and gradual changes in the level of interest rates still entail some risk. After a long period of low interest rates accompanied by surges in public and private indebtedness, an increase in the general interest rate level would trigger reductions in asset values and increases in funding costs weakening the financial position of debtors through two mechanisms. Any change not accompanied by income improvements would thus tend to increase the credit risks associated with household mortgages, corporate loans and sovereign debt, while creating adverse incentives for orderly debt-service. In addition, consistency in the reaction of expectations would be central, as volatile expectations would render the form of the term structure unstable, potentially creating arbitrage opportunities and contributing to increases in market volatility.

Simultaneous interest hikes and reduced liquidity facilities may increase contagion effects between weaker market segments and within the shadow banking system.

In this context, the simultaneous off-loading of asset purchases or other means of liquidity provisioning, and the associated ceasing of determining long-term interest rates could potentially overburden expectation formation in the private sector by delivering additional impetus to term structures. Temporary liquidity effects and portfolio adjustments would increase fragmentation between liquid and illiquid asset market segments, implying higher contagion risks between the latter, where economic

[7] Debt-to-gross-income ratios of EU households rose sharply in most EU Member States between 2007 and 2012, as reported in various editions of the ESRB risk dashboard. Cf. also T.72 for the moderate development in gross disposable income.

[8] This is also embedded in the high implied volatilities observed for short-term interest rates, pointing to considerable investor uncertainty with regard to the shorter investment horizon (R.3).

[9] In summer 2013 capital flows temporarily reversed, generating substantial outflows for emerging markets. These sizeable flows also impacted the fund industry focused on emerging markets (R.12).

fundamentals and investor transparency are both weaker. The shadow banking system is particularly vulnerable to these asymmetries, as, compared to other markets, it lacks market transparency, thereby increasing investor sensitivity to putative commonalities between different assets or borrowers. Contagion risks would thus be even higher. Additionally, the instability of entire investor bases to changes in the risk environment, as observed in repo markets for example,[10] may create negative feed-back effects into the real economy and the wider financial system. Aggravated contagion risks in some market segments would thus assume systemic relevance by increasing system-wide structural vulnerabilities.

In Europe in particular, higher interest rates would tend to increase fragmentation, raising funding risks in weaker market segments.

For Europe the issue of fragmented financial markets is of particular relevance, as spreads between different sovereigns, and also between banks and corporates of different nations and rating classes, are already present in the current low interest rate environment. As argued above, asymmetries in the sensitivity to rising policy rates of yields on different assets are likely to deepen this fragmentation.[11] Thus, in markets with lower liquidity issuers might be exposed to higher funding risks, as reflected in stronger increases in refinancing costs and stronger reductions in access to refunding.[12] This vulnerability is further emphasized by a large minority of corporate debtors being severely distressed[13] in Member States associated with distressed sovereigns.

All exit strategies tend to increase liquidity and funding risks, counterparty risks and temporary valuation risks.

One particular issue presenting risks for market participants, regardless of the speed of the adjustments, is whether unsecured or secured interest rates will be employed as policy targets in need of guidance. Traditionally, unsecured rates have been the centre of focus; however, as secured assets provide alternatives associated with lower risk and several central bank facilities effectively already determine secured interest rates, unguided market expectations with regard to this aspect may result in distorted risk premia, creating the possibility of mispricing and the related risks stemming from temporary increases in market volatility and possible reductions in portfolio efficiency. Similarly, regardless of their speed, changes in the interest-rate environment are likely to generate additional counterparty risks by revaluing individual exposures. As these changes in exposures cannot be hedged as a whole, the entire financial sector would need to bear this additional systemic risk. Finally, balance sheets in the banking industry, and also in parts of the fund industry, are characterized by longer maturities on the asset side than on the liabilities side. Increases in long-term interest rates will create potential losses that need to be buffered by bank equity and fund shares. This would imply substantial valuation corrections in both segments, potentially driving up liquidity and funding risks.

Risks stemming from exit strategies V.5

Risk Type	Determinants	Affected entities	Risk Category
Valuation	(Un-)coordinated abrupt exit	Cross-border investors	Market
Credit	(Un-)coordinated abrupt exit	Cross-border investors	Credit
Funding	(Un-)coordinated abrupt exit	Cross-border investors	Liquidity
Default	Gradual exit	Debtors	Credit
Intransparency, economic risks	Gradual exit	High-yield investors	Contagion
Light regulation, intransparency	Gradual exit	Shadow banking system	Contagion
Systemic contagion	Gradual exit	Shadow banking system	Macroeconomic
Fragmentation	Gradual exit	Distressed debtors	Liquidity
Price corrections	Exit	Banking sector, fund industry	Liquidity
Mispricing	Exit	All investors	Market
Counterparty	Exit	All investors	Credit

Sources: ESMA.

Conclusions

Both prolonged phases of low interest rates and exit scenarios from such market conditions, be they gradual or more abrupt, are accompanied by economic benefits and risks. Focusing exclusively on the risks, a qualitative descriptive analysis identifies a broad set of risks from the various risk categories discussed in this report. Market risks feature most prominently, as mis-valuation contributes to asset price bubbles and temporary price fluctuations due to volatile portfolio adjustment processes. Credit and liquidity risks caused by the distorted pricing of risk premia, informational asymmetries and temporary capital flows between market segments are of almost of equal importance. Contagion risks arise as second-round effects transmitting primary risks to a wider set of markets. Feed-back loops with economic activity establish macroeconomic risks.

[10] This issue is discussed in the Oct. 2013 GSFR of the IMF for mortgage real estate investment funds (MREITS), and in a forthcoming ESMA working paper on hedge funds, prime brokers and systemic risks for hedge funds.

[11] Evidence for these different interest rate sensitivities can be found, for example, in the variance of slopes in bond yield curves, depending on ratings and issuers. Cf. ERSB Risk Dashboard, Indicator 6.1.

[12] This coincides with the evidence provided in the IMF's last GFSR that lending rate variations within the EU are determined less by monetary policy in selected distressed Member States than in selected non-distressed Member States.

[13] I.e. showing up as a high percentage of corporate debt concentrated in firms with high debt-to-asset ratios, as high leverage ratios in the corporate sectors and as a high share of debt in firms with low interest coverage ratios etc.

The CRA industry's market and performance – What evidence from ESMA's Central Rating Repository?[1]

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This article analyses trends and developments in the credit rating industry starting from the data credit rating agencies (CRAs) submit to ESMA's Central Rating Repository (CEREP)[2]. We first provide an overview of the market, focusing on its level of concentration and how different competitive structures have emerged in relation to different classes of credit ratings. We also highlight whether and how the financial crisis had an impact on the CRA industry and the structure of CRAs' credit ratings portfolios. The credit rating assigned by CRAs to financial instruments is an important factor investors consider in managing their portfolios. For that reason, we also look at the performance of the ratings (namely default distribution, accuracy and volatility of ratings), including a comparison by asset class and period of observation (e.g. pre- or post-financial crisis).

Market overview

The CRA industry is generally perceived as highly concentrated. In point of fact, the proportion of overall outstanding ratings issued by the largest three CRAs has been well above 90% since 2005 (the starting point of our observations for the purpose of the following analysis), and topped 95% in the period leading up to the 2008 financial crisis. Nevertheless, it is interesting to see how different competitive structures have been developing in the CRA industry according to the segment (i.e. type of credit rating) considered.

Although concentration in the CRA industry is high overall, it varies amongst different categories

Analysis of the data on market concentration shows that the CRA industry has a dual structure (see V.1 and V.2).

Big-3 concentration by number of outstanding ratings V.1

	2005 S1	2008 S2	2013 S1
Total corporate	87%	86%	82%
Of which:			
Insurance	*79%*	*65%*	*70%*
Financial non-insurance	*85%*	*87%*	*83%*
Non financials	*92%*	*94%*	*85%*
Sovereign	83%	82%	86%
Structured finance	100%	100%	96%
Covered bonds	100%	100%	99%
All rating types	97%	97%	94%

Source: ESMA.

