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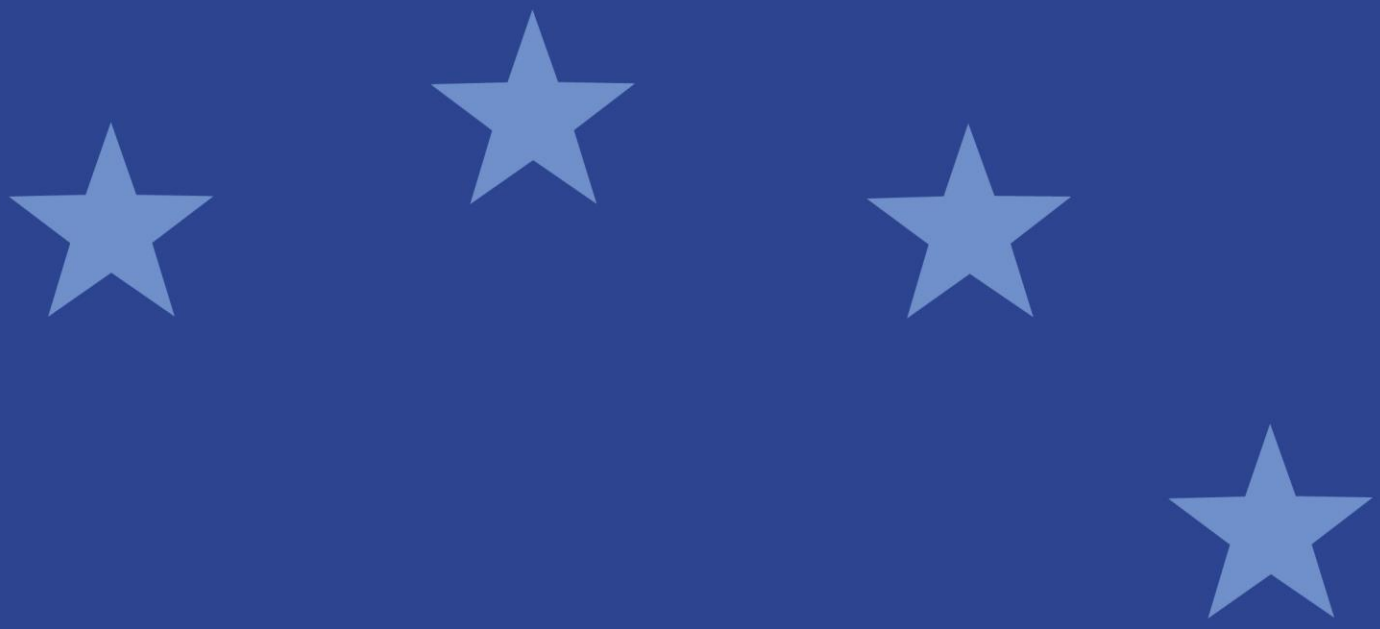
European Securities and Markets Authority

Trends Risks Vulnerabilities

No. 1, 2013



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ESMA Report on Trends, Risks and Vulnerabilities, No. 1, 2013

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Authorisation: This Report has been reviewed by ESMA's Committee for Economic and Market Analysis (CEMA) and has been approved by the Authority's Board of Supervisors. ESMA thanks the members of CEMA for contributions and valuable comments.

 Cut-off date for data used in this Report is 31 December 2012 unless indicated otherwise. 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.

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Editorial

Dear Reader,

With this edition, the European Securities and Markets Authority presents its first Report on Trends, Risks and Vulnerabilities to be published in future on a semi-annual basis. This first issue of the Report reviews the full year 2012. Future editions will address the respective preceding two quarters.

The Report forms part of our ongoing surveillance work under Article 32 of the ESMA Regulation, in the course of which we continuously monitor developments and risks in the market segments within our remit and beyond. We report our assessment of market conditions to the European Parliament, the Council and the Commission as well as the European Banking Authority, the European Insurance and Occupational Pensions Authority and the European Systemic Risk Board. In our risk assessment, we strive to develop a comprehensive picture of systemic and macro-prudential risks in the EU, from ESMA's perspective.

In this and future editions of the Report we aim to share our assessments publicly, providing analyses in three areas:

Trends: In the section entitled Trends we report on developments in securities markets, in the investor community, and in securities market infrastructures. In doing so, we provide a historical and comparative perspective on standard indicators of market performance with the aim of identifying any possible adverse developments in the relevant EU markets.

Risks: Our risk assessment brings together key indicators of financial risk with the aim of identifying possible areas of distress using state-of-the-art analytical tools. This Risk Dashboard has been developed in close cooperation with the European Banking Authority, the European Insurance and Occupational Pensions Authority, the European Systemic Risk Board, and the European Central Bank. In addition to the semi-annual editions of this Report, we will provide quarterly up-dates of the Risk Dashboard going forward.

Vulnerabilities: Complementing our continuous monitoring of Trends and Risks, the section entitled Vulnerabilities offers insights into our work on topical financial market issues. In concise individual articles we intend to provide in-depth analyses on selected topics of relevance to our assessment of current and potential future trends and risks.

We are planning to develop the Trends, Risks and Vulnerabilities Report and the Risk Dashboard further in future editions, paying tribute to the evolving nature of the markets under the Authority's remit and to progress on risk indicators and analytical techniques. We would therefore welcome any feedback and suggestions on our work at financialstability@esma.europa.eu.

We at ESMA are pleased to share this part of our surveillance work with a wider audience, and we hope that our Trends, Risks and Vulnerabilities Report and the Risk Dashboard will contribute to the understanding of systemic and macro-prudential risks in the EU.

Executive Summary

EU securities markets in 2012

Securities markets and investment conditions in the EU improved in 2012, especially in the second half of the year. Systemic risk in EU securities markets decreased in the fourth quarter. The recovery is linked to the ECB's announcement of Outright Monetary Transactions (OMT) in early August, which alleviated pressures on euro area sovereign bond markets and reduced uncertainty among market participants. However, risk indicators remained at high levels due, among other factors, to the on-going European sovereign debt and banking crisis, market clustering, i.e. one group of countries featuring high yields and another group of countries with comparatively very low yields, funding risk, potential long-term implications of low interest rates and obstacles to orderly market functioning. The outlook on future risks indicates that they will remain high, with credit risk in particular expected to increase due to the concentration of outstanding bank and sovereign debt on securities with high risk premia and short maturities.

Trends

Securities markets: After a volatile first semester, financial market conditions improved as from July 2012 in the wake of the ECB's Outright Monetary Transactions (OMT) announcement. However, some financial market segments remained under pressure. Euro area sovereign bond markets in particular continue to struggle, along with other unsecured markets, as evidenced by low corporate bond issuance and subdued activity in the interbank market.

Investors: Improving market conditions drove up the net asset value of the EU fund industry to EUR 7.8tn as of year-end. The main beneficiaries were bond, hedge, real estate and exchange-traded funds. Only recently have equity, balanced and money market funds displayed signs of increasing activity. Fund flows to the EU fund industry remained volatile. Inflows were focused on low-risk funds, and funds invested the proceeds of newly issued shares mainly in assets perceived as featuring low risks, in particular low country risks.

Market infrastructures: Activity on European trading venues decreased significantly in 2012, dropping below the five-year average as uncertainties surrounding the European economic outlook weighed on investors' willingness to trade. The use of Central Counterparties (CCPs) has increased for OTC derivatives worldwide, with around 60% of interest rate swaps now cleared by CCPs, while for CDS the share of contracts cleared through CCPs is stable at around 10% of notionals.

Risks

Liquidity risk: Liquidity risk remained stable and dispersed across market segments and regions. Recent policy measures reduced liquidity risk in some segments, while others such as money market funds saw a deterioration in liquidity conditions. Liquidity risk remains a source of concern especially in the sovereign bond market.

Market risk: Equity and bond markets showed signs of relaxation as from the third quarter. In particular, risky bond market segments saw a lessening of investor aversion. Still, the fund industry continued to reduce its investments in EU securities markets.

Contagion risk: The clustering of EU sovereign bond markets became more pronounced. The main drivers were lower CDS exposures and increased perception of idiosyncratic risk by investors. Both effects have helped to mitigate aggregate contagion risk. Despite the decrease in idiosyncratic risk associated with the group of countries with high sovereign yields, due to similar structural problems contagion risk remains high within this group and continues to be a source of concern.

Credit risk: Issuance volumes on EU securities markets have increased, but were concentrated on high risk asset classes. Banks and sovereigns exposed to high risk premia concentrated a higher proportion of their outstanding debt on shorter maturities, implying that under potential future stress conditions sovereign issuers may face funding difficulties as they have to roll over their debt by regularly issuing sovereign bonds. Substantial credit and rollover risks thus remain for the future.

Main risks: Sources

Risk	Change since 1Q12
European sovereign debt crisis	→
Market clustering	↑
Funding risk	↗
Low interest rate environment	↗
Market functioning	↗

Note: Assessment of main risk sources for markets under ESMA remit, change since the last assessment.

Main risks: Categories

Risk category	Change since 3Q12	Outlook for 1Q13	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 Joint Committee of the three ESAs, green=low, yellow=moderate, orange=high, red=very high.

Vulnerabilities

In addition to market trends and existing risks, ESMA monitors on an on-going basis market developments which we consider potential vulnerabilities. In this edition, we discuss the following topics:

Collateral concerns in financial markets — a European perspective: The collapse of unsecured markets during the financial crisis, as well as regulatory initiatives such as the European Market Infrastructure Regulation (EMIR), have led market participants to rely increasingly on collateral as a means of mitigating counterparty risk, stimulating the demand for collateral. At the same time, the collapse of the US shadow banking system, including formerly AAA-rated securitised products, and the on-going European sovereign crisis have depressed the supply of higher-quality collateral. While the supply of higher-quality collateral is still estimated to be higher than demand (EUR 11.8tn against EUR 4.1tn in 2012) in Europe, additional demand for collateral is likely to exceed the additional supply of collateral in 2013-2014, making collateral comparatively scarcer. This trend could heighten financial stability risk, as financial institutions lacking higher-quality collateral may use lower-quality collateral to mitigate their counterparty risk, enter into collateral swaps with third parties or pledge some of their assets, resulting in rising asset encumbrance.

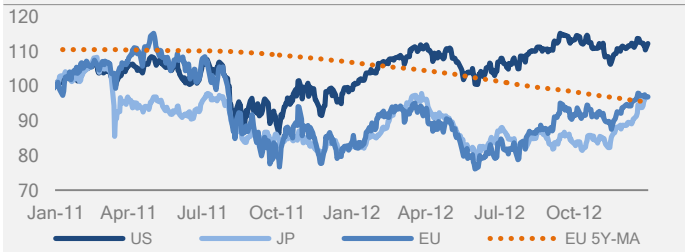
Hedge funds and prime brokers — systemic risk implications: Hedge funds, prime brokers and their funding counterparties in repo markets provide an alternative to financial intermediation through traditional banking. Results drawn from an econometric analysis indicate that in times of distressed financial markets, this alternative may be vulnerable to substantive price movements in the assets pledged as collateral, because prime brokers could start to hoard collateral and thus diminish the flow of intermediated funds. This could jeopardise hedge funds' liquidity; margins may tend to rise reducing the ability to raise liquid funds, making hedge funds more likely to be forced into fire sales of assets. In such a scenario, asset prices would experience downward pressure, and haircuts and margin calls could squeeze additional liquidity out of the hedge fund sector. Prime brokers may respond to this by hoarding more collateral and at some point by sharply reducing the supply of collateral to the repo market. This would negatively impact repo market volumes, reducing liquidity and increasing the risk of an eventual market shut down. One important source of funding for the alternative financial intermediation chain could thus be severely impaired. In addition, such effect may spread to other repo market participants. Furthermore, the negative repercussions on prime brokers' main business could feed back into the banking system and contribute to its systemic vulnerability.

Trends
Risks
Vulnerabilities

Securities markets

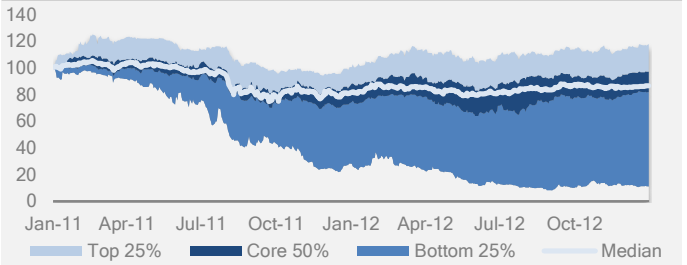
Equity markets

Equities: EU prices close to its 5Y-MA T.01



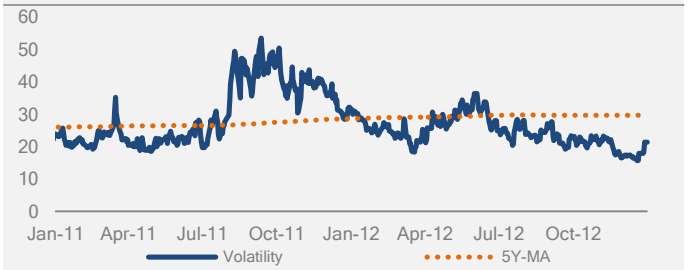
Note: Datastream regional equity indices, EU, US , JP. Indexed, 01.01.2011=100.
5Y-MA= 5Y moving average.
Sources: Thomson Reuters Datastream, ESMA.

Price dispersion: Increase due to outliers T.02



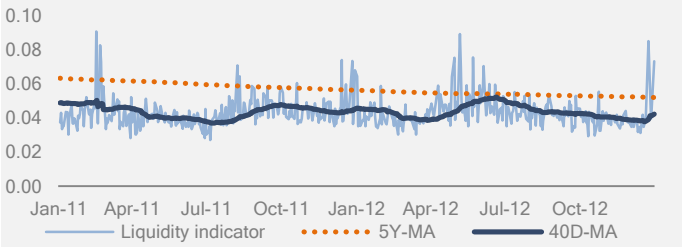
Note: Dispersion of the 27 main national equity indices, EU. Indexed, 01.01.2011=100.
Sources: Thomson Reuters Datastream, ESMA .

Volatility: Significant improvement since July 2012 T.03



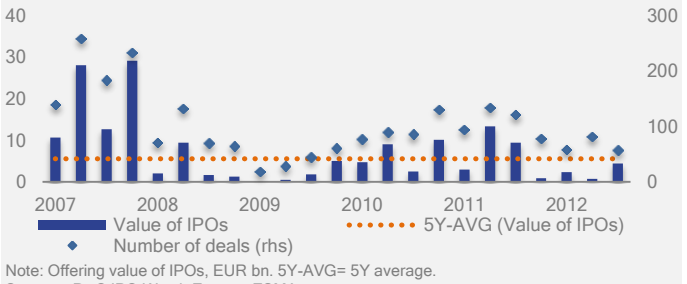
Note: Implied volatility of options on Eurostoxx 50, %. 5Y-MA= 5Y moving average.
Sources: Thomson Reuters Datastream, ESMA.