Big-3 concentration by number of new ratings V.2

	2005 S1-2008 S2	2008 S2-2013 S1	2012 S1-2013 S1
Total corporate	74%	63%	53%
Of which:			
Insurance	*42%*	*45%*	*43%*
Financial non-insurance	*89%*	*80%*	*73%*
Non financials	*70%*	*58%*	*49%*
Sovereign	65%	68%	60%
Structured finance	100%	91%	84%
Covered bonds	100%	99%	94%
All rating types	98%	93%	85%

Source: ESMA.

On the one hand, there is the issuer segment (that is credit ratings for financial and non-financial corporates and sovereign), where the market coverage of the largest three CRAs is in a range of 70% to 85% of outstanding ratings and which, moreover, shows declining concentration. More specifically, analysis of the distribution of new ratings issued in the last 18 months reveals a trend towards further expansion in market participation, with the largest three CRAs covering around 50% of new overall corporate ratings (notably, less than 50% for the insurance and non-financial corporate segments) and 60% of the new sovereign ratings.

On the other hand there is the issue segment, comprising structured finance and covered bond products[3]. These rating classes are still dominated by the largest three CRAs, which covered practically 100% of the EU market until the financial crisis, since when only a small number of new participants have emerged.

The contributory factors behind greater concentration in the structured finance and covered bond classes include the need for appropriate governance and specialist skills, including dedicated processes and methodologies; and legacy and/or long-standing relationships, including access to proprietary information. While each aspect merits individual analysis, we confine ourselves here to commenting on the relevance of information availability. In that regard, the data available in CEREP show that the ratings produced for structured finance and covered bond instruments are all solicited – in other words, the rating is assessed following a contractual mandate between the issuer and the CRA (see V.3).

[1] This article was authored by Jakub Brettl and Lelio Lapresa, both at the ESMA CRA Unit.

[2] CRAs (i.e. either registered or certified in the European Union) must provide information on their rating activities and performance to ESMA's Central Repository (CEREP) every six months, the reporting periods being January to June (S1) and July to December (S2). The database can be accessed through ESMA's website (http://cerep.esma.europa.eu/cerep-web/). For the purpose of this analysis, data have been elaborated in order to avoid any statistical misrepresentation resulting from the particularities in some CRAs' reporting standards.

[3] CRAs submit information on both asset classes to CEREP.

Proportion of solicited ratings by rating type V.3

	2011 S1	2013 S1
Total corporate	96.2%	92.5%
Of which:		
Insurance	*92.6%*	*92.7%*
Financial non-insurance	*95.9%*	*95.8%*
Non financials	*97.5%*	*89.9%*
Sovereign	90.3%	85.0%
Structured finance	100%	100%
Covered bonds	100%	100%
All rating types	99.1%	98.2%

Source: ESMA.

This evidence suggests that CRAs providing credit ratings on these financial instruments need access to specific proprietary information, which inhibits the development of unsolicited ratings and ultimately reduces the potential for market participation in those categories.

The additional requirements set by the CRA3 regulation for structured finance instruments, including those referring to the disclosure of information (e.g. performance of underlying assets, cash flows, collateral etc.) should allow key information to become more easily available to third parties and hence reduce the risk of information asymmetry between market participants. It will be interesting to see whether this will also result in a larger number of CRAs operating in the structured finance segment.

The financial crisis had an impact on CRAs' credit rating portfolios

Data available in CEREP also provide useful information on the size (in terms of the number of outstanding ratings) of each rating category. V.4 shows that around 80% of the total outstanding ratings currently refer to either structured finance or covered bond instruments – the rating categories where market concentration is highest. Post-2008 this ratio has fallen only slightly, with the larger reduction in the structured finance category partially offset by the increased proportion in the covered bonds class.

Distribution by type of rating V.4

	2005 S1	2008 S2	2013 S1
Total corporate	22%	16%	18%
Of which:			
Insurance	*3%*	*2%*	*2%*
Financial non-insurance	*9%*	*7%*	*7%*
Non financials	*10%*	*6%*	*9%*
Sovereign	4%	3%	3%
Structured finance	43%	52%	46%
Covered bonds	32%	29%	33%

Source: ESMA.

At the same time, it is worth looking at how the CRA industry developed in the years leading up to the 2008 financial crisis. Between 2005 and 2008, the total number of outstanding ratings increased by around 50% (at a CAGR[4] of 12%), as a result of the rise in credit ratings issued on, primarily, structured finance and, secondly, covered bond instruments. The growth in the structured finance class is particularly striking, with the amount of outstanding ratings almost doubling during the period (i.e. more than an 80% rise in less than 4 years), at a 19% CAGR (see V.5 and V.6).

Variation in number of outstanding ratings V.5

	2005 S1-2008 S2	2008 S2-2013 S1	2005 S1-2013 S1
Total corporate	13%	-4%	8%
Of which:			
Insurance	*21%*	*-28%*	*-12%*
Financial non-insurance	*24%*	*-19%*	*0%*
Non financials	*0%*	*22%*	*22%*
Sovereign	16%	-5%	11%
Structured finance	82%	-23%	41%
Covered bonds	37%	-1%	35%
All rating types	50%	-13%	31%

Source: ESMA.

Growth in number of outstanding ratings (CAGR) V.6

	2005 S1-2008 S2	2008 S2-2013 S1	2005 S1-2013 S1	2011 S1-2013 S1
Total corporate	3%	-1%	1%	3%
Of which:				
Insurance	*6%*	*-7%*	*-2%*	*-2%*
Financial non-insurance	*6%*	*-5%*	*0%*	*-2%*
Non financials	*0%*	*5%*	*3%*	*9%*
Sovereign	4%	-1%	1%	1%
Structured finance	19%	-6%	4%	-8%
Covered bonds	9%	0%	4%	-8%
All rating types	12%	-3%	3%	-6%

Source: ESMA.

The exponential growth in the number of structured finance credit ratings is a direct corollary of the growth in the structured finance products reported before the crisis. Its magnitude appears extraordinary when considering that it occurred in economies and financial systems considered as being mature. While data show the power of financial innovation in fuelling this growth, from a regulatory perspective it is important to ensure that financial innovation is not detrimental to financial market stability and investor protection.

V.6 also shows how the structure of the CRAs' overall credit rating portfolio has changed in the last two years. The CRA industry as a whole still appears to be under pressure in terms of rating volumes (i.e. industry CAGR negative at -6%). Almost all rating categories saw a reduction in the number of outstanding ratings, the only material exception being the ratings for non-financial corporates. This is most likely one of the consequences of the bank deleveraging process, which is causing corporates to seek alternative sources of funding to bank lending. In such cases, having a public credit rating could facilitate the process.

We would also remark on the change in size of the credit rating portfolio (by number of outstanding ratings) reported by the individual CRAs before and after the financial crisis (see V.7).

4 Compound Annual Growth Rate.

Number of CRAs by growth in outstanding ratings V.7

	2005 S1-2008 S2	2008 S2-2013 S1	2005 S1-2013 S1	2011 S1-2013 S1
CAGR ≥ 20%	2	3	2	3
10% ≤ CAGR < 20%	5*	-	1	2
0% ≤ CAGR < 10%	6	2	8*	5
-10% ≤ CAGR < 0%	3	9*	4	6*
CAGR < -10%	-	4	1	4
Industry's CAGR average	12%	-3%	3%	-6%

* The asterisk indicates the category in which the largest 3 CRAs rank.
Source: ESMA.

Data show ten out of the twenty CRAs registered or certified by ESMA at the end of 2012 reporting a positive CAGR over the last 18 months. This is despite the material reduction in the industry's total number of outstanding ratings, driven by the three largest CRAs (whose number of outstanding ratings fell at a CAGR below -5% during the same period).

In the following section we examine in detail the performance of credit ratings in the European Union, using some of the most common measures applied in the industry.

Performance of ratings in the EU

We analyse the rating performance using default and rating distributions, accuracy ratios and measures of rating (in)stability (see Box 1.).