Liquidity: Roughly stable in 2012 T.04



Note: Liquidity measured as median Bid-Ask spread, EU components of Stoxx Europe 50, %.
5Y-MA= 5Y moving average.
Sources: Thomson Reuters Datastream, ESMA.

IPO: Still subdued T.05



Note: Offering value of IPOs, EUR bn. 5Y-AVG= 5Y average.
Sources: PwC IPO Watch Europe, ESMA.

Equity markets developed positively in 2012. After a volatile first semester, equity indices increased as from early August 2012, along with an overall improvement of financial markets in the EU, following the announcement of Outright Monetary Transactions (OMT) by the ECB and further progress on the establishment of a Banking Union. The improvement can also be seen in liquidity and volatility indicators, which performed better than their five year averages.

Global Equities: After bottoming out in July, the EU equity index increased by 10% as from then, edging closer to its five-year average. Compared to Japan, EU indices performed slightly better as from July 2012. However, EU indices underperformed compared to the US, due to macroeconomic conditions. US equity markets were around 12% higher than their early 2011 level, while European and Japanese indices were still 3% lower.

Dispersion: As from August, most of the EU national equity indices experienced increases. More precisely, from then on the top 75% followed an upward trend. However, one European country suffered a very significant decline from January 2011, as indicated by the lowest value of the bottom 25%. The aggregate effect of this sharp decline was mitigated by the fact that the country in question is relatively small in terms of market capitalisation. However, it does indicate European equity markets' increasing differentiation, as price movements in national equity indices for the bottom quartile are decoupled from the generally positive trends in other national indices.

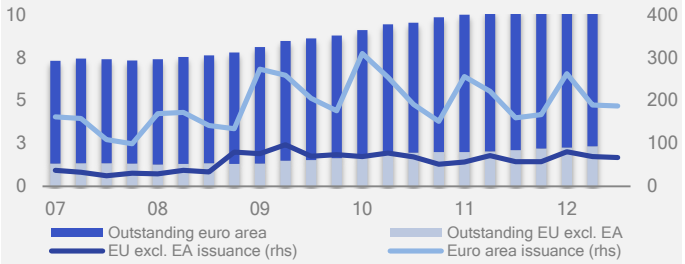
Volatility: Expected volatility, measured by the implied volatility of options on the Eurostoxx 50, decreased from July 2012 and at year-end was around 8.5 percentage points lower than its five-year average. Having been roughly stable in 1Q12, volatility increased between April and June, edging up to 37%, before receding to 20% at year-end. The relatively low level of this indicator can be interpreted as evidence of reduced uncertainty among market participants.

Liquidity: In European secondary markets, liquidity remained roughly stable in 2012 despite significant deterioration in May and June. At around 4 basis points, the median bid-ask spread was slightly lower at year-end than its five year average, way off the all-time high of 30 basis points reached in December 2008. The increase in May and June was related to the deterioration in liquidity for the Italian and Spanish constituents of the Eurostoxx50.

New issuance: Initial Public Offerings (IPOs) in 3Q12 remained sluggish in Europe, with only 57 IPOs raising EUR 4.4bn, well-below the five year average of EUR 7.3bn. Volume was concentrated mainly in one IPO on the London Stock Exchange: at more than EUR 4bn, it accounted for 90% of the capital raised in 3Q12 in the IPO market. Low IPO activity is linked to tough market conditions in the first semester of 2012 that resulted in low offering values and postponement of IPOs for a number of companies.

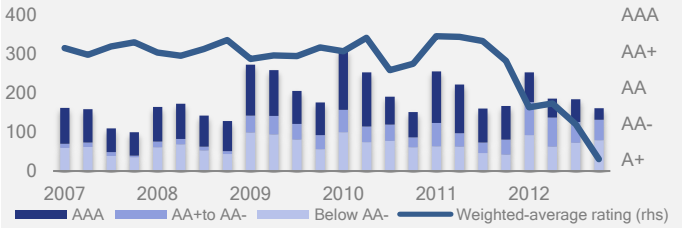
Sovereign bond markets

Issuance: Relatively stable T.06



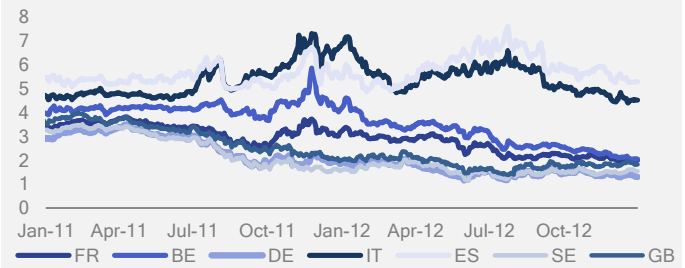
Note: Quarterly issuance of sovereign debt , EUR bn, and outstanding debt, EUR tn.
Sources: Dealogic, Eurostat, ESMA.

Issuance : Deterioration in credit ratings T.07



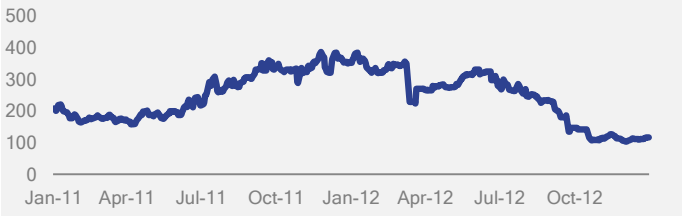
Note: Quarterly issuance of sovereign debt in the euro area ranked by S&P ratings at launch, EUR bn. Weighted average rating computed by converting ratings into a numeric scale (AAA=1, AA+=2 etc.).
Sources: Dealogic, ESMA.

Yields: Decline since mid-July T.08



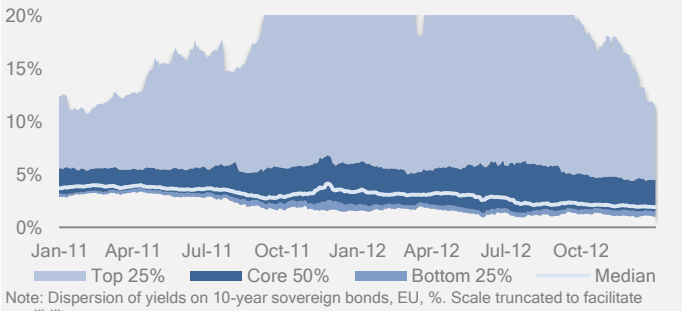
Note: Yields on 10-year sovereign bonds, selected EU members, %.
Sources: Thomson Reuters Datastream. ESMA.

Sovereign CDS: Significant fall since mid-July T.09



Note: Spread on 5Y Western Europe SovX index, basis points. Index computed as an average of CDS spreads on 14 EU 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.

Dispersion in the EU: Overall decrease T.10



Note: Dispersion of yields on 10-year sovereign bonds, EU, %. Scale truncated to facilitate readibility.
Sources: Thomson Reuters Datastream, ESMA.

After a significant deterioration in April-June 2012, sovereign bond markets improved from July on. While issuance was steady, volatility and yields increased in June and July and liquidity worsened during this period due to concerns related to the solvency of sovereigns and uncertainty regarding EU policy actions. The announcement of specific policy measures by the ECB during the summer has led to an improvement in market conditions since then, but sovereign markets remain under pressure.

Issuance: 2012 sovereign issuance volumes totalled EUR 1,090bn (EUR 820bn for the euro area), close to the five-year average but 4% higher than total issuance in 2011 and 66% higher than 2007. As of 2Q12, outstanding debt in the EU amounted to EUR 10.8tn, around 85% of EU GDP. In the euro area, outstanding sovereign debt reached EUR 8.5tn, accounting for 90% of GDP. Outstanding debt in the EU in 2Q12 was 7% higher than in 2Q11 and 45% higher than in 2Q07.

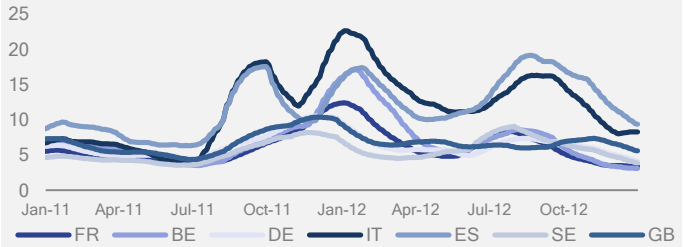
Ratings: While issuance volumes in the euro area were relatively steady in 2012, the credit quality, proxied by the credit ratings from Standard & Poor's, deteriorated. The weighted average rating on issuance was close to A+, down three notches from a year ago when it was AA+. In 2012, 54% of sovereign bonds issued were rated AAA or AA+, against 60% in 2011; 13% between AA and A- (40% in 2011) and 33% below A (0.2% in 2011). Dispersion in the credit ratings of euro area sovereigns thus rose in 2012. This reflects an increased perception of risk differences between sovereign debtors as well as the growing isolation of individual sovereign debt markets.

Yield levels: Funding conditions for sovereigns improved across the board from early August, especially for Spain and Italy (decrease in yields by around 140 basis points). This trend follows the announcement of Outright Monetary Transactions (OMT) by the ECB on 2 August. Under this framework, the ECB would buy bonds from euro area sovereign issuers, provided the issuers ask for financial assistance and comply with the related austerity measures. The signalling effect of this measure seems to have been strong even before its activation, as no euro area sovereign has asked for assistance since the announcement.

CDS spreads: EU CDS spreads declined significantly in 2012, as reflected in the SovX index, computed from a sample of EU sovereign Credit Default Swaps, which decreased by around 200 basis points as from June. This decline can be explained by the overall improvement in funding conditions for sovereigns. Alternatively, the anticipated ban of naked, i.e. uncovered, CDS due to the entry into force of the Short-Selling Regulation on 1 November 2012 created incentives for an increase in the supply of CDS in order to net out existing naked positions, thereby increasing market pressure on CDS spreads.

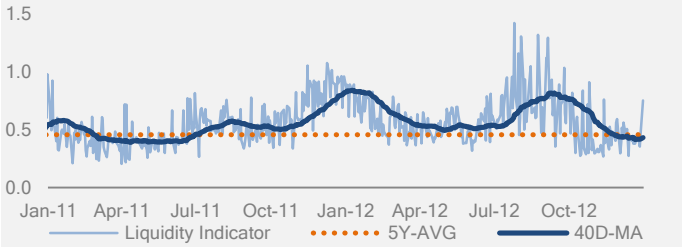
Yield dispersion: Yields declined for most EU countries. The value of the third quartile (i.e. the one that includes 75% of EU countries in the sample) fell from 6.3% in July 2012 to 4.5% at year-end, and the median declined from 3.5% to 3%. The first quartile increased from 1.4% to 1.6%, providing further evidence that the flight to safety lessened in the sovereign bond market and that sovereign yields seemed to converge over the last quarter. However, for a

Volatility: Relaxation from 3Q12 on T.11



Note: 40D volatility of 10Y sovereign bonds, selected EU members, %. Series are smoothed exponentially.
Sources: Thomson Reuters Datastream, ESMA.

Liquidity: Despite improvements, liquidity remains subdued T.12



Note: Liquidity measured as median Bid-Ask spread on 10Y sovereign bonds benchmarks, EU sovereigns, %. 8Y bonds used for CY and SK. 5Y-AVG=5Y average.
Sources: Thomson Reuters Eikon, ESMA.

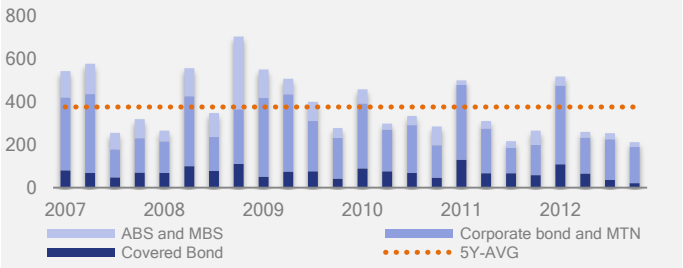
few countries sovereign yields remained substantially higher, as indicated by the size of the upper quartile.

Volatility: The improvement in yields was coupled with a reduction in volatility during the second semester of 2012, especially for Italy and Spain, and to a lesser extent for France and Belgium. However, for some countries volatility was still higher at year-end than in early 2012.

Liquidity: On EU secondary markets, liquidity on sovereign bonds improved during the first semester of 2012 but contracted sharply for most of 3Q12, especially for bail-out countries. From early August, liquidity improved and was close to its five-year average at year-end. However, liquidity on EU sovereign bonds was clustered. For countries under financial assistance and Eastern European countries, liquidity was relatively low, for different reasons. For bail-out countries, over the last few years investors have been reluctant to trade their sovereign debt because of the credit risk, while for Eastern European sovereigns domestic structural factors such as the comparatively small size of the market can explain the relatively low liquidity of sovereign bonds, which barely changed over the last two years.

Corporate bond markets

Corporate bond issuance: Still sluggish T.13

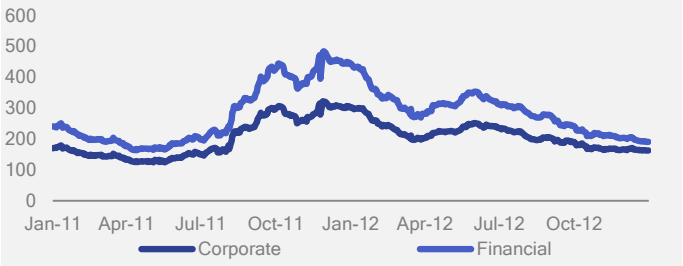


Note: Quarterly issuance of debt by deal type, EU, EUR bn. 5Y-AVG= 5Y average.
Sources: Dealogic, ESMA.

Issuance by sector: Decline in the share of banks T.14

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

Corporate bonds: declining spreads T.15



Note: Asset swap spreads on Barclays Pan-European bond indices, basis points.
Sources: Thomson Reuters Datastream, ESMA.

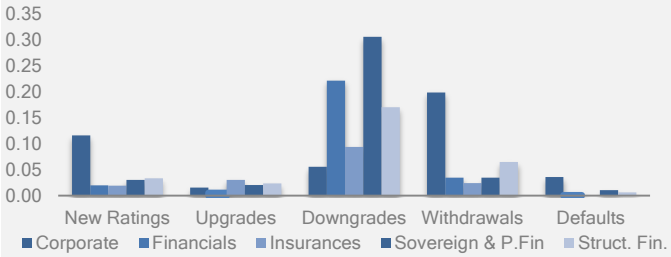
Conditions improved in corporate bond markets as evidenced by the decline in spreads. However, issuance remained sluggish, especially for banks, partly due to unintended substitution effects of the ECB's long-term refinancing operations.

Issuance: Corporates issued around EUR 1,240bn in 2012, 4% below 2011 (1,290bn) but 17% below the five-year average. Corporate bonds and medium-term notes (MTN) accounted for the bulk of issuance, with a share of 70%, and 20% for covered bonds. Issuance of asset-backed securities (ABS) remained sluggish with a share of 10%, whereas in 2007 and 2008 ABS had accounted for 30% of corporate bond issuance. The banking sector remained the main issuer of bonds, with a share of around 55% in 2012; however its share steadily declined over the last quarters from 70% in 2011. Non-financial corporate bonds accounted for around 35% of issuance in 2012, against 20% a year previously. This trend can be explained by funding difficulties for banks, as well as substitution effects linked to the ECB's long-term refinancing operations in December 2011 and March 2012, which provided banks with cash for up to a three-year period. Funding strains for financial institutions, and especially banks, are also indicated by the high proportion of retained assets across the EU (asset encumbrance).

Bond spreads: Asset swap spreads declined across the board on corporate bonds from early 2012. This trend was driven mainly by a decline in bond yields due to the improved perception of credit risk on corporates, also mirrored in the CDS market. The difference in spreads between financials and all corporates narrowed over the period as spreads on financials decreased more than on corporates (-250 basis points for financials and -140 basis points for corporates).

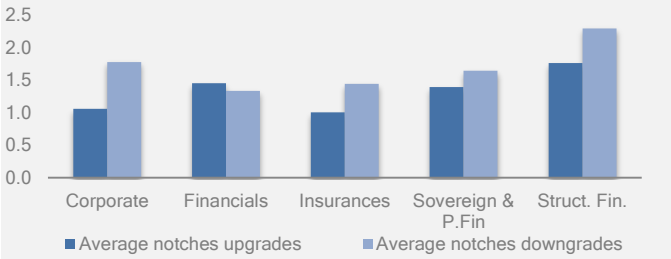
Credit ratings

Rating activity: Substantial number of downgrades T.16



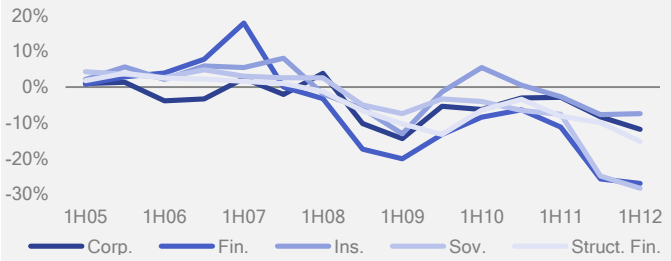
Note: : Rating activity of all credit rating agencies (CRAs) by asset class for 1H12, % of outstanding ratings.
Sources: CEREP, ESMA.

Rating actions: Downgrades were larger than upgrades T.17



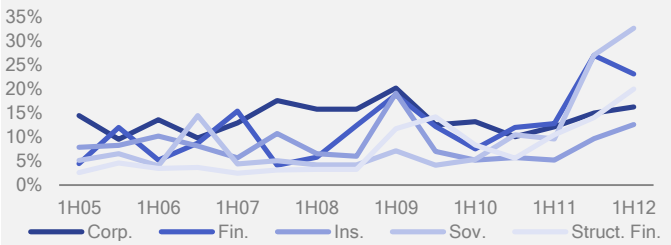
Note: Average size of upgrades and downgrades from all credit rating agencies by asset class for 1H12, average number of notches.
Sources: CEREP, ESMA.

Rating changes: Downward trend T.18



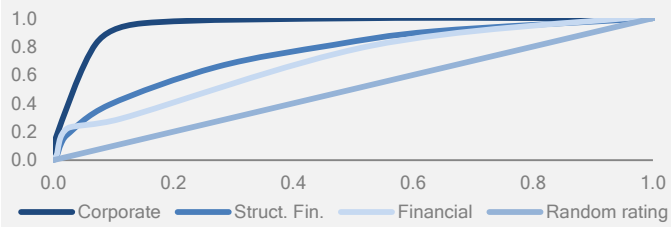
Note: Drift of ratings from all credit rating agencies by asset class computed as percentage number of upgrades minus percentage number of downgrades.
Sources: CEREP, ESMA.

Volatility: Significant increase T.19



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

Rating performance: Higher for corporates, lower for financials T.20



Note: Cumulative accuracy profile (CAP) curves for the 3 largest credit rating agencies. 2008-2012. 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.

Rating activity in 1H12 was characterized by ratings downgrades, which were more frequent than upgrades and larger in terms of notches. Rating volatility peaked, indicating further uncertainty over credit rating agencies' (CRAs) assessment of issuer credit risk.

Rating activity: The first half of 2012 was characterized by a large number of downgrades. Downgrades exceeded upgrades across all asset classes, reflecting the overall negative trends in economic activity in Europe. Sovereigns suffered a dramatic number of downgrades, which accounted for around 31% of all sovereign rating activity, followed by financials (22% of rating activity) and structured finance (17%). Upgrades were sporadic in the first half of 2012. The most upgraded asset class was insurance (3%), followed by structured finance (2%) and sovereigns (2%). Defaults occurred in three asset classes – corporates, sovereigns and structured finance – with default rates of 3.6%, 1.1% and 0.6% respectively. In the first half of 2012, defaults were registered on altogether ten ratings (across four agencies) on sovereigns, with one occurring on a local municipality in Bulgaria and the remainder during the technical default of Greece. With the exception of financials, downgrades also exceeded upgrades in terms of the number of notches. The most dramatic "jumps" in ratings occurred on structured finance products, where upgrades averaged more than 1.5 notches and downgrades more than 2.5 notches.

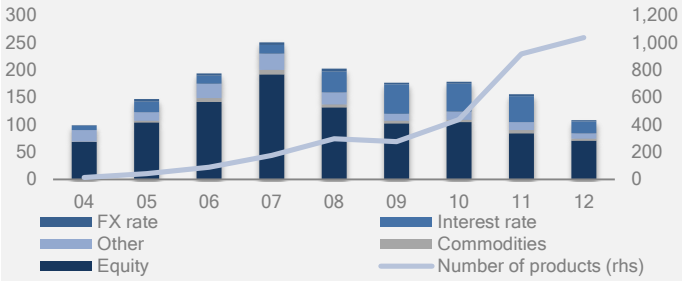
Rating changes: Beginning in 1H11, the significant downward trend continued in 1H12 with more downgrades than upgrades across all asset classes. Financials and sovereigns experienced the most dramatic change, while insurance was relatively stable. The effect of the overall negative trend is a downward shift in the distribution of ratings on the rating scale. A similar trend was observed between the second half of 2008 and the end of 2009.

Volatility: After peaking in 1H09, rating volatility across asset classes decreased in 2010 but regained momentum from 2011 to reach new highs in 1H12. Higher rating volatility leads to a higher transition rate among rating classes, providing further evidence of uncertainty over credit risk among CRAs.

Rating performance: Ratings performed very differently across asset classes over the period 2008 to 2012, as evidenced by the cumulative accuracy profile (CAP) curves. The closer the CAP curve is to the 'random' curve the lower is the performance of the ratings, i.e. defaults occurring independently of the rating grade. Corporate rating performance was higher than for financials and structured finance issuers, with defaults mostly concentrated on low-rated corporate bonds, as evidenced by the shape of the CAP curve. Financials' CAP curve was affected 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. No CAP curve was created for sovereigns due to the statistical insignificance of the default sample.

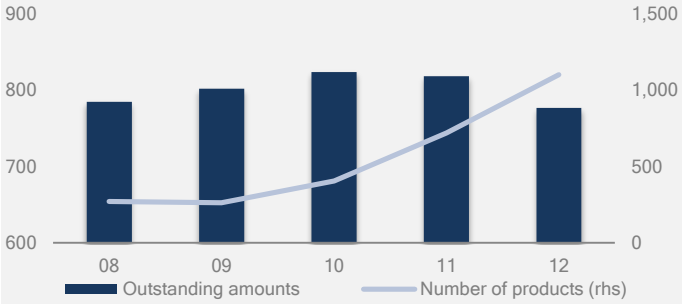
Structured retail products

Volumes: Decline continued in 2012 T.21



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

Outstanding amounts: Substantial decline T.22



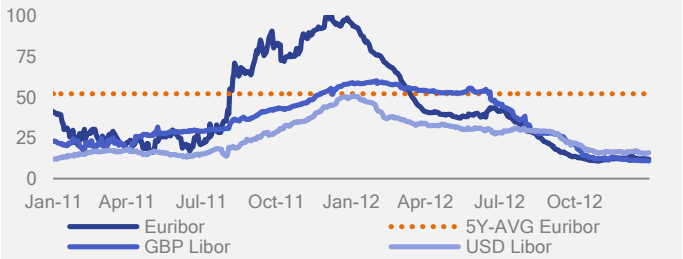
Note: Outstanding amounts, EUR bn. Number of products, thousand.
Sources: StructuredRetailProducts.com, ESMA.

Volumes of structured products sold to retail investors contracted by 30% in 2012 due to investor reluctance to exposure in financial markets and a low-interest-rate environment that made it more difficult to offer compelling products.

Structured retail products: The volume of structured products sold to retail investors continued to shrink in 2012, falling 30% to around EUR 110bn at year-end, against EUR 160bn in 2011 and EUR 180bn in 2010. The decline was driven mainly by retail investors' limited acceptance of exposure to financial markets in the current environment and to low interest rates that made it more difficult to offer compelling products. Equity products still constitute the majority of products sold (65%), followed by interest rate products (19%), while other asset classes represent around 15% of the volume. As a result of the reduction in volumes sold, outstandings fell by around EUR 40bn to EUR 780bn, down 5% from their 2011 peak of EUR 825bn. The number of structured products sold in 2012 increased by 13% to reach one million, while the number of outstanding products climbed to around 1.1 million at year-end. While the database used covers most of the EU market, it may not be fully representative of domestic markets in all EU countries. The type of products sold may also vary widely among countries in terms of forms used (i.e. unsecured bond, fund etc.), payoff structure and degree of capital guarantee.

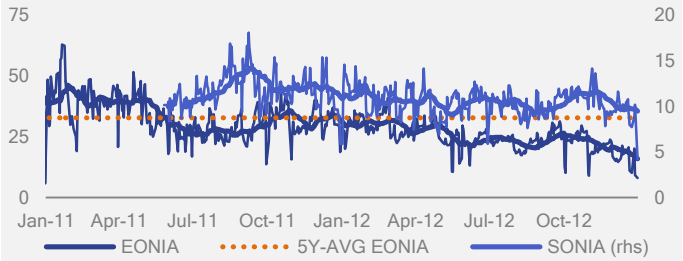
Money markets

Spreads: Substantive decline T.23



Note: Spread between 3M interbank rates and 3M Overnight Index Swap (OIS), basis points. 5Y-AVG= 5Y average.
Sources: Thomson Reuters Datastream, ESMA .

Interbank overnight activity: Significant decline T.24



Note: 20D moving average of volumes on Euro Overnight Index Average (EONIA) and Sterling Overnight Index Average (SONIA), EUR and GBP bn. 5Y-AVG= 5Y average.
Sources: Thomson Reuters Eikon, ESMA.

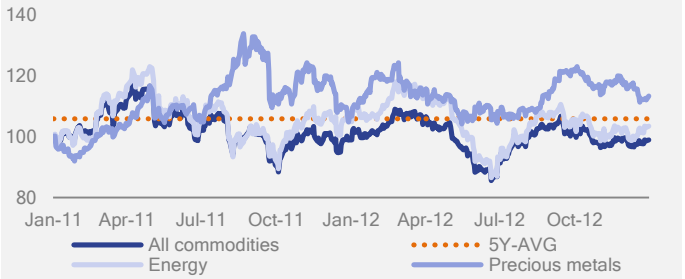
At year-end interbank spreads reached their lowest levels since August 2007. However, activity remained subdued in the unsecured interbank market as banks held back on lending to each other.

Spreads: Interbank market spreads continued to narrow in the euro area, reaching their lowest level since August 2007 at around 10 basis points at year-end. The downward trend is explained by the ECB's large injections of liquidity. A similar pattern can be observed in GBP and USD interbank spreads.

Volumes: Activity in unsecured overnight interbank transactions declined in 2012. For the EUR market, volumes reached around EUR 20bn at year-end, less than half the average volumes observed in 2007 (EUR 50bn) and less than the EUR 33bn five-year average. According to the 2012 ECB Money Market Survey, activity in the unsecured interbank market weakened 35% in 2Q12 compared to 2Q11, downsizing by more than 66% since its 2007 peak. Despite significant liquidity injections by the ECB, banks remain reluctant to lend to each other on an unsecured basis, preferring to operate in the secured interbank market. Moreover, most of the transactions are for very short maturities, with the survey showing that overnight transactions accounted for 83% of lending.

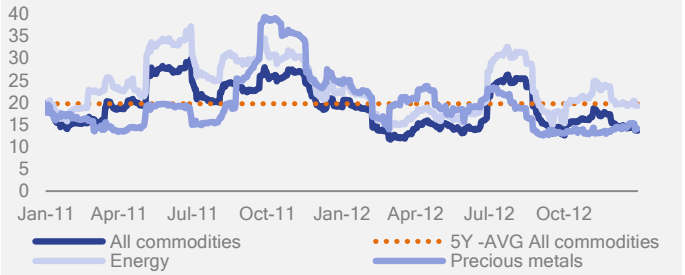
Commodity markets

Commodities: Precious metals on the rise T.25



Note: S&P GSCI Commodity indices. Indexed, 01.01.2011=100. 5Y-AVG= 5Y average for all commodities.
Sources: Thomson Reuters Datastream, ESMA.

Volatility: Significant decline since July T.26



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

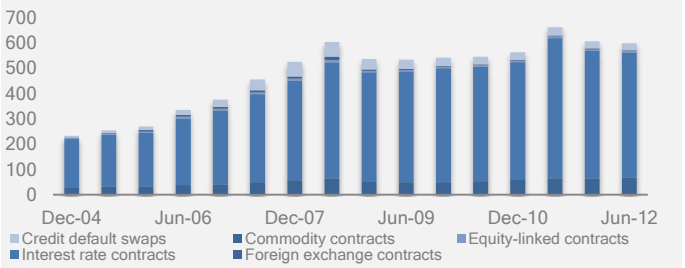
Commodity prices were less volatile in 2012 than in 2011, with a significant price decline in the first half of 2012 followed by an increase as from July. The slight softening in energy prices can be linked to reduced demand as the macroeconomic outlook worsened globally in 2012. The rise in precious metals reflects the continued role of gold as a safe asset, in a general context of risk aversion.

Prices: Having sagged in the first half of 2012, most commodity prices rebounded to their early January 2011 levels. Precious metals continued to surge, gaining 13% between January 2011 and December 2012. At year-end the overall commodity index was close to its five year average, its constituents having taken different directions with energy prices 13% lower than their average and precious metals 30% higher. Agricultural prices, as measured by the S&P GSCI Agri&Live index, headed up during the first half of 2012 but down in the second half, resulting in an overall increase of 2% for 2012.