Accuracy measures explained

Accuracy measures are designed to quantify the ordinal ranking power of a rating system (e.g. corporate ratings). Some of the most common measures used are default rate distributions, accuracy ratios, volatility metrics, rating migrations and recovery/Loss Given Default (LGD) metrics. Measures used in this paper were selected on the basis of the data available in the CEREP database. These measures are briefly explained below:

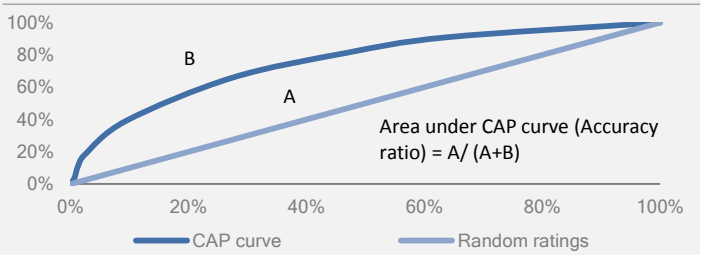
Default and rating distributions

The measure plots the rating distribution of a particular cohort (2008 in this paper) against the distribution of default rates in the same cohort over a given period of time (five years in this paper). In other words, the resulting chart shows which rating classes, on a historical basis, are most likely to experience defaults. A rating system performing relatively well will demonstrate its ordinal ranking power by the fact that most defaults will tend to occur in the lower parts of the rating scale, while defaults should be rare among the highest rating classes. The distribution of defaults should then resemble an exponential (or linear on a logarithmic scale) curve. Additionally, we supplement the analysis with the rating distribution for the 2008 cohort at the end of five years in order to depict the transition of the rating cohort over time.

Accuracy ratio

As a measure of rating performance, the Accuracy Ratio (AR) is very closely related to the Cumulative Accuracy Profile (CAP) – the area between the random curve (the 45 degree line) and CAP curve is our AR (see chart below)[5].

CAP Curve



AR can reach values between one (in which case the CAP curve would be a straight line) and zero (random curve and CAP curve are aligned), where the closer the area is to one the better the system is at differentiating between defaulters and non-defaulters. As with CAP, if defaults do not occur during various time periods AR cannot be computed. One disadvantage of AR over CAP is that a particular CAP curve can have only one AR; however one AR can be represented by multiple CAP curves.

Volatility of ratings

For the purposes of this article we choose to measure rating volatility as a notch-weighted sum of upgrades and downgrades divided by the sum of ratings outstanding in each asset class.

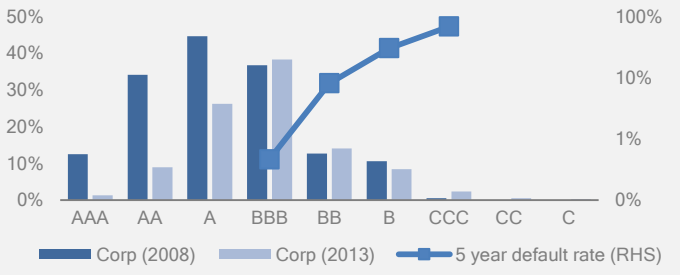
Notches per downgrade and upgrade are the simple weighted average of notches conditional on rating change (upgrades or downgrades) occurring.

Default and rating distributions

One way to analyse rating performance is by using default and credit rating distributions. Fundamentally, and as explained in Box 1, this lies in plotting the distribution of a particular rating cohort (2008 in this example) and its default rate over a given period of time (we have chosen five years). As credit ratings are ordinal measures of creditworthiness, a well-performing rating system should clearly discriminate between rating classes, whereby most defaults should occur in the lowest credit rating categories while defaults should be very rare in the highest categories.

Further, we supplement the analysis with the rating distribution for the 2008 rating cohorts after five years (i.e. 2013). This allows us to see the transition in distribution in five years. We compare the performance of the ratings across asset classes (corporate non-financial, financial and structured finance). The rationale for not including other ratings in the analysis (e.g. insurance) is that there were no defaults in the sample over the period observed.

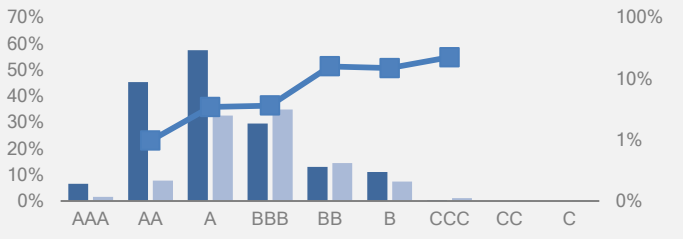
Defaults - Non-financial corporates V.8



Note: Ratings as percent outstanding. Defaults as percent outstanding in each rating class.
Sources:CEREP, Author's computations.

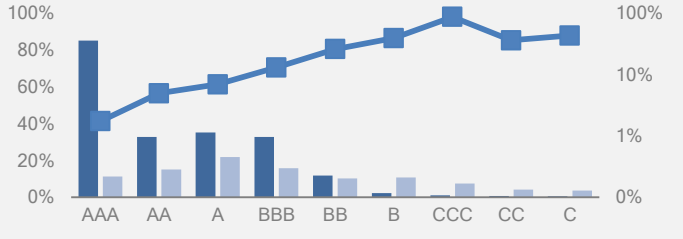
5 For more see Sobehart, Keenan and Stein, "Benchmarking Quantitative Default Risk Models: A Validation Methodology", Algo Research Quarterly, March/June (2001).

Defaults - Financials V.9



Note: Ratings as percent outstanding. Defaults as pecent outstanding in each rating class.
Sources: CEREP, Author's computations.

Defaults - SF V.10



Note: Ratings as percent outstanding. Defaults as percent outstanding in each rating class.
Sources: CEREP, Author's computations.

Clearly, the performance of the respective credit rating systems is not homogeneous across asset classes. In fact, all three charts show that the rating systems are capable of discriminating between higher and lower odds of default across the respective rating scale.

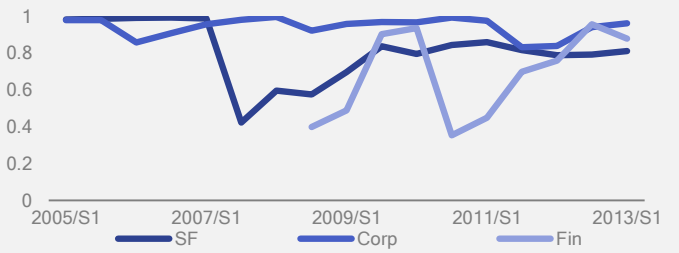
The distribution of corporate ratings indicates that in the period under review the highest rating category where defaults occurred was BBB (0.46%). Default occurrence varies considerably for the other two asset classes. Although generally rare, defaults by financials have had a tendency to occur even among the highest rating categories – the highest default in our sample occurred in the AA class (0.86%) and rose exponentially from there. The performance of structured finance ratings was, in relative terms, the worst of the three asset classes and was where defaults occurred even in the AAA class. The odds on defaults occurring are not identical in the three asset classes, and the particular rating class (for example AA) does not measure the odds of default uniformly across asset classes.

Finally, an examination of 2013 rating distributions in the respective asset classes shows how ratings have evolved over time. The credit ratings assigned to the respective asset classes tend to decrease during crises, resulting in a shift to the right of the rating distribution towards lower rating grades. Structured finance ratings experienced a visibly larger shift, and the number of AAA ratings today is nearly 70% lower than at the beginning of 2008. At the same time, the number of lower ratings in the lower portion of the scale also substantially increased, resulting in a significantly "fatter" right tail of the distribution than prior to the crisis.

Accuracy ratios

Accuracy Ratios (ARs) are similar to rating/default distribution analysis inasmuch as both are based on identical input: the distribution of ratings and defaults. In practice, there are two ways of presenting the accuracy ratio: one uses the Cumulative Accuracy Profiles (CAP), which offers a similar analysis to that provided in the previous section (see also chart T.90 for CAP), and the other condenses the CAP into a single number (see Box 1). The distinct advantage of AR is that it allows the performance of rating systems to be monitored over time.