Realised volatility: As from January, volatility declined for most commodity indices, hitting lower levels than the five-year average except in June and July, when uncertainties surrounding the European sovereign crisis triggered a general bout of financial market volatility. Volatility in agricultural goods remained high in the second half of 2012.

Derivatives markets

Contracts outstanding: Stable notional amounts T.27



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

Contracts outstanding: Decline in market value T.28

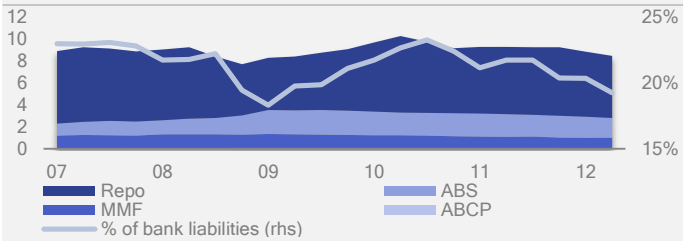
Note: Gross market values of outstanding OTC derivatives by category, USD tn. Gross market values represent the cost of replacing all open contracts at the prevailing market prices.
Sources: Bank for International Settlements, ESMA.

In 2012, global OTC derivatives market held stable in terms of notional amounts. Lower price volatility trimmed gross market values slightly. Interest rate swaps continued to form the bulk of the OTC derivatives market with a share of 83% of gross notionals as of end-June 2012.

Contracts outstanding: Global OTC derivatives market remained stable in terms of notional amounts at USD 639tn as of end-June 2012. The bulk of the global OTC market consisted of interest rate contracts, which accounted for 83% of gross notionals. Gross notionals on CDS declined 6% to USD 26.9tn due to portfolio compression in bilateral and centrally cleared trades. In the process, essentially similar transactions among counterparties are terminated and replaced by a smaller number of transactions of decreased notional value in order to reduce the risk, cost, and inefficiency of maintaining unnecessary transactions on the counterparties' books. The cost of replacing existing contracts at prevailing market prices fell 7% to USD 23.5tn in 2012 due to lower price volatility. Gross credit exposures, which measure the reporting dealers' exposure after allowing for netting agreements, shrank by 6% to USD 3.6tn.

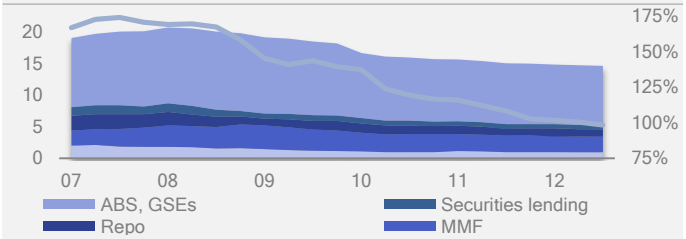
Shadow banking

EU shadow banking system: Slight decline T.29



Note: Size of shadow banking system proxied by amounts of Asset-Backed Securities (ABS) and Asset-Backed Commercial Paper (ABCP) outstanding, size of the EU repo market and liabilities of Money Market Funds (MMF), EUR tn.
Sources: ECB, AFME, ICMA, ESMA.

US shadow banking system: Small increase T.30



Note: Size of shadow banking system proxied by liabilities of ABS issuers , GSEs and poool securities (ABS, GSEs), open commercial paper (CP), size of the US repo market , securities borrowed by broker dealers and liabilities of Money Market Funds (MMF), USD tn.
Sources: FED Flow of Funds, ESMA.

The shadow banking system T.31

The definition of shadow banking has not yet been finalised conclusively. The Financial Stability Board (FSB) defines shadow banking as "*credit intermediation involving entities and activities outside the regular banking system*". The size of the shadow banking system is assessed by adding the liabilities of ABS issuers and all short term money transactions not backstopped by deposit insurance schemes (repo, MMF, commercial paper and securities lending). The estimates are gross measures, i.e. they may include double counting, and as such represent the gross total of securities related to shadow banking activities.

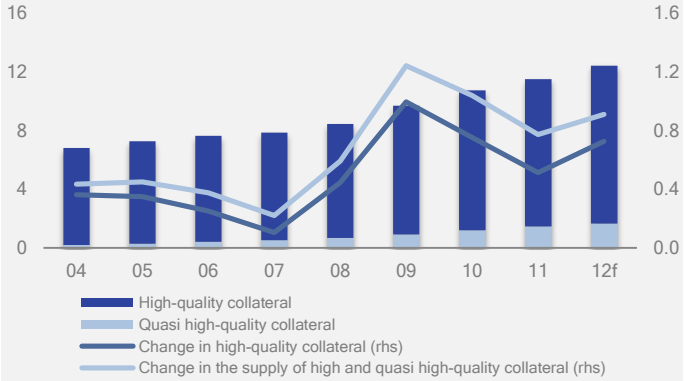
EU shadow banking activity contracted by 8% in 2012 while US shadow banking remained stable. European shadow banking amounted to around 18% of EU bank liabilities while the US shadow banking system represented roughly 95% of US bank liabilities.

EU: EU shadow banking activity was scaled back by around EUR 820bn in 2012 and stood at EUR 8.5tn as of 2Q12. This development is linked to reductions in all its main components: the size of the repo market (-EUR 480bn), the amount of ABS outstanding (-EUR 260bn) and the contraction in the European MMF industry (-EUR 80bn). There was little change in composition in 2012, with the repo market accounting for 66%, ABS for 22% and MMF for 11%. European shadow banking amounted to around 18% of EU bank liabilities as of 2Q12, down from a high of 23% in 2Q10. This trend is linked to the absolute decline in the shadow banking system, while bank liabilities edged up a little.

International comparison: The US shadow banking system grew by 2% in 2012 to USD 14.6tn as of 3Q12. As in Europe, the US shadow banking system in 2012 saw hardly any change in composition. Liabilities of ABS issuers and Government Sponsored Enterprises (GSE) accounted for 65% of the total, followed by MMF (17%), while the repo and commercial paper market represented around 7% each. Repo and commercial paper accounted for respectively 11% and 9% of the shadow banking system when it peaked in 3Q07. The US shadow banking system accounted for around 95% of US bank liabilities in 2012, down from a peak of 175% in 3Q07. This is explained by the contraction in shadow banking (USD 5tn) and the rise in US bank liabilities (USD 4tn) over the period.

Supply of collateral

Collateral outstanding: Increase due to sovereigns T.32



Note: Amounts outstanding and yearly changes, EUR tn.
Sources: Dealogic, Eurostat, AMECO, ESMA.

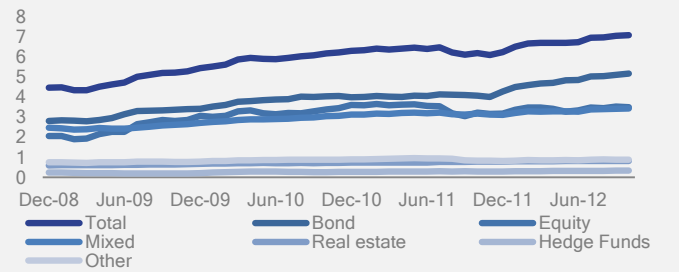
The supply of high-quality collateral in Europe expanded in 2012 by EUR 0.9tn to EUR 11.8tn. This increase was due chiefly to issuance by EU sovereigns with high credit ratings.

Market size: The supply of high-quality collateral increased in 2012 by around EUR 0.9tn, but the pace decelerated. The growth in supply stems mainly from strong issuance by EU sovereigns carrying high ratings (EUR 725bn against EUR 510bn in 2011), as private issuance of quasi high-quality collateral dipped to EUR 185bn from EUR 260bn in 2011. High-quality collateral is proxied by sovereign bonds issued by countries with a credit rating of BBB- or above, while quasi high-quality collateral is proxied by corporate and covered bonds rated AA- or above.

Investors

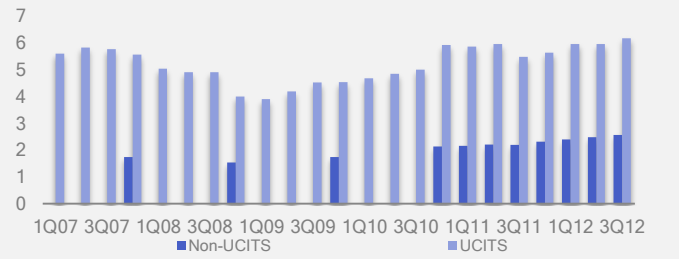
Fund industry

Assets: EA investment funds grew in 2012 T.33



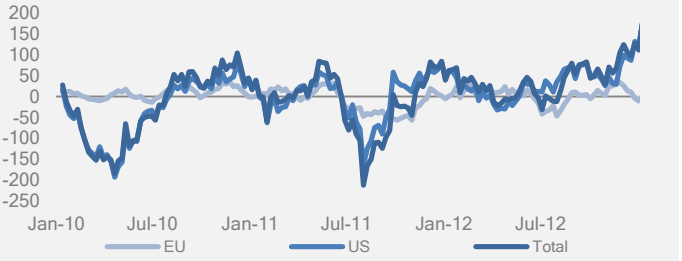
Note: Assets under management of euro area funds by fund market segments, EUR tn.
Sources: ECB, ESMA.

Net Assets: UCITS recover, Non-UCITS increase market share T.34



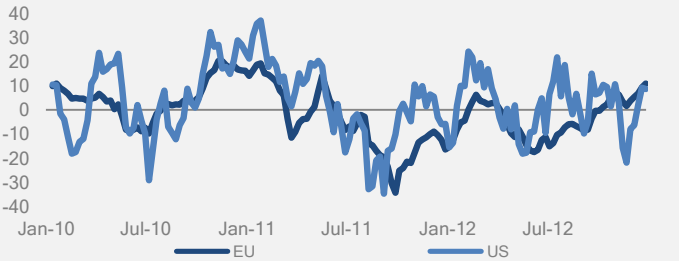
Note: Net asset value of EU fund industry, EUR tn.
Sources: EFAMA, ESMA.

Flows: Outflows experienced during crisis yet not offset T.35



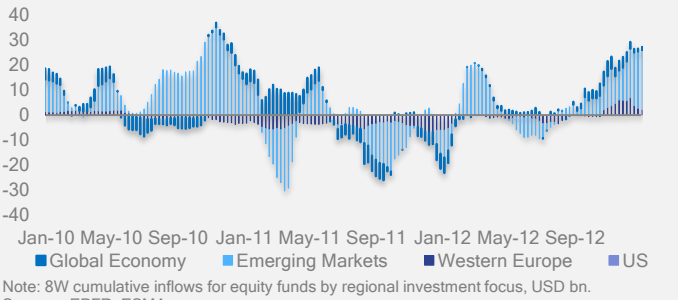
Note: 8W cumulative net flows, USD bn.
Sources: EPFR, ESMA.

Flows: EU industry returned to positive growth in 3Q12 T.36



Note: 8W cumulative flows into equity funds, USD bn.
Sources: EPFR, ESMA.

Equity fund flows: Outflows for funds focused on US and WE T.37



Note: 8W cumulative inflows for equity funds by regional investment focus, USD bn.
Sources: EPFR, ESMA.

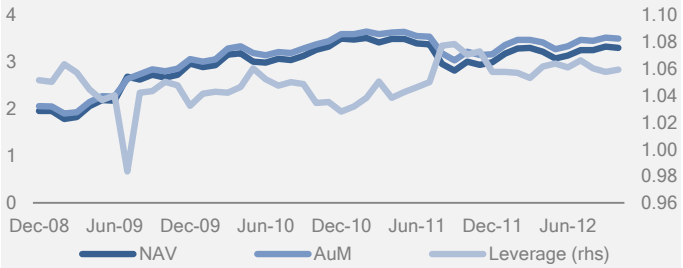
In 2Q12 the EU investment fund industry returned to positive growth. This was driven mainly by bond funds, although smaller fund sectors, e.g. real estate funds and exchange-traded funds, also played a part. While equity and balanced funds, i.e. funds which do not invest exclusively in a specific asset class, failed to make any sizeable contribution, recently they have shown signs of increasing activity. Fund flows to the EU industry remained volatile. Inflows were directed towards low-risk funds, and funds invested preferably in low risk assets. In particular, funds focused on US bonds, corporate bonds and equities of emerging or global markets. Leverage levels of equity, bond and balanced funds remained stable, even if balanced funds did display greater volatility than bond and equity funds. Real estate funds underwent a period of deleveraging.

Assets: Assets under management (AuM) by the investment fund industry in the euro area totalled EUR 7tn in October 2012 (up 9% since January 12). Substantial cross-holdings between fund sectors explain the differences between the assets under management in the investment fund industry overall and the pure aggregate of the assets under management in the industry's subsectors. The money market industry added another EUR 1tn to this figure. This means the EU fund industry is smaller than the US investment industry, which in 2012 reported assets of EUR 10tn for the entire fund sector (EUR 2.75tn for money market funds). In the first half of 2012 euro area bond funds posted stronger growth than other types of funds, due to various factors. First, movements in asset prices influenced the value of funds' assets. Second, the ECB's intervention in sovereign bond markets made bond funds attractive again. Third, risk aversion produced a flight to quality in the form of investments in sovereign debt of supposedly safe havens. In the first half of 2012 the European fund industry continued to bounce back from the contraction in its financial base observed in late 2011. In June, shares issued by the euro area fund industry totalled EUR 7.8tn. In particular, the non-UCITS fund industry continued to grow, raising its market share to 29% in October 2012. Looking back to 2007, we see that in total EU fund industry shares topped their pre-crisis level in 2012.

Fund flows: In the second quarter of 2012 investors began purchasing fund industry shares again, mainly by stepping up inflows into US-domiciled funds, with net flows close to zero for the EU fund industry. In the longer term, the US fund industry experienced inflows aggregating to USD 18bn since November 2007, while in the same period the European fund industry suffered outflows of USD 158bn.

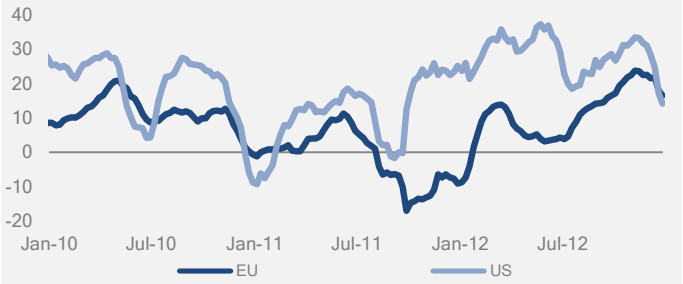
Equity funds: In the third quarter of 2012, funds started to flow back into the European equity fund industry, particularly funds domiciled in the euro area. This reversed the trend from the first half of 2012. US-based funds

Equity funds' NAV, AuM: Share base stable T.38



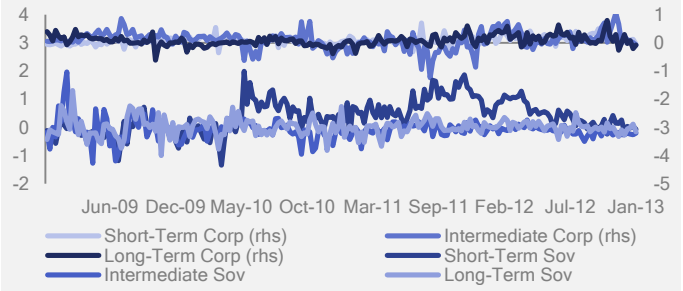
Note: Net asset value and assets under management of EA equity funds, EUR tn. Leverage computed as AuM/NAV ratio.
Sources: ECB, ESMA.