Accuracy ratio - Various asset classes V.11



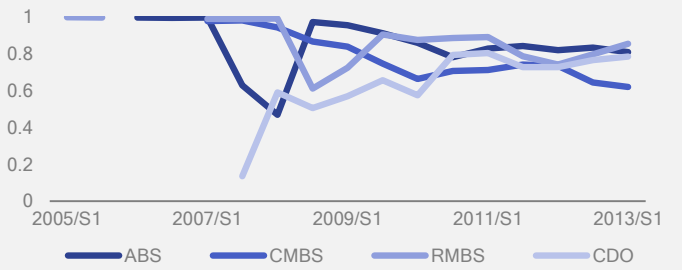
Note: See Box 1. SF refers to Structured finance, Corp to Corporate (Non-financial) and Fin to Financial.
Sources: CEREP, Author's computations.

We feature the AR for the same asset classes as in the preceding section. Clearly, the AR is also able to differentiate between the performance of the three asset classes. Furthermore, AR enables us to identify when the performance of ratings has declined.

Corporate ratings exhibit the most stable AR over time. In addition, the fact that it has remained above 80% in the period under review means that all the defaults occurred in the bottom percentiles of the rating distributions. The AR of structured finance and financials tells a different story. The accuracy ratio of financials is the most volatile, with the troughs in the second half of 2008 and first half of 2011 coinciding with the financial – and subsequently the sovereign European – crises. The underlying reasons are the same as indicated in the section above: defaults in financials are rare, but they also occur in the highest rating categories. In relation to structured finance, the AR showed uneven performance. For example, in the early days of the financial crisis the AR fell sharply to 40% in the first half of 2007. Subsequently, the AR of structured finance ratings gradually recovered to 80% in 2009, since when it has remained more or less constant.

Structured finance products and their ratings are even more interesting, as they belong to an asset class that consists of a rather broad set of sub-asset classes. The most common are asset-backed securities (ABS), commercial and residential backed securities (CMBS and RMBS), and collateralized debt obligations (CDO). Since there is a rather large heterogeneity in terms of the assets that are used as collateral for the structured finance notes, it is likely that we will observe varied performance in their ratings over time.

Accuracy ratio - Sub-SF V.12



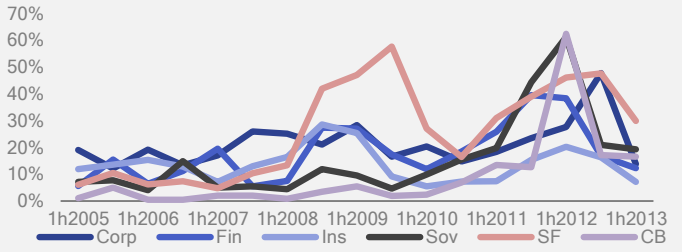
Note: See Box 1.
Sources: CEREP, Author's computations.

As the chart above shows, performance by the various structured finance sub-asset classes was certainly not homogeneous during the crisis period. In general, CDOs – typically the most complex structured finance sub-asset class – performed worst at the outset of the crisis, when the rating system nearly lost its relative ranking power. In other words, based on the occurrence of defaults in the respective rating classes it was difficult to see any distinction in creditworthiness between AAA and C. ABS and RMBS similarly performed poorly early on but recovered relatively quickly and are now among the best-performing structured finance ratings. The AR of CMBS, although not hit as hard early on, slowly deteriorates over time and is now the lowest of all structured finance ratings.

Volatility of ratings

Volatility is not a performance measure per se, as rating agencies do not typically target certain levels of volatility (or stability). The volatility of ratings, or more accurately the frequency of rating upgrades and downgrades (and their size), is an important indicator of the credit assessment's propensity to change.

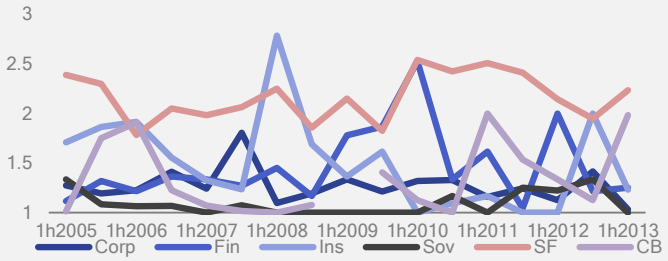
Volatility of ratings V.13



Note: See Box 1. Corp refers to Corporate (Non-financial), Fin to Financial, Ins to Insurance , Sov to Sovereign, SF to Structured finance and CB to Covered bond.
Sources: CEREP, Author's computations.

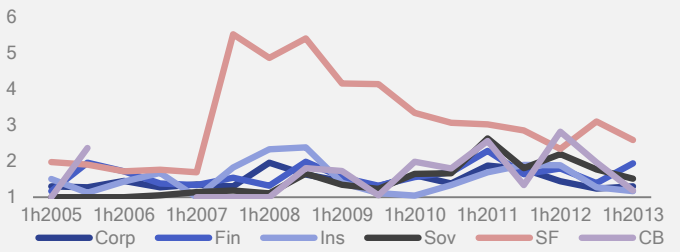
The type and magnitude of rating changes will depend on the specific phase of the credit cycle (resulting in varying levels of volatility). Therefore, it is the relative behaviour of credit ratings over time that gives a better indication of how robust the rating assessments are. Structured finance ratings are among the most volatile, with the highest level of volatility seen in the early stages of the financial crisis. Other asset classes, namely corporates, financials, sovereigns and – briefly – covered bonds experienced elevated levels of volatility in the period coinciding with the European sovereign crisis. Rating volatility as calculated here has one important caveat: Volatility rises both when a large number of ratings change slightly and also when only a few ratings (in relative terms) change dramatically. Hence, another indicative measure of the robustness of credit ratings is the average size of the rating changes, that is the average number of notches on which a rating change (i.e. downgrade or upgrade) is conditional.

Notches per upgrade V.14



Note: See Box 1. Corp refers to Corporate (Non-financial), Fin to Financial, Ins to Insurance, Sov to Sovereign, SF to Structured finance and CB to Covered bond.
Sources: CEREP, Author's computations.

Notches per downgrade V.15



Note: See Box 1. Corp refers to Corporate (Non-financial), Fin to Financial, Ins to Insurance, Sov to Sovereign, SF to Structured finance and CB to Covered bond.
Sources: CEREP, Author's computations.

The distribution of upgrades and downgrades generally tends to be rather narrow as, on average, rating changes in either direction rarely exceed two notches. This tended to be the case even during the crisis years, indicating that the high volatility of corporate, sovereign, financial and covered bonds was predominantly the result of a large number of small rating actions rather than the other way round. However, it is where downgrades are involved that the broader structured finance asset class tends to experience significantly larger rating actions than the other asset classes. Chart V.15 indicates that even in the run-up to the crisis (pre-2007) the average size of downgrades (around two notches) was higher than in the other asset classes (with the exception of covered bonds in 2H2005). As from the first half of 2007, average downgrades were much larger, at an average of approximately 5.5 notches per downgrade, peaking again in the second half of 2008 at 5.3. This number has been gradually decreasing since the second half of 2008, but even five years on it is still well above all the other asset classes, in which the average downgrade never surpassed 2.6 notches.

Conclusion

Starting out from an analysis of outstanding credit ratings in the European Union, this note shows how highly concentrated the CRA industry is, with the market dominated by the largest three CRAs. Concentration is particularly pronounced in the structured finance and covered bond rating categories – despite the entry of a few new operators in those two segments – whereas it is less marked in the non-banking corporate category. As far as

rating performance is concerned, we have demonstrated significant heterogeneity across asset classes, with corporate non-financial ratings appearing to perform much better than ratings of financial institutions and structured finance instruments. This was particularly evident during the crisis years, when corporate ratings exhibited very stable performance while that of the other two asset classes deteriorated or showed considerable variance. Finally, as shown in this paper, past performance is no powerful predictor of future achievement.