Bond fund flows: Investments flow back to bond funds T.39



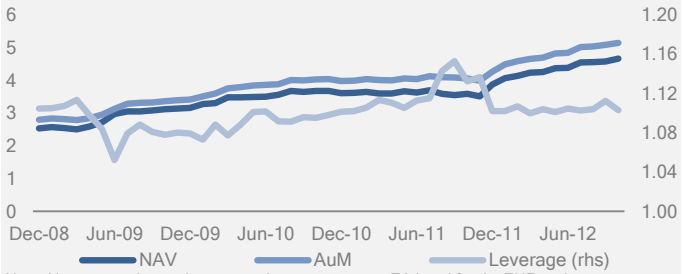
Note: 8W cumulative flows into bond funds, USD bn.
Sources: EPFR, ESMA.

Bond fund flows: Corporate bond funds preferred in 2012 T.40



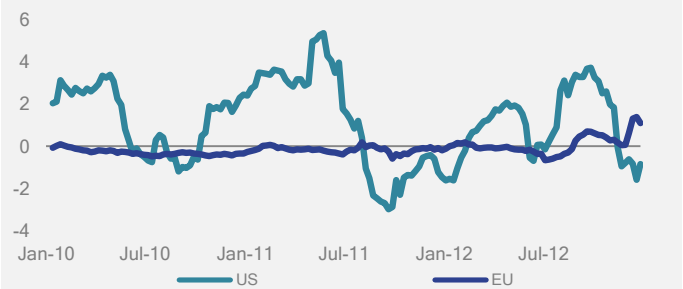
Note: Inflows for bond funds by maturity of investment focus, USD bn.
Sources: EPFR, ESMA.

Bond funds' NAV, AuM: Industry kept growing T.41



Note: Net asset value and assets under management, EA bond funds, EUR tn. Leverage computed as AuM/NAV ratio.
Sources: ECB, ESMA.

Balanced fund flows: Positive inflows since 3Q12 T.42



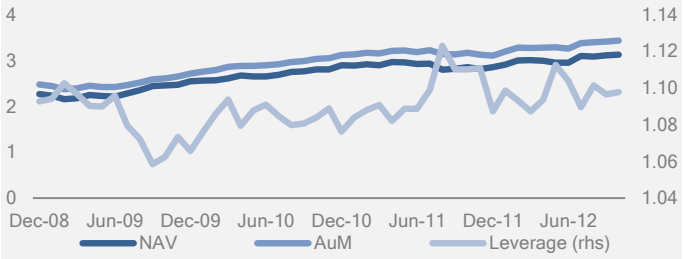
Notes: 8W cumulative inflows into balanced funds, USD bn.
Sources: EPFR, ESMA.

developed similarly, but with greater volatility. On the other hand, funds with an investment focus on Western European equities experienced losses in their share base throughout almost the whole of 2012, a pattern that was replicated for funds focused on US assets. In contrast, funds investing into global or emerging markets experienced mainly positive inflows throughout 2012. In line with this fund flow pattern, in the first half of 2012 the equity industry recovered from its temporary decline in the third quarter of 2011. As of October 2012, the industry managed assets of EUR 3.5tn. Industry leverage has edged up marginally since mid-2010, with the exception of a temporary peak in the third quarter of 2011. This contrasts with a previous fall in the leverage ratio.

Bond funds: European bond funds, like their US counterparts, saw their share base surge in the first half of 2012, a trend reinforced in 2H12. In the fourth quarter of 2012 these inflows started to stagnate. Like equity funds, Western European bond markets did not benefit from the growth, since funds invested their assets mainly outside Western Europe, irrespective of their domicile. Demand for shares in funds focusing on sovereign bonds dropped during the first two quarters of 2012, while demand for funds investing in corporate bonds edged up. This reversed the preceding 12-month trend, in which inflows into short term sovereign debt were significantly higher than into bond funds investing in the corporate sector or with higher maturities. Recently, investors have shunned funds with a sovereign focus in favour of funds focused on corporate bonds, in particular with shorter maturities. Investors thus tended to invest in funds concentrating their investments on assets with a comparatively low risk profile. In the first six months of 2012, bond funds in the euro area drove up their net asset values and assets under management sharply. In October 2012, euro area bond funds managed more than EUR 5.1tn of assets. The reduction in the difference between NAV and AUM metrics indicates that recently bond funds have not adjusted their leverage, which peaked in the third quarter of 2011 at 1.15 and subsequently dropped to its current level. Nevertheless, over the entire period the leverage ratio of euro area bond funds remained higher than that of equity funds.

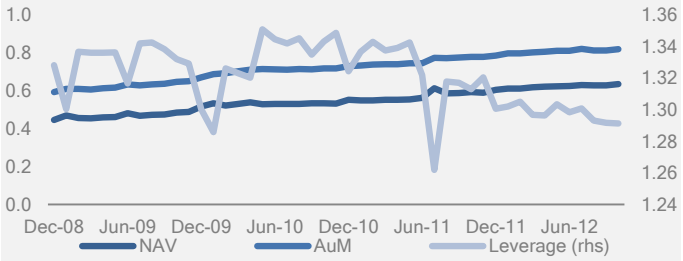
Balanced funds: In the third quarter of 2012 investments into shares of EU balanced funds rose for the first time in almost two years. Despite some volatility, this trend was reinforced in 4Q12. The EU industry followed a pattern of investment flow roughly similar to the US industry, but on a substantially lower scale. Only in the fourth quarter of 2012 did growth in balanced funds domiciled in the EU surge, while US funds reported a loss in their shares. For both regions, the absolute level of flows into balanced funds remains several times smaller than into bond, equity or money market funds. The inflows to the balanced fund industry mainly benefitted funds investing in global or US assets. Investments into balanced funds focusing on Western Europe actually turned increasingly negative. Since late 2010 inflows into balanced funds have been volatile. This applied to almost all funds irrespective of their geographic investment focus. The general inflow of funds left the euro area balanced fund industry with a combined net asset value of EUR 3.1tn in June 2012, while it managed assets worth EUR 3.4tn. The asset side of euro area balanced funds featured substantial cross-

Balanced funds' NAV, AuM: Leverage remained stable T.43



Note: Net asset value and assets under management, EA mixed funds, EUR tn. Leverage computed as AuM/NAV ratio.
Sources: ECB, ESMA.

Real estate funds' NAV, AuM: Growth and deleveraging T.44



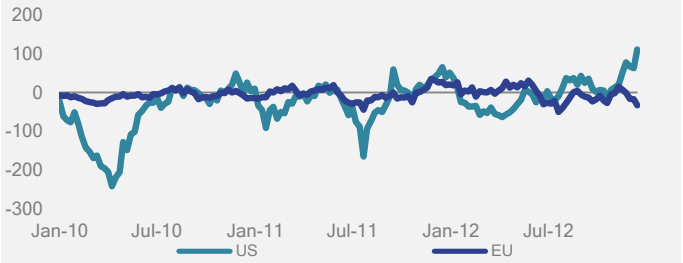
Note: Net asset value and assets under management, EA alternative funds, EUR tn. Leverage computed as AuM/NAV ratio.
Sources: ECB, ESMA.

holdings of fund shares, at EUR 0.95tn. The degree of leverage has fluctuated in line with inflows of funds into the euro area balanced industry: whenever funds exited this market segment the leverage increased, while external financing was ramped up. Euro area balanced funds thus used external borrowing to balance outflows from their share base.

Real estate funds: In the first three quarters of 2012 real estate funds domiciled in the euro area continued to grow their assets under management (EUR 0.82tn in October 2012) and their capital base (EUR 0.63tn in July 2012). This follows a long-term trend that was interrupted only temporarily mid-2011. Between late 2008 and June 2012, euro area real estate funds experienced share growth from EUR 0.45tn to EUR 0.63tn, most of which occurred before April 2011. While the rate of expansion subsequently slowed, it still remained positive. In April 2011, the industry also started to increase its leverage. Despite some intermediate fluctuation this trend has persisted to the present day. In all probability it reflects the real estate fund industry's reaction to the unfolding European banking crisis and the associated fall in house prices and mortgage lending.

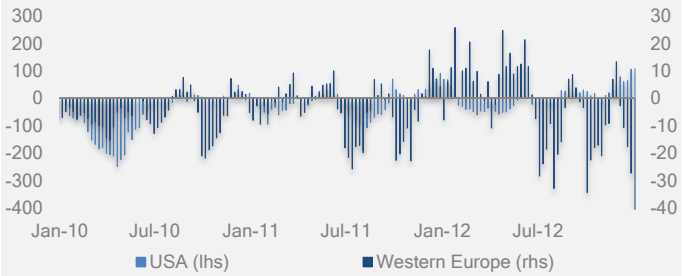
Money market funds

Flows: MMFs back to growth, EU funds weaker T.45



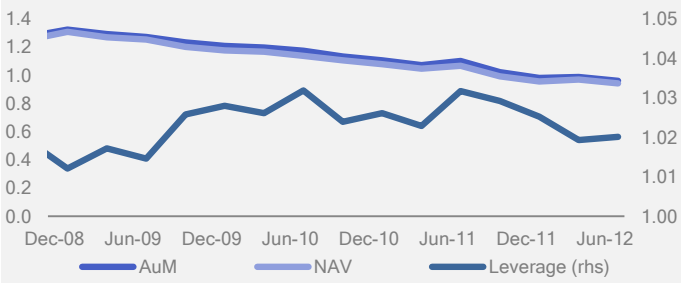
Note: 8W cumulative inflows for money market funds, USD bn.
Sources: EPFR, ESMA.

Flows: Increasingly volatile flows into MMF T.46



Note: 8W cumulative inflows for money market funds by regional investment focus, USD bn.
Sources: EPFR, ESMA.

NAV, AuM: EA MMFs' assets and leverage declined T.47



Note: Net asset value and assets under management, EA money market funds, EUR tn.
Sources: ECB, ESMA.

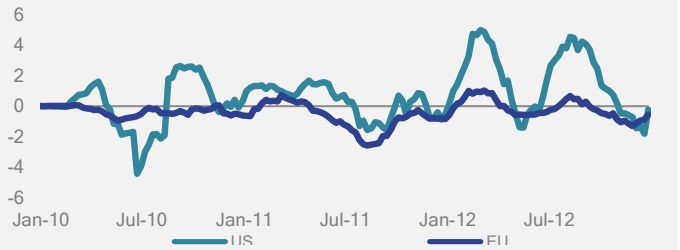
Throughout 2012 money market funds continued to suffer outflows from their share base. They matched this decline in liabilities with a reduction in their assets. Hence no major change occurred in their leverage ratio.

Fund flows: Throughout the first half of 2012 EU money market funds enjoyed a net inflow, but this changed in the third quarter. Since then the sector has experienced outflows from its share base. While this pattern was the qualitative mirror image of developments in the US, over the whole of 2012 US-based money market funds lost more funds on average than the EU industry. In particular, the EU industry's share base suffered less absolute variation than the US, reflecting the smaller size of this market segment in the EU. Similarly, money market funds focusing their investment on Western Europe experienced capital outflows in the third quarter of 2012, and flows into the funds became increasingly volatile. While money market funds with a US focus were also experiencing fluctuations between in- and outflows, the situation was more stable. The high volatility in the Western European market segment reflected the industry's difficult environment amid considerable risks, low returns and low liquidity in Western European money markets in general.

Assets: Between early 2012 and June 2012 assets under management and shares outstanding in euro area money market funds continued to contract. Since late 2008 euro area money market funds had been losing capital. This trend slowed in the first quarter of 2012, only to pick up again in the second quarter. Overall, in the second quarter of 2012 the euro area money market fund industry remained small with roughly EUR 0.96tn assets under management, compared to roughly EUR 2.75tn for the US sector. Euro area money market funds' low but stable leverage indicates that the industry as a whole is not severely exposed to the immediate danger of a shareholder run.

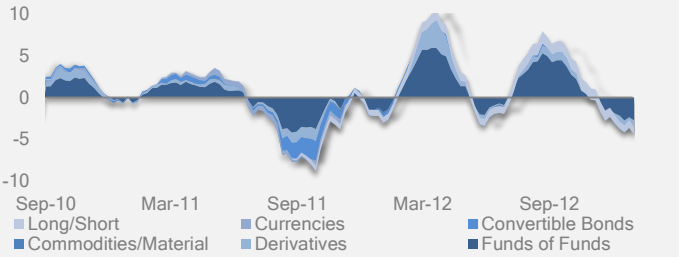
Alternative funds

Flows: Inflows into EU and US alternative funds converge T.48



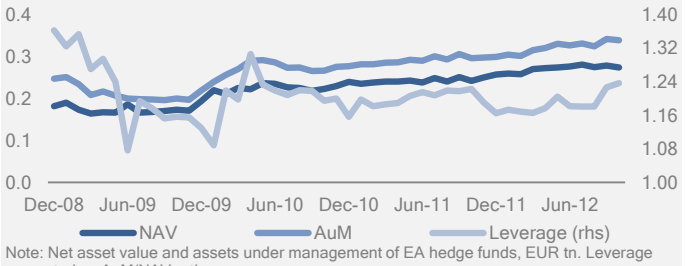
Note 8W cumulative inflows for alternative funds, USD bn.
Sources: EPFR, ESMA.

Flows by strategies: Increasing, but volatile inflows T.49



Note: 8W cumulative inflows for alternative funds, USD bn.
Sources: EPFR, ESMA.

NAV, AuM: Leverage rising again T.50



Note: Net asset value and assets under management of EA hedge funds, EUR tn. Leverage computed as AuM/NAV ratio.
Sources: ECB, ESMA.

In 2012 the EU alternative fund industry, i.e. mainly hedge funds, was characterized by volatile capital outflows. Inasmuch as there were any inflows at all, investors mainly preferred funds of funds. The degree of leverage within the industry held stable, except for an upturn in the third quarter of 2012.

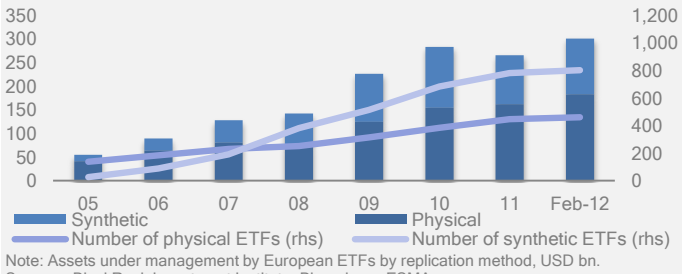
Fund flows: Inflows into alternative funds were volatile throughout 2012. After a substantial decline in the second quarter, investments flowed back to the industry until September, when the trend was reversed again. In general, inflows into the EU industry were smaller and less volatile than into the US industry. This is explained by the larger volume of the US industry and more congenial macroeconomic conditions. In the closing weeks of 2012, inflows into the alternative fund industry increased in both the EU and the US.