EU Central Securities Depositories – Systemic considerations

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This article concerns itself with Central Securities Depositories (CSDs) in the EU and systemic considerations arising from the services they provide, their links and industrial organisation. Since the financial crisis and Pittsburgh G20 declaration, financial market infrastructures (FMIs) have come to the fore of the policy agenda. This has resulted in a concerted policy effort at global and regional levels. As economies of scale and scope exist across settlement-related services, the links among FMIs tend to form dynamically and can result in changeable, complex and extensive interdependencies. Indeed, this also holds true for FMIs' links with the wider financial sector. On the one hand, this can support efficiency and financial stability in normal times, including by promoting financial market integration and diversification. On the other, resulting rearrangements of industrial structures also can lead to a redistribution of risks and possibly change their nature, with potential implications for resilience and shock-propagation in times of crisis. Thus, cross-sector and cross-country regulation and supervision are important considerations.

Central securities depositories (CSDs) are financial market infrastructures (FMI) of systemic relevance and, due to the risks they face, are subject to financial market regulation. At present, no commonly accepted definition of a CSD exists. Rather, one can consider the various services an FMI offers and accordingly subject these to regulation and supervision. As described below, draft EU CSD Regulation (CSDR) under consideration differentiates between core and ancillary services, with relevant regulation seeking to address the risks and potential spillovers from various services rendered.[2] Overall, the systemic relevance of a CSD derives from the criticality of its services to the functioning of markets.

The interplay of market forces and public sector initiatives at the global and regional levels are resulting in industrial reorganisation of the FMI sector, with attendant redistribution of risks. In view of economies of scale and scope being married with barriers to entry, market forces tend to favour agglomeration. This partly explains the tendency for the sector to organise in monopolistic structures bounded by national frontiers. Driving further agglomeration is ongoing EU financial market integration, which encourages greater cross-border activity and links in the industry.

From a regulatory point of view, several initiatives are relevant to the settlement industry. Notably, CSDR represents the third leg of a concerted EU regulatory effort to enhance financial market stability, transparency and efficiency, thus complementing EMIR and MiFID. It aims at harmonizing and facilitating cross-border CSD access within the EU, is expected to come into effect by early-2014, and could reinforce further market integration. As for EMIR, though focused on the clearing requirement for standardised derivative contracts, it directly affects the industry due to asset management requirements for central counterparties (CCPs). Indeed, the interconnected nature of the financial sector implies that non-FMI regulation, notably Basel III, will affect the FMI sector. Finally, the implementation of TARGET2 Securities (T2S) is designed to provide an EU-level shared settlement platform hosted by the ECB. T2S should enhance efficiency and reinforce EU integration by reducing costs and the number of intermediaries and accelerating settlement, as well as ensuring greater consistency of industry standards.

This note first considers the interplay of services rendered, links among entities and related risks. Thereafter, it moves on to the relationship between market structure and systemic risk. Finally, it reflects on the implications of CSD failure and policy challenges.

CSD services, links, and risks

Services

The nature and scope of services rendered by CSDs vary depending on jurisdiction and market practices. Similarly, attendant risks are driven by the nature of these services and how they interact with others. Hence, regulation addreses risks according to the provision of services. Indeed, CSDR distinguishes between core and ancillary services. Accordingly, core activities include notary, safekeeping and settlement services.[3] Economies of scope deriving from the complementary nature of various services allow CSDs to gain efficiencies by offering a suite of services beyond core services. CSDR further groups these ancillary services into those that contribute to the safety, efficiency and transparency of securities markets and those that are rather of a banking type. The former include general collateral management, matching of settlement, shareholder registry, or regulatory reporting services. Banking services include the provision of cash accounts, securities lending, or pre-financing.

Core activities expose CSDs to non-negligible risks, notably of a legal and operational nature. Counterparty risk exists in the settlement process, though for the counterparties to a transaction. Further, this is significantly mitigated by adherence to exchange-of-value industry standards, such

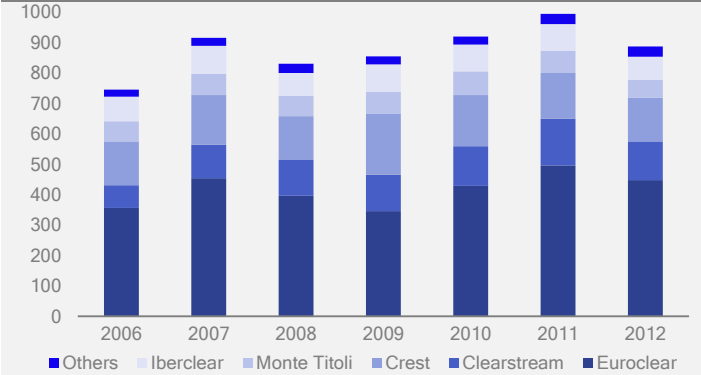
[2] Draft regulation has been adopted by the European Parliament, with a vote expected to take place early 2014. The draft version referred to in this article was published on 7.3.2012. ESMA is expected to draft relevant technical standards in due course. CSDR will amend the 1998 SFD directive amended in 2009. (See EU regulations 98/26/EC and 09/44/EC)

[3] Notary services help ensure the integrity of securities' issuances and also include registrar activities. Corporate actions can relate to areas such as tax, dividends or proxies management. Safekeeping includes managing transfer and book entry. Finally, there is settlement, notably of immobilised and dematerialised assets, in the form of operation of a securities settlement system.

as a Delivery versus Payment (DvP). Therefore, CSDs' risk management focuses on operational and legal details. Therefore, CSDs' risk management focuses on operational and legal details. The systemic nature of these core activities is evident from Graph V.1, which shows the value of settlement orders processed by European CSDs from 2006 through 2012. The sheer size of nearly EUR 1qn in 2011 reveals the importance of this sector for the functioning of EU financial markets. Further, the graph clearly shows the concentration of activity. The composition reveals the importance of the two International CSDs (I-CSDs) and the continued relevance of national frontiers.[4] The degree of concentration also raises too-big-to-fail considerations.

The differentiation of ancillary services rests on an efficiency and risk basis with a view to enforcing risk management practices accordingly. Market efficiency-enhancing ancillary services reduce the number of intermediaries in the post-trade life-cycle and are commonly considered essential for modern and developed securities markets since they support market participants in fulfilling contractual obligations; financing and investment operations for securities lending; the circulation of collateral; or even Central Bank open market operations. On the other hand, while banking services can naturally grow out of custodial activities and increase market liquidity in normal times, they also expose the CSD to non-negligible risks from leverage and lending. A build-up of attendant risks can harbour a systemic dimension that can unwind discontinuously, for instance in the event of sudden deleveraging in the sector. CSDR aims at appropriately ring-fencing risks to core activities.

Value of transactions settled by EU CSDs V.1

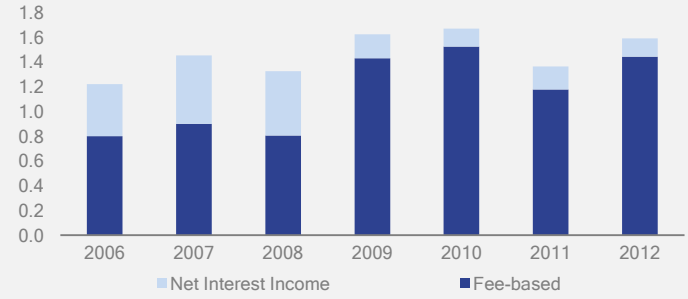


Note: Value of settlement instructions processed by EU CSDs; annual data in EUR tn.
Sources: ECB, ESMA.

CSDs' revenues derive from the services they provide, thus often comprising a portfolio of revenues streams which can be fee- or interest-based. CSDs typically charge fees for notary, safekeeping and settlement services. According to I-CSDs' annual reports, these activities generate more than half of their revenue. Given issuance and settlement activities are complemented by having a shareholder registry and may also involve fees, the exact fee schedule can vary. On the other hand, interest revenues, such as from lending activities, are also important, and factors affecting margins will include the interest rate environment, fee income, and service portfolio. Notably, the portfolio of services provided, regulatory environment, market demand and competitive pressures will jointly determine where an entity may seek to secure margins.