Investment focus: Throughout 2012 inflows of capital to the alternative funds industry were channelled mainly into funds of funds. Funds with differing strategies attracted very little of the investment as investors favoured well-diversified fund positions for their moderate risk profile.

Assets: Within the euro area, hedge funds managed EUR 338bn as of October 2012 and, on aggregate, had EUR 274bn in shares outstanding. The difference between the two figures is due mainly to external funding. In 2012, both assets under management and the amount outstanding of shares issued by the euro area hedge fund industry continued the upward trend prevailing since late 2010. During the first three quarters of 2012 euro area hedge funds ratcheted up their leverage to its previous level. However, compared to December 2008 leverage was reduced by more than 10 percentage points.

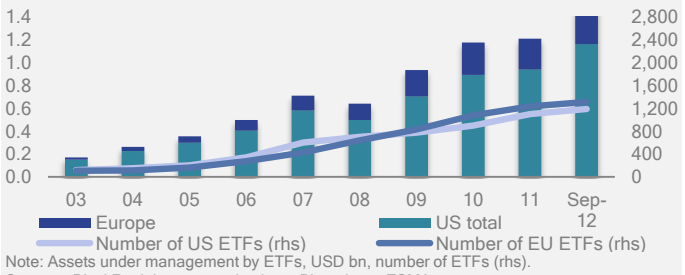
Exchange-traded funds

EU ETF: Temporary loss of assets by synthetic ETFs reversed T.51



Note: Assets under management by European ETFs by replication method, USD bn.
Sources: BlackRock Investment Institute, Bloomberg, ESMA.

International ETF: Recovery of industry in 2012 T.52



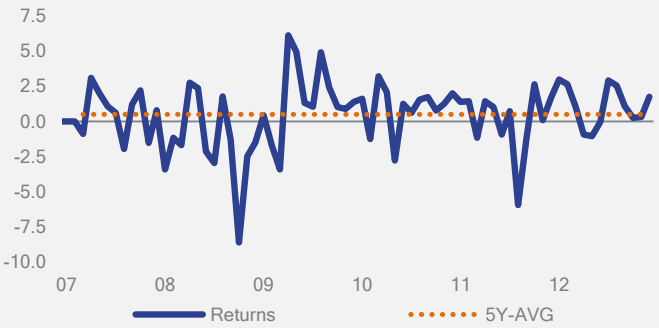
Note: Assets under management by ETFs, USD bn, number of ETFs (rhs).
Sources: BlackRock Investment Institute, Bloomberg, ESMA.

In 2012, assets under management by European exchange-traded funds increased. The fall in the share base of synthetic exchange-traded funds observed in 2011 was reversed.

Assets: In the first three quarters of 2012 European exchange-traded funds recovered from their 2011 share losses. The rebound was particularly marked for synthetic exchange-traded funds, which grew in the 1Q12 alone by 15%. Hence, the simultaneous growth trend in synthetic and physical exchange-traded funds was interrupted only temporarily in 2011. In total, in September 2012 European exchange-traded funds comprised 1,311 funds with EUR 308bn in assets under management. Roughly 65 percent of this volume was managed by exchange-traded funds with a physical replication method. Compared to the exchange-traded fund sector in the US the European industry was still in its infancy, amounting to only some 25% of the US sector and growing more slowly than the industry stateside, which in the first three quarters of 2012 reported expansion of 27%.

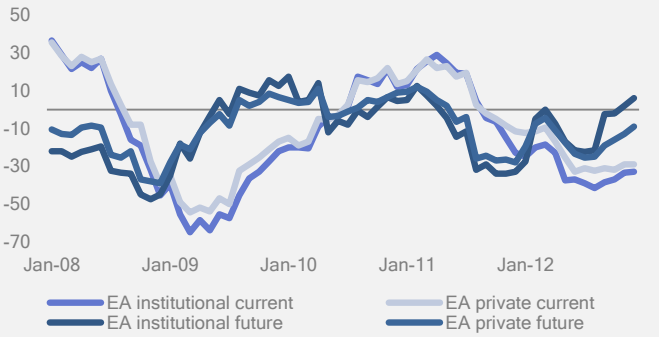
Retail investors

Portfolio Returns: Slightly below average T.53



Note: Monthly returns on a portfolio composed of 47% stocks (Stoxx600), 42% deposits (1Y Euribor) and 11% bonds (Barclays Euro Aggregate 7-10Y). 5Y-AVG= 5Y average.
Sources: Thomson Reuters Datastream, EIOPA, ESMA.

Investor sentiment: Beginning to improve in 3Q12 T.54



Note: Sentix Sentiment Indicators for euro area private and institutional investors for 10Y horizon. Zero benchmark denotes risk-neutral position.
Sources: Datastream, ESMA

In 3Q2012 the returns on a representative retail investment portfolio were above their long-term average. Investor sentiment started to pick up again.

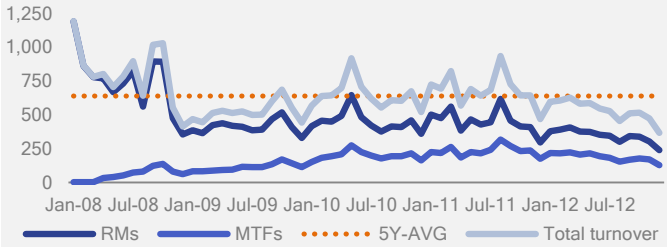
Portfolio returns: Monthly returns on a representative portfolio of retail investors' financial wealth were on average 1.15%, higher than the five-year average of 0.52%. Positive returns in 1Q12 and 3Q12 compensated the negative returns observed in 2Q12. The portfolio composition is based on Eurostat data for household financial wealth, which shows that currency and deposits represent 33%, insurance and pension fund technical reserves 29%, shares 27% and other instruments 11% of the average household's financial wealth. Using EIOPA data, 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%.

Investor sentiment: In 3Q12 private investor sentiment in the euro area began to recover from the previous two quarters' decline. But it nevertheless remained below its five-year average and below that of its international peers. This relative investor pessimism in the euro area emerged as a new phenomenon not observed in the last five years. It can be traced back to the European sovereign debt crisis and the associated macroeconomic costs. Investors' future expectations are consistent with their assessment of the current situation in so far as expectations predict changes in current assessments. Hence, the recently observed rise in expectations for the future creates optimism with regard to an improvement in investors' current sentiment. Institutional investor sentiment behaved similarly to that of private investors.

Market infrastructures

Trading venues

Trading venues: Decline in turnover T.55



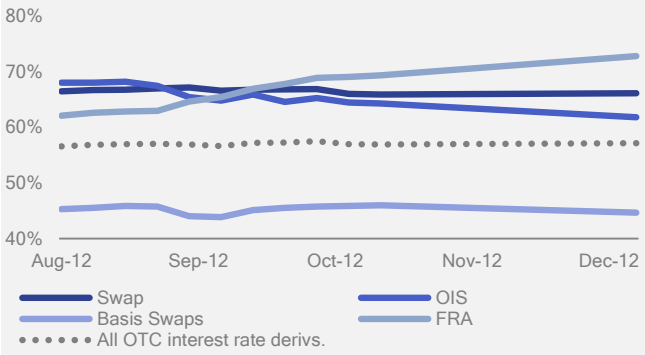
Note: Monthly turnover of lit trades on EU Regulated Markets (RMs) and Multilateral Trading Facilities (MTFs), in EUR bn. 5Y-AVG= 5Y average.
Sources: Thomson Reuters, ESMA.

Activity on European trading venues decreased in 2012 and turnover was significantly lower than its five-year average. Uncertainties surrounding the European sovereign crisis and the macroeconomic outlook weighed on investors' willingness to trade.

Turnover: Activity on European equity markets declined in 2012, with around EUR 370bn of monthly turnover as of December 2012. Recent figures for turnover were well below the five-year average of EUR 640bn. The same decline was observed for OTC trades and trades executed through dark pools.

Central counterparties

OTC interest rates derivatives: Increase in the use of CCPs T.56



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

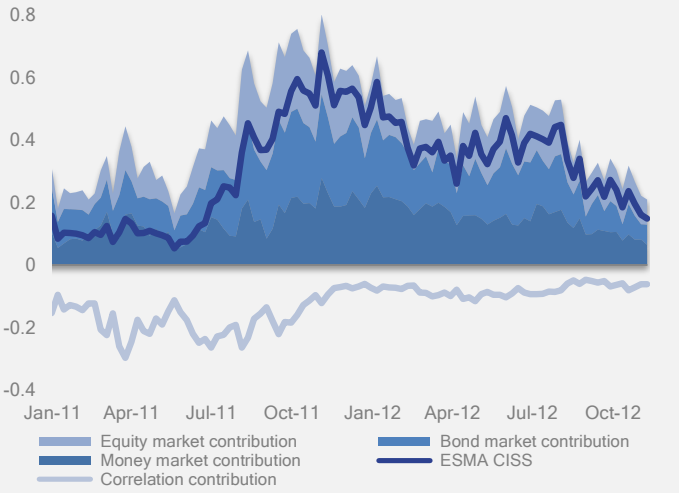
Interest rate swaps cleared through Central Counterparties (CCPs) represented around 60% of OTC interest rate contracts outstanding in December 2012, while only 10% of CDS contracts were cleared through CCPs.

OTC interest rate derivatives clearing: Interest rate Swaps (IRS) cleared through Central Counterparties (CCPs) represented around USD 290tn in notional amounts as of 28 December 2012 according to DTCC data. The bulk of it was swaps (around USD 195tn), while forwards amounted to USD 55tn. IRS cleared through CCPs represent around 60% of total notional amounts, ranging from 45% for basis swaps to 73% for forwards. Some types of IRS such as Cross Currency Swaps and Swaptions are not currently cleared through CCPs.

Trends
Risks
Vulnerabilities

ESMA Risk Dashboard

Stress in EU markets eased in the second half of 2012 R.01



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.02

Risk	Change since 1Q12
European sovereign debt crisis	→
Market clustering	↑
Funding risk	↗
Low interest rate environment	↗
Market functioning	↗

Note: Assessment of risk main sources for markets under ESMA remit, change since the last assessment.

Main risks: Categories R.03

Risk category	Change since 3Q12	Outlook for 1Q13	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 ESA Systemic Risk Heat Map, green=low, yellow=moderate, orange=high, red=very high.

Main risks: Summary assessment R.04

Risk category	Summary
Liquidity risk	Liquidity risk remained stable over the last quarter. Its dispersion across market segments and regions remained high. The evidence below indicates that recent reactions by policy makers and market participants have reduced liquidity risks in some segments. However, liquidity conditions deteriorated in other segments. Accordingly, markets remain cautious with regard to liquidity risk.
Market risk	In 3Q12 both equity and bond markets showed some signs of relaxation. In particular, riskier bond market segments were rewarded with reduced investor aversion. Even so, investments by the fund industry into European asset markets continued to

The overall level of systemic risk in EU securities markets decreased in 2012 as conditions in equity and bond markets improved, especially since July. The decline is linked to the announcement of Outright Monetary Transactions (OMT) by the ECB in early August, which alleviated the pressure on Euro area sovereign bond markets and reduced uncertainty among market participants. However, risk indicators remain at high levels and increased again in the last two months of 2012. The main sources of risk are the on-going European sovereign debt and banking crisis, market clustering, funding risk, the low interest rate environment and obstacles to orderly market functioning.

Systemic stress: The indicator of aggregate risk in securities markets fell, moving back to levels reached in June 2011 but remaining high. This trend is mirrored in equity markets, where adjusted price-earnings ratios increased for Europe but were still below their long-term average.

Among the various risks that ESMA monitors, the following are of particular importance at the current juncture:

European sovereign debt crisis: The European sovereign debt crisis continues to weigh on the stability of financial markets, despite significant improvement since July 2012. In particular, current sovereign yields remain high for some euro area countries, affecting market participants with significant exposures to sovereigns, such as banks.

Market clustering: Within the EU single market, increasing clustering of financial assets in investors' risk assessment has been observed. Also referred to as market fragmentation, this realignment of risk assessments is evidenced by the dispersion in sovereign yields, their liquidity and volatility, but also by the dispersion of national indices in equity markets. On the one hand, such market clustering can lower contagion risk as market participants are able to disentangle individual country risks from general factors, further reflecting domestic economic conditions. However, market clustering has fragmented the market into two broad clusters, increased contagion among countries in the same cluster. This is indicated by higher correlation among distressed sovereigns.

Funding risk: Activity in unsecured markets continued to be subdued, as financial institutions faced difficulties in attracting investors and had to rely on the secured funding market, putting further pressure on collateral demand. In spite of the alleviating effects of recent ECB measures (OMT, LTRO) in the short run, low bond issuance, coupled with significant bank redemptions in the next three years, due especially to maturing LTRO funds, and a decrease in debt maturity may give rise to significant funding risks in the future when financial institutions need to roll over their debt. Refinancing risks are not limited to banks, as corporates and sovereigns will also have significant rollover requirements in the next few years

Low interest rate environment: Exceptional actions taken by central banks allowed a reduction of stress in the financial system. The resulting low-interest-rate environment is changing behavioural patterns in the financial markets. While low interest rates have provided banks cheap funding, they have made it more difficult for money market funds to attract investors due to the low returns. Unsecured markets remain impaired despite policy actions. Amid high counterparty risk in the financial system,

	decline. Overall, market risks appear to have decreased slightly compared to 2Q12.
Contagion risk	In 3Q12 conditions in the market segment currently most exposed to contagion risks revealed a continued trend to clustering of European markets. The main drivers were a general reduction in CDS exposures and increasing awareness of idiosyncratic risks by investors. Both reactions tend to curb contagion risks. In addition, investors assessed the idiosyncratic risks of the most vulnerable segments as being lower than in the previous quarter. Contagion risks remain high in exactly that group of markets. Contagion risks are unchanged compared to 2Q12.
Credit risk	In the last quarter securities markets in the EU witnessed increasing issuance volumes, concentrated mainly on asset classes with higher risk. At the same time sovereign debt maturity at issuance continued to decline, in particular for countries with distressed sovereign bond markets. Similarly, the concentration of outstanding debt at shorter maturities held by banks has increased. Despite European debt issuers' recent successful refinancing operations and narrowing spreads, there remain substantial credit risks for the future.