A CSD's activities and revenue structure will depend on the group service portfolio and competitive forces, as well as on the collateral demand and interest rate environment. Annual reports can provide some insight into such structures. Figure V.2 shows the evolution of fee versus interest income for the EU I-CSDs, indicating significant revenue growth from 2009 with an attendant change in the composition of income towards fee-based revenues.

Income sources of I-CSDs V.2



Note: Information on fee revenues by international CSDs, EUR bn.
Sources: Euroclear and Clearstream annual reports, S&P data for 2006-2008, ESMA.

Links

CSDs are highly interconnected, with a variety of links to a variety of institutions, often of systemic importance. Given the interconnected and interdependent nature of the post-trade life-cycle, vertical links with other FMIs, such as trading venues or CCPs, are not uncommon. Similarly, horizontal links are ubiquitous, as each CSD has an interest in providing its investor clients with access to markets for issuance not directly served by itself. Indeed, this leads to a distinction of services provided by CSDs into those of an investor CSD and an issuer CSD.

The following examples indicate the potential for market innovations or regulatory changes to have an impact beyond the industry immediately affected. As a corollary of the above-mentioned greater horizontal linkages between CSDs, such as interoperability arrangements, the distinction between a global custodian and a CSD becomes blurred to a certain extent. In particular, the services provided by an investor CSD resemble those of a custodian, notably as a client's relationship manager to FMIs. The draft CSDR provides another intricacy, as it requires links to be of high quality and with regulated counterparties. For instance, this raises questions about the supervisory responsibility and status of the T2S platform. Similarly, EMIR specifies that CCPs must avail themselves of CSD services when managing assets, including members' and clients' collateral. Again, this potentially creates an overlap with custodians. Finally, customer relationships also reveal

[4] As far back as the 1960s, the international integration of EU and global financial markets necessitated the establishment of I-CSDs, namely Euroclear and Clearstream, for cross-border settlement and handling of Eurobonds. Clearstream and Euroclear also serve DE, FR and the Benelux countries. Crest, Iberclear and Monte Titoli are the significant players in the UK, ES and IT respectively.

complexities. For instance, CSDs are directly linked to their members, including banks and custodians, while these may also be intermediaries for other clients.[5]

Links can be a source of both efficiency and market power while simultaneously representing sources of risk differentiation and concentration, as well as propagation channels and reservoirs of resilience. Thus, regulatory vigilance is required to ensure appropriate calibration. Efficiencies encourage groups of FMIs with common links to agree on common standards, for instance following a concept generically known as straight-through processing (STP). STP requires precise communication and logistical standards, where legal hitches are minimised. Access barriers, such as those due to transaction fees, can raise competition concerns, however. Notably, unnecessary specificity and insufficient convergence can contribute to a concentration of market power in vertical silos.[6] Finally, risk diversification can be enhanced at the system-level via cross-market holdings. Yet intra-FMI industry links can constitute risk transmission channels when they carry exposures, thus requiring regulatory vigilance both from a competition and financial stability point of view.

Risks

Risks related to core activities tend to be limited and of an operational, legal, or custodial nature, while ancillary services, notably those related to banking services, can be unlimited and systemic, also due to the leverage and counterparty risk assumed. Further, links with parties carrying significant systemic risk can aggravate a CSD's risk profile by opening transmission channels.

CPSS-IOSCO's Principles for Financial Market Infrastructures outline a broad set of recommendations to address the major risks to which the industry is exposed. These include liquidity, settlement, general business, custody and operational risks. Principle 11 recommends that CSDs have appropriate rules and procedures to help ensure the integrity of securities issues and minimise and manage risks associated with the safeguarding and transfer of securities. Key recommendations include:

- Appropriate rules, procedures and controls, including accounting practices, to safeguard the rights of securities issuers and holders and prevent unauthorised creation or deletion of securities, and frequent reconciliation of securities held;
- Prohibition of overdrafts and debit balances in securities accounts;
- Maintain securities in immobilised or dematerialised form for transfer by book entry;
- Segregate between the assets of each participant as well as the CSD's own assets;
- Identify, measure, monitor and manage CSD's risks ensuing from other activities, including by ensuring these do not spill over to these other activities.

Ancillary services may expose CSDs to risks with systemic potential. Relevant financial risk can be substantial where credit or liquidity risks are present, such as with banking-type services. As drafted, CSDR would require CSDs that provide banking-type services to comply with more stringent prudential requirements in a separate legal entity. Thus, CSD banking-type activity is not authorized except with derogation from a NCA. Further, legal segregation of banking activities within the Group would be required.

Market structure and systemic risk

Economies of scale and scope: Size and interconnectedness

FMIs' systemic relevance derives from the dependency of markets on their services and is typically related to size and interconnectedness. While the relevance of size is often evident from concentration, the relevance of industry links is often highly complex. Scale and scope economies in CSD activities favour monopolistic, utility-like structures within each market. The interplay of horizontal and vertical links spawns networks spanning multiple networks, thus at once yielding asymmetric roles for CSDs and raising considerations for both cross-sector and cross-country supervision.

Scale economies increase with the degree to which activities can be replicated, which is also determined by homogeneity of asset class and legal environment. In the presence of barriers to entry, including those due to sunk costs related to regulatory requirements, an incumbent will likely service any new issuance before a competitor emerges. Scope economies, on the other hand, derive from the provision of services, such as the provision of banking-type activities or of a shareholder registry, that form natural complements to core services. Further, market segmentation tends to be sustained where there are differences in standards, such as accounting, technical, or legal. Such differences are often found across asset classes and countries, thus favouring specialisation and national monopolies. The US market presents an extreme case, with the Federal Reserve focusing on Federal Government issues, while DTCC handles the remainder. In the EU, differences across national borders have sustained fragmentation.

Market forces aside, regulatory changes likely are leading to further consolidation within the EU, thus breaking down the legacy of fragmentation along national borders. Similar to the cases of non-financial and networked utilities, this legacy contributed to post-trading being a source of inefficiency within EU financial markets. Over the past

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5 From an operational perspective, end-customers of settlement services can access either through a direct account with the CSD or through a so-called agent or custodian bank. The latter holds an omnibus account with the CSD, which is a single account for commingled funds or positions of multiple parties. In that scenario, these banks are funnelling business activity to CSD while obtaining fees from end-customers uninterested in the burden of holding a direct CSD account. To a marginal extent, these custodian banks also compete with CSDs in the event that several of their clients engage in a transaction where a closed circuit may allow the internal transfer of the securities within the bank.

6 B. Serifsoy and M. Weiß, 2007, "Settling for efficiency – A framework for the European securities transaction industry", *Journal of Banking & Finance*, 31, pp. 3034–3057.

decade, EU post-trading has changed considerably, with market participants pursuing various strategies, including cross-country consolidation and drives toward vertical integration. On account of national fragmentation, settlement costs in the EU have been an estimated 33% higher compared to the US.[7] For cross-border transactions, the cost differences are estimated at a multiple of that, notably due to intermediaries extending the length of the value chain. Such inefficiencies would ultimately translate into higher costs of capital across the EU, making the marketplace less competitive and contributing to cross-border market fragmentation.

Horizontal links

Horizontal links may drive efficiency gains and can improve system diversification yet can also give rise to the appropriation of economic rents and form transmission channels. Industry consolidation could take many forms, and benefits could include smoother settlement and possibly even reduced settlement failures caused by CSD operational incompatibilities. There are also arguments against consolidation, however. Further concentration would increase too-big-to-fail issues, while it could also give rise to monopoly rents. Hence, continued fragmentation with open access to competitors' transaction feeds could enable better price discovery mechanisms, while building enough redundancy into the system to mitigate too-big-to fail concerns.

With segmented markets, such as fragmentation along national borders, multiple CSD memberships may be required to access multiple markets. In an EU context, this is relatively onerous and runs against the common market principle. Alternatively, CSDs can establish links with each other. This way CSDs become central nodes in networks that connect markets. Costs can thus be reduced by CSDs handling cross-market transactions while retaining local specialisation. Yet such links also change the structure of the market, and cross-country issues can arise.

Vertical links

Vertical integration is a typical feature of the post-trading industry, often complemented by horizontal links. Examples include LSE Group's recent acquisition of both LCH Group and Monte Titoli; Clearstream is part of Deutsche Börse; Keler is a vertically integrated market player. Complementarity of services and ease-of-access are driving factors behind this integration, including the provision of one-stop-shops for clients, which reduces the number of parties involved and yields efficiencies from scope economies. Uniformity of communication and order transmission channels, such as achieved via STP, is an important aspect in these efficiencies. As discussed above, the co-existence of differing standards across silos could reduce competition, effectively serving to segregate markets. Such silos could also limit the consolidation of horizontal service providers due to asymmetric information and access limitations.[8] The surveillance of governance and market practices of groups is an important regulatory consideration, also to enforce competitive practices or to monitor risk transmission channels among different business segments. As explained above with respect to the blurring of the distinction between a custodian and the investor CSD, when roles become hazy this raises considerations regarding cross-sector supervision.

Regulatory challenges

A particular challenge for regulation is that significant changes to regulation tend to alter market structures, which in turn requires anticipation and monitoring or rerouting of the risks that consequently emerge. Another challenge lies in the systemic nature of CSDs, implying that their continued operations are critical to markets and suggesting the necessity to consider regulatory measures.

Though only a consideration in extreme circumstances, it is possible for a CSD to be rendered inoperable for operational, legal or financial reasons. Given their systemic nature, such an event would severely disrupt securities markets and the real economy. An isolated settlement failure is unlikely to give rise to such an event, however, as the risk the CSD is exposed to when using DvP settlement is limited. Nonetheless, the idiosyncratic and systemic risks discussed above could trigger such an event. A rescue operation for a CSD would be challenging, with high stakes and policy coordination vital - across sectors, countries, and regions.

As institutions of systemic relevance, CSDs are part of ongoing international work on the recovery and resolution of FMIs. On October 5th, 2012, the EU Commission released a public consultation on the resolution of FMIs that underlined the differences among FMIs and banks as well as between CSDs and CCPs, which thus require different resolution models. For instance, unlike banks neither CCPs nor CSDs receive retail deposits or provide maturity transformation. CSDs are also different from CCPs, notably inasmuch as they do not assume credit risk, as DvP in principle eliminates counterparty risk. The Commission's work is ongoing. Further, CPSS-IOSCO published a report on FMI recovery in August 2013.

The full deployment of ongoing policy initiatives is likely to reshape the industry landscape. First, small players may suffer from increased compliance costs, possibly generating consolidation within the industry. Second, the structure of CSDs will have to adapt to the new regulatory requirement, especially for the banking-type activities requiring segregation from other activities. Likewise ongoing industry restructuring may give rise to competition in other sectors not accustomed to competing with CSDs. Third, increased competition resulting from CSD access liberalization and the reduction in transaction costs driven by T2-S may require re-examination of

7 Malkamaki et al., 2006, "Economies of scale and technological development in securities depository and settlement systems", *Journal of Banking & Finance*, 30(6), 2006, pp. 1783-1806.

8 See Koppl, Thorsten V. and Monnet, Cyril, 2007. "Guess what: It's the settlements! Vertical integration as a barrier to efficient exchange consolidation", *Journal of Banking & Finance*, 31(10), pp. 3013-3033.

business models and mark-ups. Similarly, CSDR and EMIR may alter the post-trading value chain, with global custodians entering into the settlement business. Thus, diversification of revenues strategies is likely, including the possibility of riskier collateral management services. This can bring about vertical and horizontal links, including to third countries. Such factors require competition and financial stability oversight, including cross-jurisdiction approaches, spanning sectors and borders national and regional.

Conclusion

CSDs are systemic financial institutions by dint of their central position in the post-trade life-cycle and the necessity of their services for the functioning and efficiency of financial markets. Their services in the areas notary, settlement, custody, information processing and storage related to securities services form an essential part of the trading value chain. Further, economies of scale and scope in conjunction with market-integrating forces are favouring the emergence of complex links among monopolistic players in a variety of markets. Thus, one observes links between a variety of CSDs, other FMIs, and even other related industries, notably those engaged in banking-type activities. Attendant on these links, and the market structures to which they give rise, will be the emergence of a new set of systemic risks. Given the emerging cross-sector and cross-country links, regulation and supervision will have to be particularly conscious of interactions between the various and disparate markets. Hence, policy coordination and enforcement will require not only cross-border but enhanced cross-sector dimensions.

As part of this reorganisation there are several important policy initiatives globally and at the EU level. In the EU these include T2S, as well as CSDR and, in a wider sense, also EMIR. To date, the CSD industry has not demonstrated an excessive appetite for risk. Nonetheless, CSDR will represent a much needed update of the current regulatory framework introducing the latest recommendations of CPSS-IOSCO on Principles for Market Infrastructures, especially a risk-based approach. CSDR aims at reducing inefficiencies arising from fragmentation, overlapping technical platforms or concurrent communication standards. The implementation of CSDR will likely overlap with T2S deployment: their joint impact is likely to increase the soundness of EU financial markets, their competitiveness for the benefit of the real economy, and probably more cost-efficient FMIs. It remains to be seen how these policy initiatives will affect market structures, however, and consequent redistribution of risks. Potential aspects include race-to-the-bottom strategies and the impact on the market for collateral.

With such significant changes afoot in the post-trading industry, including increased inter-industry and international links, the significant efficiencies remain to be exploited in terms of scale and scope. At the same time, however, the potential for propagation of severe events through the system is also raised. From a financial stability point of view, data gaps and supervision across industries and countries are important considerations, including the creation of suitable fora, such as colleges with pertinent capacity and power.

Stress testing of investment portfolios

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Since the onset of the financial crisis, stress testing has become an integral part of the risk management process for investment portfolios. It is viewed as a complementary tool to some of the more standard risk metrics such as volatility and VaR. A stress testing programme that has the input and buy-in of not only the risk management team but also the portfolio managers and senior management is the one most likely to better position the investment company's portfolios for major market events.

Prior to the financial crisis of 2008, stress testing was frequently thought of within the risk management community in the way that some professionals in the hard sciences look upon their colleagues in economics: with a mixture of condescension and scepticism. Unlike some of the traditional statistical metrics found in the risk manager's toolbox - Value at Risk ('VaR'), expected shortfall, volatility and higher moments, stress testing was considered somewhat less objective. In contrast to the stand-alone risk metrics, stress testing demands that the user integrate a qualitative narrative into the quantitative process. To the purest of quantitative analysts this allowed for the unwelcome presence of subjective biases.

The financial crisis however, revealed the fragilities of employing a single risk metric such as VaR to communicate exposures. VaR provides the investor with an estimation of the maximum loss up to a certain confidence interval over a specific period of time, assuming normal market conditions. What VaR does not explain is the risk embedded in the tail or the risk profile of the distribution during non-normal conditions. Some risk managers responded to these potential weaknesses of VaR calculations by examining the tail and distribution profile, using metrics such as the expected shortfall, kurtosis and skewness.

Still, despite these complementary sets of risk metrics, most investment fund managers were caught off-guard by the suddenness of the market crisis of 2008, and the way in which credit stress triggered market stress, liquidity stress, operational stress and ultimately reputational risks. The tools that had been employed to estimate risk were based on either known historical time series and distributions or what were seen as plausible estimated ones. Neither correctly forecast the depth, severity and length of the crisis. What we observed was not so much the flaws of these metrics but their limitations. Under extreme market conditions the underlying assumptions broke down. Yet, there was an important complementary set of instruments in the risk manager's toolbox that had not in most instances been robustly employed – stress testing.