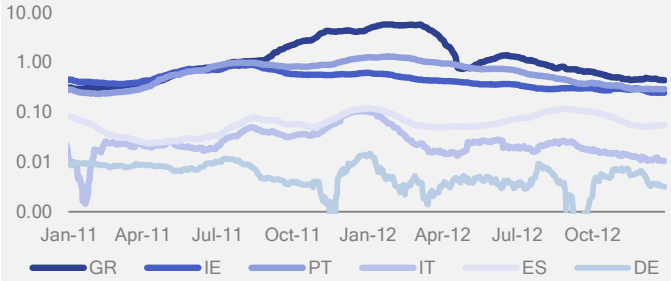
Note: Qualitative summary of assessment of main risk categories for markets under ESMA remit.

liquidity injections by central banks have been used as substitutes for market funding rather than as complementary funding tools. In the long run, low interest rates may also imply risks of distortions in capital allocation and foster search-for-yield strategies generating flows into high-yield and, by implication, more risky assets.

Market functioning: Recent investigations into alleged misconduct in interbank rate-setting have raised concerns about the reliability of benchmarks in financial markets. On secondary equity markets, 2012 events outside the EU, such as the cancellation of BATS IPO, the Knight event in the US and a recent sharp drop in Indian stock market prices over a very short time frame, have raised concerns over high-frequency trading. In times of financial market stress, the flow of funds from repo markets via prime brokers to hedge funds (and the reverse flow of collateral) is exposed to a potential hoarding of collateral by prime brokers which impairs the functioning of the entire chain.

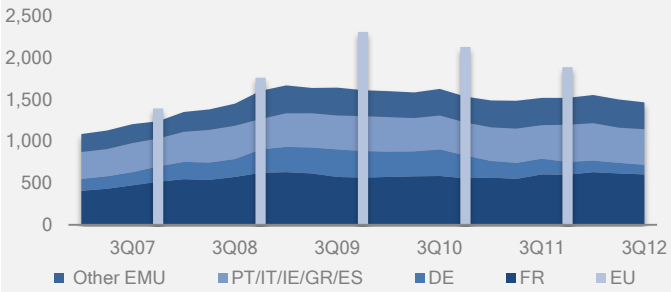
Liquidity risk

Liquidity increased across range of markets R.05



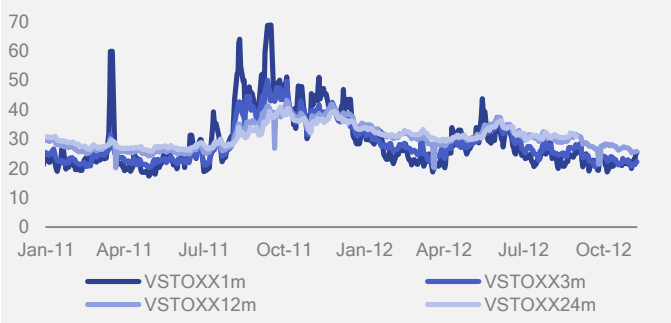
Note: Euro zone sovereign bid-ask spread in percentage points (logarithmic scale). 30D moving average.
Sources: Thomson Reuters Eikon, ESMA.

Slight decrease in supply to money markets R.06



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

Decline in volatility expectations, but dispersion compressed R.07



Note: Stoxx50 implied volatilities measured as indices, %.
Sources: Thomson Reuters Eikon, ESMA.

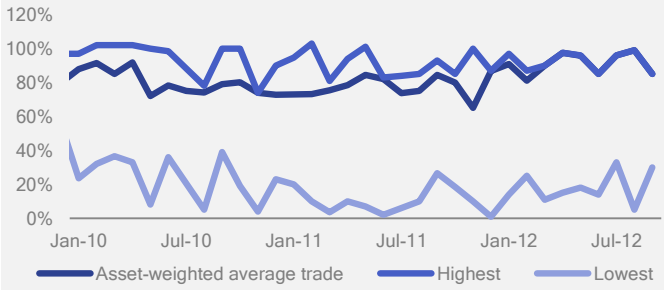
Liquidity risk remained stable over the last quarter. Its dispersion across market segments and regions remained high. The evidence below indicates that recent reactions by policy makers and market participants have reduced liquidity risks in some segments. However, other segments displayed deterioration in liquidity conditions. Markets therefore remain cautious on liquidity risks.

Sovereign bonds: In 3Q12 the bid-ask spreads of euro area sovereign bonds declined for several key countries, while holding roughly stable or increasing for others. However, there is considerable dispersion in levels across sovereigns. While some countries not yet using IMF and EU bailout funds still face lower market depth than other EU countries, in the first weeks of 4Q12 their markets improved in terms of the bid-ask-spreads. The continued volatility of German bid-ask spreads signals the presence of general doubts about market liquidity within the euro area.

Short-term securities: In 3Q12, the outstanding volume of short-term securities, which is the maximum liquidity available to money markets, fell slightly. In particular, the German market continued to contract, while in euro area economies with distressed sovereign debt markets volumes did not follow up on their previous growth, although they remain high. On the other hand, in France (the largest issuer in the euro area) and in the aggregate of all other euro area economies volumes recently grew or stabilized. In general, there is no evidence that money markets are seriously hampering the provision of liquidity within the euro area. Taken in conjunction with low interest rates, this indicates that the driving factor for the squeeze in the supply of capital to businesses is not a lack of liquidity, but rather the lack of intermediaries' willingness to extend credit because of the greater perceived risk.

Volatility: In 3Q12 implied volatilities on equity continued to decrease. A regular volatility index term structure existed until early November 2012, when compression in dispersion of the term structure began to increase again. Looking back at 2Q12, this constellation very probably heralds a reversal of the term structure in the near future. In this case, short-term risk expectations exceed long-term expectations. Equity markets would therefore expect a negative development in the near future, which is usually followed by

Price index for hedge fund shares on secondary markets R.08



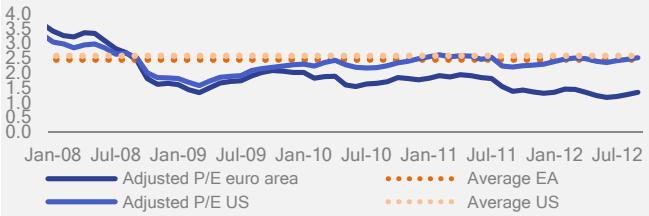
Note: Monthly price index for hedge fund shares on secondary markets, computed as the asset-weighted average trade in percent of the net asset value.
Sources: Hedgebay, ESMA.

a rise in implied volatilities. However, the current level of implied volatilities is comparatively low.

Liquidity premium: The liquidity premium required by investors to acquire hedge fund shares remains positive but declined on average over the last quarter. Meanwhile, variability in liquidity premia became more pronounced, while their dispersion decreased. Consequently, hedge funds performed better and the associated risks decreased. Funds with market directional strategies are reported to have underperformed in recent quarters, contributing to the high variation observed in returns. The improvements noted above thus imply that the impact of macroeconomic risks on the hedge fund sector's liquidity has recently declined.

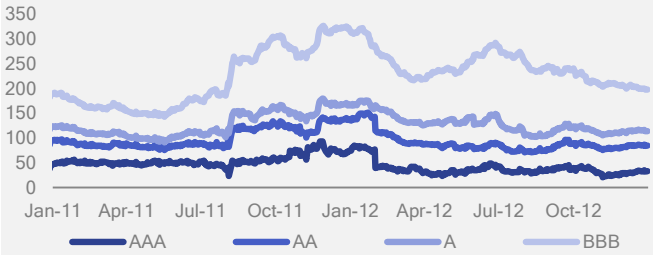
Market risk

Adjusted price-earning ratios for euro area and US equities R.09



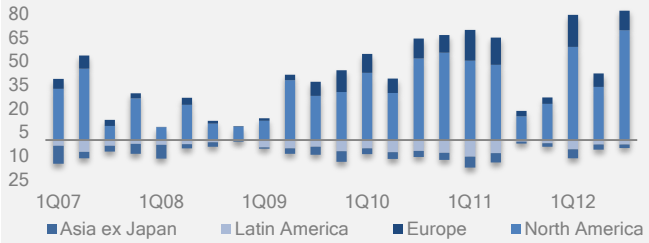
Note: Monthly earnings adjusted by a Kalman filter methodology which eliminates trends and cyclical factors based on OECD leading indicator, units of standard deviation. Averages computed over 2M73-11M12.
Sources: Thomson Reuters Datastream, ESMA.

Recent rise in risk spreads slows again R.10



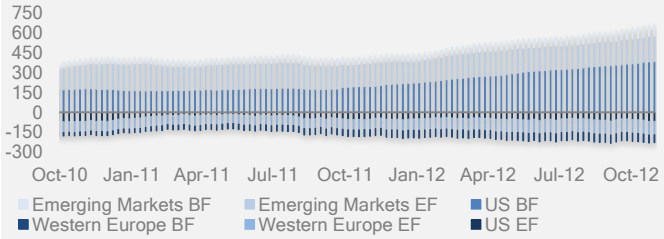
Note: Non-financial corporate bond spreads by rating grades, EMU, basis points.
Sources: Thomson Reuters Datastream, ESMA.

High-yield corporate bond issuance R.11



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

Investments into funds follow investors' risk perceptions R.12



Note: Cumulative netflows into bond and equity funds (BF and EF, respectively) by regional investment focus, USD bn.
Sources: EPFR, ESMA.

In 3Q12 both equity and bond markets showed some signs of relaxation. Most particularly, riskier bond market segments' ability to generate yields was rewarded by ebbing investor aversion. Nonetheless, investments by the fund industry into European markets continued to decline. In total, market risks decreased slightly on 2Q12.

Equities: Despite an increase in 3Q12, the price-earnings ratios of equities in the euro area continued to underperform their long-term averages. Meanwhile, US equities continued the rebound that had persisted since summer 2011 interrupted only by a temporary dip. The recently widening gap between euro area and US price-earnings ratios has remained stable; hence the difference in the perception of macroeconomic conditions and prospects between the US and the euro area remains unchanged.

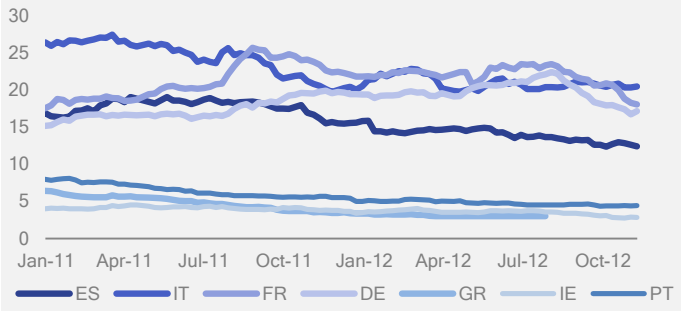
Bond Spreads: Bond spreads of investment grade non-financial corporations in the euro area reflect the macroeconomic uncertainty. In general, risk spreads in the last three months narrowed moderately. However, the decline was non-monotonic, displaying some volatility in perceived macroeconomic risks. Over the last month the decline in risk spreads gathered some momentum. This fall in levels might have been encouraged by macroeconomic policy actions, which began to restore some confidence in European debt markets. On the other hand, continuing outflows from Western European funds indicate that the situation is still uncertain.

Bond Issuance: Issuance of high-yield corporate bonds rose again sharply in 3Q12, with increases in both Europe and North America. The high volatility in issuance observed since mid-2011 persisted. Both effects can be traced back to loose monetary policies, still-high macroeconomic uncertainties around the world and investors' highly elastic risk premia.

Capital flows of funds: Risk perceptions also dominate the direction in which investments in fund companies flow. This behaviour continued in 3Q12. Due to the high macroeconomic risks investors perceived within the euro area, investments concentrated on markets and asset classes currently regarded as offering sustainable positive returns: emerging market bond and equity funds and US bond funds. A similar pattern applies within the euro area, where investments are channelled into funds focused on German bond and equity markets. In general, this flow pattern is supported by the evidence from adjusted price-earnings ratios.

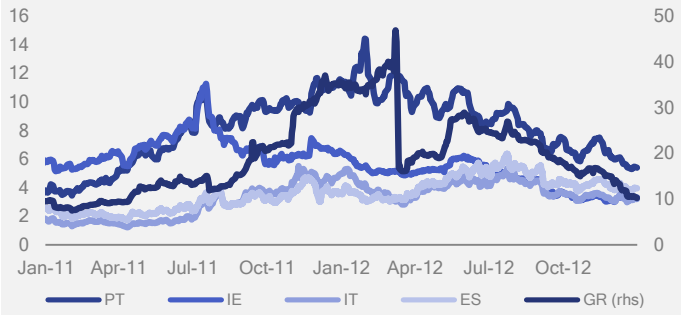
Contagion risk

European Sovereign CDS net notional amounts R.13



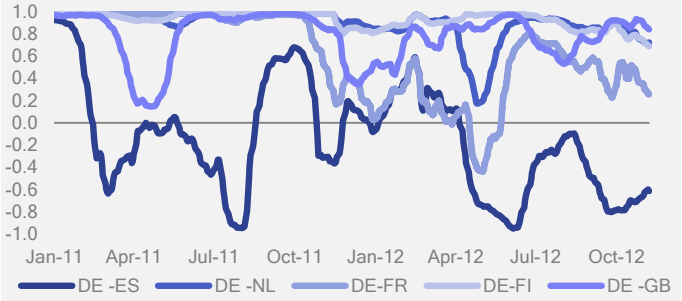
Note: USD bn.
Sources: Thomson Reuters Eikon, ESMA.

Sovereign risk premia improved, but remain high R.14



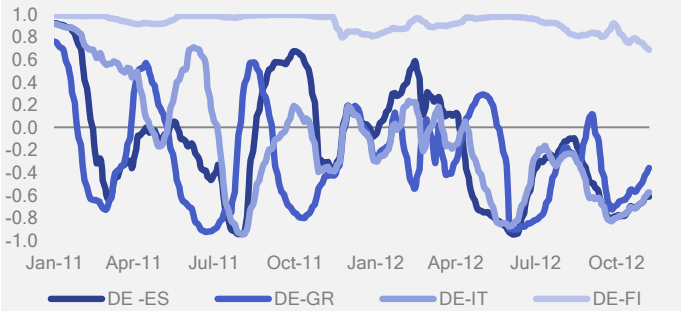
Note: Selected 10Y euro sov. bond risk premia (vs. German bond), percentage points.
Sources: Thomson Reuters Datastream, ESMA.

Distressed markets decoupled from other EU economies R.15



Note: Correlations over 60D rolling windows of 10Y sovereign bond redemption yields, EU.
Sources: Thomson Reuters Datastream, ESMA.

Markets with sovereign stress converge R.16



Note: Correlations over 60D rolling windows of 10Y sovereign bond redemption yields, EU.
Sources: Thomson Reuters Datastream, ESMA.

In 3Q12, conditions in the market segment currently most exposed to contagion risks revealed a continued trend to clustering of European markets along fiscal risk levels. The main drivers were a general reduction in CDS exposures and an increasing perception of idiosyncratic risks by investors. Both reactions tend to curb contagion risks. In addition, investors deemed the idiosyncratic risks of the most vulnerable segments lower than in the previous quarter. Nonetheless, contagion risks remain high within this group. Overall they are therefore unchanged on 2Q12.