Why stress testing?

Unlike portfolio risk metrics, stress testing is intended less as a predictive tool and more as a means of assessing potential outcomes and assigning a probability to those outcomes. The process of stress testing forces the investment manager to link the portfolios' positions to relevant risk factors while considering a set of outcomes, however low in probability, that could materially impact the return profile of the portfolio. When considering a stress scenario, either historical or simulated, the portfolio manager is able to link a potential loss to a recognizable event rather than a single statistic such as VaR. This serves to improve not only the understanding of portfolio risk exposures but improves the portfolio construction, monitoring and if needed hedging process.

Prior to the launch of new or innovative products, stress testing plays an especially important role in the testing and approval phase. The testing process serves to determine whether the risk return profile of a given product is suitable for a target audience. The results may also be shared with investors to provide a greater degree of transparency than the range of outcomes in severe market scenarios.

Goals of stress testing

Stress testing is generally employed for one of two purposes: limit setting or as a means of communication. In the former, the level of detail feeding the stress testing model and its ability to accurately analyse multi-factor shocks is essential, as the resulting limits, e.g. localized duration exposures for bonds or factor exposures for equities, guide the management of the portfolio. The stress tests serve to reinforce whether position and sector limits are appropriate for normal conditions.

When using stress testing as an internal communication tool, one should be parsimonious in the selection of risk factors so as to more easily convey the results. In this case, ease of understanding the shocked risk factors and the attendant effects are the priority. The challenge here is structuring stress tests that are sufficiently severe while at the same time remaining plausible. Balancing the two requires the input and buy-in of relevant stakeholders, risk managers, portfolio managers and portfolio market analysts. Scenarios not sufficiently severe will fail to add necessary complementary value to the existing metrics. Scenarios deemed implausible will fail to resonate with the stakeholders.

Types of stress testing

There are two major types of stressing a portfolio, the first is sensitivity analysis, and the second is what is traditionally termed stress testing. A sensitivity analysis seeks to determine the resulting effect on the portfolio by shocking a single risk factor, say a minor shift in interest rates, credit spreads or equity volatility. Its appeal lies in the simplicity in which one can undertake the analysis and relative ease of interpreting the results. A comparison of the portfolio Profit and Loss or VaR before the shock, and then after, helps us to understand the comparative sensitivity of the portfolio to the shocks. However, within the simplicity of scenario analysis lies its frailty. It is perhaps too great an assumption to believe that the risk factors are independent of one another, and that one can shock a single risk factor without appreciating its impact on another factor, e.g., the known correlation between interest rates and equity prices.

When compared to sensitivity analysis, the number of shocks employed in stress testing is considerably greater. It takes the form of shocking asset returns negatively. The user must then choose between relative or absolute shocks to the portfolio, with relative shocks to factors generally considered more realistic. For instance, applying absolute changes to interest rates when yield curve levels are materially different is not robust. How does one consider the appropriate stress tests for a portfolio? As we cannot predict the next crisis, complementary types of tests should be employed to the process, which generally take one of three forms: using historical time series, simulated time series or reverse stress testing.

In using historical scenarios, a known event is used to test how a portfolio would have performed in such a scenario. Yet the choice of the historical scenario needs to be well-considered as to its relevance to the type of portfolio. The risk factors associated with a credit portfolio differ in kind from that of cash or equity portfolios. For instance, stressing a bond portfolio with the 2000 dot-com crash is much less applicable than stressing a growth-oriented equity portfolio with the dot-com scenario. Similarly, the stress scenario needs to be relevant to the instruments held in the portfolio, e.g., using the 1998 Russian financial crisis is not relevant to a portfolio employing credit default swaps not in existence in 1998.

While historical stress testing has the virtue of having actually occurred, many risk and portfolio managers view historical shocks as a version of 'fighting the last war', and see historical stress tests as losing relevance over time. The passage of time may alter the dependency relationships across risk factors. Moreover, the financial crisis that began in 2007 has led observers to question whether any historical stress event could have adequately captured the length and depth of this most recent crisis. Investment managers may seek to complement historical stress tests through simulation.

Simulation strives to overcome some of the weaknesses of historical scenarios. In simulation, a large number of random samples are generated in order to compile a distribution. The chosen paths ideally exhibit the non-normal characteristics of the fat tailedness of the distribution as measured through skewness and kurtosis, not visible through the VaR calculation. Also, a simulation enables us to challenge assumptions as to the level of volatility and correlation among risk factors in a crisis. The complexity of the simulated stress depends on the underlying portfolio and the number of risk factors that impact returns. In general, a compromise must be struck between testing an exhaustive set of risk factors and a smaller set of factors that are more easily given to understanding and communication.

'Reverse stress tests' examine those events that are most likely to inflict the greatest damage on the portfolio, effectively allowing the portfolio to fail. For instance, in a money market portfolio, factors that will cause the market value of the portfolio to materially depart from the book value may be considered. Key risk factors are defaults, redemptions, liquidity, rates and spreads. Once there is an understanding of what it takes to break the portfolio, we are better positioned to understand how to construct, monitor and importantly hedge the portfolio against these factors.

Interpreting the results

The results of the stress tests need to be reviewed and analysed by the key stakeholders as part of the firm's risk management process. Like the construction of the stress test, analysis of the results is both a quantitative and qualitative process. Given the probability or likelihood of the tested risk factors, adjustments may be made to the portfolio to better protect against them. The team needs to review the tests on a regular basis to determine their ongoing relevance to a given portfolio. The stress testing programme will need to be updated both as a result of economic events and as the risk profile of the portfolio changes.

Results: Regulatory backing

Within the European Union, the UCITS rules that set out the risk management process an investment company should have in place also mandate that the company must conduct stress tests and scenario analyses to address risk from changes in market conditions. Further, the investment company must conduct stress tests to assess the liquidity risk of UCITS under exceptional circumstances. Likewise, AIFMD contains requirements for stress testing under conditions similar to UCITS. It further requires that the investment company report the results to the relevant National Competent Authority. As well, AIFMD specifies the need to conduct liquidity risk stress testing of a portfolio to determine its ability to meet atypical redemption needs.

In short, the regulatory rules on stress testing are more principles-based rather than prescriptive. Given the vast range of asset classes that a given investment company may have under management and the need to tailor the stress test to the risk factors relevant to a given asset class, discretion in devising the stress test is needed. As economies and market events unfold, the stress tests should adapt and change in response in an iterative way. In this sense, the principles-based regulatory approach is sensible, as a highly prescriptive one could quickly become outdated.

Governance

Critical to a useful and usable stress testing framework is the involvement of all stakeholders concerned – risk management, senior management and the portfolio managers. There is little value in the risk management department stress-testing the portfolios if the underlying scenarios have not received input and acceptance from the portfolio managers. It is they who are managing the funds on a day to day basis and must be aware of their risk exposures, especially those unknown exposures that the stress-testing process uncovers. Similarly, senior management must have an appreciation of the results and knowingly acknowledge that the identified risk exposures remain consistent with the investment risk/return profile. The culture of risk management best develops when there is a shared understanding and appreciation of the risk appetite for a given portfolio strategy.

The very process of structuring, analysing and discussing a set of stress tests with a group of key stakeholders enriches the risk management culture. The investment firm that has devised and conducted stress tests and then discussed the results is much better positioned for a major market event, even if that event differs from the stressed scenario. They have a shared understanding of the portfolios' risk exposure and will have debated contingency measures leaving them much better prepared to respond.

Conclusion

Stress testing is no longer viewed as optional in the good governance of investment portfolios but as a necessary tool the investment company employs both in its investment and risk management processes. In addition, the construction of the stress tests and the analysis of the results have become an effective communication tool within the investment company, ensuring the shared participation of the portfolio managers, risk managers and senior management. Importantly, this sharing of responsibility serves to ensure that the responsible parties are acknowledging and effectively assuming responsibility for the risk profile of a portfolio. If the financial crisis has done little else in terms of good, it has served to improve investment management governance processes and in turn the protection of investors.


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