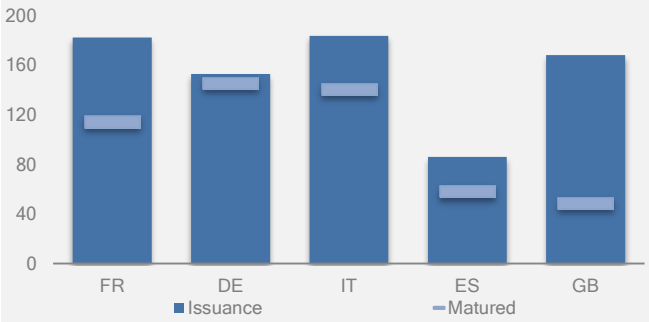
Sovereign CDS: In 3Q12 outstanding CDS net notional amounts continued to decrease for most euro area countries exposed to sovereign risk. Outstanding net notionals also started to fall for several euro area countries not yet associated with exceptionally high sovereign risks. This reflects an increasing reluctance on the part of CDS issuers to offer insurance that exposes them to sovereign debt, as well as lower demand for protection as a result of international investors' reduced activity in those particular asset markets, potentially caused by the entry into force of the Short Selling Regulation. The contagion risks to which the remaining international counterparties are exposed increased for most markets characterized by high sovereign risk. On the other hand, the reduction in overall international exposure to those markets does mitigate the increase in contagion risk to some extent.

Sovereign risk premia: In the last quarter, sovereign risk spreads in several euro area countries exposed to debt problems narrowed significantly. Recently, this trend has been reversed, with sovereign risk spreads for all observed countries starting to widen again. International bond investors still appear very sensitive to any new information on distressed European markets' sovereign debt. However, recent policy actions have relieved some of the market pressure.

Yield correlation: Correlations between the yields on 10-year sovereign benchmark bonds for European economies indicate increasing fragmentation of sovereign bond markets in Europe. While there is still some similarity between most Northern European sovereign bond markets, economies labouring under seriously distressed fiscal conditions saw their yield correlation with the other European sovereign debt markets reduced further in the third quarter of 2012. While this increasing market clustering is a cause for concern from a single market perspective, it also mitigates contagion risk as investors are increasingly using diverging risk levels to distinguish categories of sovereign debt in Europe. Nevertheless, the risk of contagion remains high within the group of countries exposed to sovereign debt problems. The negative correlation pattern between distressed European sovereign debt markets and other EU markets also indicates that investors are increasingly treating the two types of sovereign debt as substitutes in their portfolios. As a result, the issuance of new debt has become more challenging for individual sovereign issuers. Going forward, the associated reduction in maturities is maintaining the market pressure that is currently generating sizeable sovereign spreads, for the future.

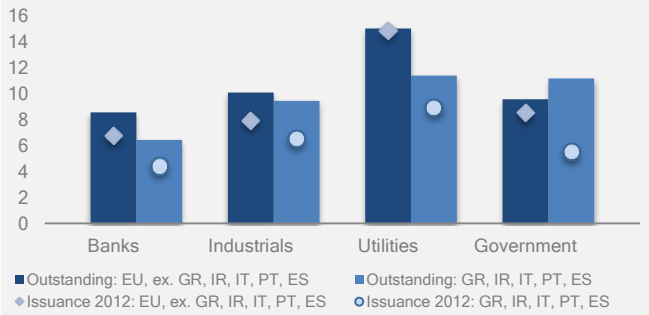
Credit risk

Sovereign stake on additional debt in 2012 R.17



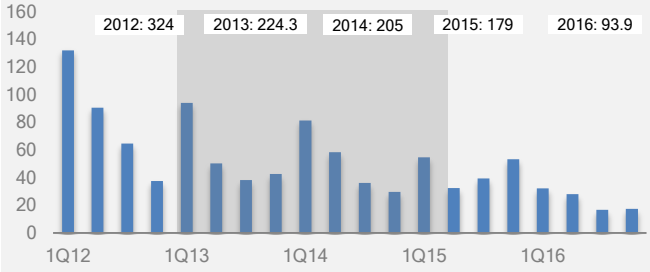
Note: Amounts of issued and matured public debt, selected EU sovereigns, EUR bn. 2012.
Sources: Dealogic, ESMA.

Maturities of outstanding and new debt in the EU by sectors R.18



Note: Maturities of outstanding and new debt (YTD) by sectors, EU, years.
Sources: Dealogic, ESMA.

Future EA banks redemptions imply high refinancing needs R.19



Note: Quarterly euro area banks' redemptions excl. LTRO (variable expiry between Dec-12 to Mar-15), EUR bn. Grey shaded area indicates increased financing needs of about EUR 1,018bn.
Sources: Dealogic, ESMA.

In the last quarter securities markets in the EU witnessed increasing issuance volumes, concentrated mainly on asset classes with higher risk. At the same time sovereign debt maturity at issuance continued to fall, in particular for countries with distressed sovereign bond markets. Similarly, the concentration of outstanding debt at shorter maturities has increased for banks. Despite the recent successful refinancing operations by European debt issuers and narrowing spreads, substantial credit risks remain for the future.

Issuance: In 3Q12, issuance of securities with a maturity of more than 18 months in the EU increased or remained stable in most market segments. The only exception has been lacklustre issuance in asset-backed securities markets. The concentration of increased issuing in market segments with higher risk classes, while issuance in liquid asset classes has remained stable, indicates that raising capital called for substantial risk premia. The temporary peak in non-financial corporate spreads observed in 3Q12 (see R.10) confirms this impression.

Refinancing: In the EU, the main sovereign issuers have successfully rolled over maturing debt. All sovereigns used the previously improved market conditions to issue additional debt. The maturity of the debt newly issued by sovereigns of economies in distress has apparently decreased substantially (see R.18), meaning that in the medium-term funding problems may arise again, especially if the supply of funds to those markets remains low for a prolonged period. Nevertheless, European sovereigns currently face no immediate serious threat to their refinancing capabilities.

Maturities: Newly issued securities meanwhile feature a lower average maturity than current outstanding debt (please note that the data is not controlled for volume), the trend being more pronounced among EU countries directly exposed to high sovereign risk. In particular, issuers normally characterized by longer maturities shortened the maturity of their newly issued securities. The strongest reduction in maturity was observed in sovereign debt issuing in distressed market segments. Since debt turnover has risen at the same time, the amount of postponed credit risk has increased. Moreover, the uniform maturity reduction in the EU banking sector reflects a common pattern in bank behaviour and might therefore imply an additional contagion channel.

Bank redemptions: The maturing debt needing to be refinanced by private euro area banks by the end of 2016 jumped in the last quarter from EUR 826bn to EUR 864bn. Of this total EUR 521bn needs to be refinanced by 1Q15. These refinancing requirements do not include obligations to central banks, which are usually in the form of short-term debt. However, the three-year LTRO facilities provided by the ECB in December 2011 (EUR 489.0bn) and March 2012 (EUR 529.5bn) both have a maturity of three years, with early repayment possible any time after one year. These additional financing requirements of EUR 1,018.5bn push up European banks' refinancing needs to roughly EUR 1.5tn between 4Q12 and 1Q15, meaning the future credit risk remains substantial for Europe's banking sector. However, factors such as deleveraging and restructuring processes and the downsizing of the banking industry may reduce banks' funding needs.

Trends
Risks
Vulnerabilities

Collateral concerns in financial markets — a European perspective

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The collapse of unsecured markets during the financial crisis, as well as regulatory initiatives such as the European Market Infrastructure Regulation (EMIR), have led market participants to rely increasingly on collateral as a means of mitigating counterparty risk, stimulating the demand for collateral. At the same time, the collapse of the US shadow banking system, including formerly AAA-rated securitised products, and the on-going European sovereign crisis have depressed the supply of higher-quality collateral. While the supply of higher-quality collateral is still estimated to be higher than demand (EUR 11.8tn against EUR 4.1tn in 2012) in Europe, additional demand for collateral is likely to exceed the additional supply of collateral in 2013-2014, making collateral comparatively scarcer. This trend could heighten financial stability risk, as financial institutions lacking higher-quality collateral may use lower-quality collateral to mitigate their counterparty risk, enter into collateral swaps with third parties or pledge some of their assets, resulting in rising asset encumbrance.

During the financial crisis of 2007 and 2008, liquidity on unsecured markets such as the interbank market dried up and confidence vanished among market participants. Due to heightened counterparty risk and regulatory initiatives such as the European Market Infrastructure Regulation (EMIR), market participants are increasingly relying on collateral to mitigate this counterparty risk, leading to an increase in the demand for collateral. At the same time, the collapse of the US shadow banking system, including formerly AAA-rated securitised products, and the on-going European sovereign crisis have weighed on the supply of high-quality collateral. An additional factor has been a reduction in the velocity (or reuse) of collateral among market participants, which may put further pressure on the supply of collateral and the smooth functioning of financial markets.

Supply and demand for collateral

In order to assess the drivers of supply and demand for collateral, it is useful to review the use of collateral in financial markets.

Use of collateral in financial markets

Collateral can be used in secured funding markets, in securities lending transactions and in OTC derivatives transactions (Table V.01).

Use of collateral in financial markets V.01

Market	Collateral amounts	Main type of collateral used	Credit rating of collateral
Global OTC derivatives	EUR 2.8tn	Cash (75%), government bonds (16%)	N/A
Securities lending (Europe)	EUR 160bn	Non-cash (56%)	N/A
European repo market	EUR 3.1tn	EU government bonds (78.7%)	92% equal to or above BBB-
ECB refinancing operations	EUR 1.3tn	Non-marketable assets (25%), ABS (16%), uncovered bank bonds (15%), sovereign bonds (15%)	None for sovereign bonds, otherwise BBB- or above

Sources: ICMA, RMA, ECB, ESMA.

In a secured borrowing transaction the bank grants a loan to the borrower secured against collateral posted by the borrower. At the end of the loan period, in the absence of a default, the borrower returns the cash and gets back the collateral posted. In the event of a default by the borrower, the counterparty can use the collateral to limit any potential loss. Repurchase agreements (repos) involve a two-way transaction whereby one party sells securities with an agreed repurchase on a future date. Central-bank refinancing operations also involve repo transactions.

Collateral is also used in securities lending transactions, whereby one party borrows the securities and posts collateral (possibly in the form of cash) to the counterparty.

In OTC derivatives transactions, counterparties post collateral to mitigate risk stemming from mark-to-market valuation of derivatives positions. When OTC derivatives are cleared by Central Counterparties (CCPs), clearing members put up margin (initial and variation margin) to the CCP.

Supply of collateral: cumulated increase of EUR 0.8tn for 2013-2014

High-quality liquid assets are needed to mitigate counterparty risk effectively. Building on the approach outlined by Levels and Capel (2012)[1], high-quality collateral can be defined as marketable sovereigns or central-bank-eligible debt securities with a credit rating equal to or higher than BBB-; quasi high-quality collateral consists of i) corporate bonds (if not issued by financial institutions) with a credit rating of AA- or higher and ii) covered bonds with a credit rating of AA-[2].

[1] Levels, A. and J. Capel (2012), "Is collateral becoming scarce? Evidence for the Euro Area", Journal of Financial Market Infrastructure, Vol. 1 (1).

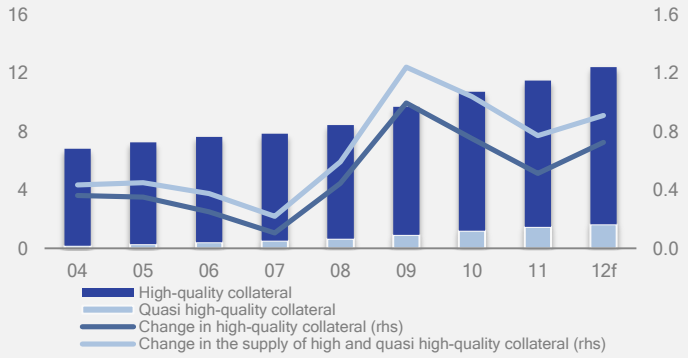
[2] Levels and Capel also include marketable securities issued or guaranteed by sovereigns, Public Sector Entities (PSEs) or central banks with a credit rating of AAA to AA-, but due to data restrictions those instruments were excluded from the computations.

Estimates of the supply of collateral are based on outstanding amounts of sovereign debt for EU countries with a credit rating of BBB- or above, using the European Commission's estimates of financing needs for 2012, 2013 and 2014[3] and assuming no change in ratings in the next two years. For corporate and covered bonds, the outstanding amounts are computed as the accumulation of bonds issued in the EU that have not yet matured, assuming no net issuance in 2013 and 2014.

As illustrated in Chart V.02, the supply of high-quality collateral represents around EUR 10.74tn in 2012 and quasi high-quality collateral around EUR 1.64tn. The increase in supply for 2013 and 2014 is estimated at EUR 0.85tn, EUR 466bn for 2013 and EUR 390bn for 2014.

These figures represent an upper boundary, as some sovereign bonds with ratings equal to or above BBB- may not be accepted as collateral by some counterparties. Another approach is to use CDS implied ratings, where sovereigns' CDS are compared to their peers by rating category. If the CDS of an issuer is two standard deviations higher than the average CDS of the group, then sovereign bonds are no longer considered high-quality collateral. Using this approach, high-quality collateral would be around EUR 8.77tn (instead of EUR 10.74tn) and the additional supply would be EUR 0.78tn for 2013 and 2014 (instead of EUR 0.85tn).

Supply of collateral in the European Union V.02



Note: Amounts outstanding and yearly changes, EUR tn.
Sources: Dealogic, Eurostat, AMECO, ESMA.

But this approach does have some limitations: it excludes non-European financial instruments that could be used as collateral, and it does not correct for the holdings of European collateral by non-European institutions, such as FX reserves managers. The supply is proxied by outstanding amounts, while some of the instruments may not be available on loan due to buy and hold strategies, for example. Finally, cash has been excluded from the estimate of the supply of collateral, although it is extensively used in OTC derivatives (75% of transactions involve cash collateral) and in securities lending transactions (44%). However, to obtain cash, financial institutions need to have assets that are eligible for collateral in the repo market or for central banks' refinancing operations.

Demand for collateral: increase of EUR 2.41tn

Estimation of additional demand for collateral is linked to the development of financial markets requiring collateral.

For the repo market it is assumed, as in Levels and Capel (2012), that the market will grow steadily from EUR 3.1tn in 2012 to EUR 3.8tn in 2013 and EUR 4.1tn in 2014, implying additional demand of EUR 700bn in 2013 and EUR 300bn in 2014 (EUR 1tn overall).

For secured lending, it is assumed that the size of the market will remain constant, as observed in 4Q11 to 1Q12[4].

With regard to OTC derivatives, it is likewise assumed that the market will not change in size. However, stricter regulations on OTC derivatives such as EMIR in Europe, and the Dodd-Frank Act in the US, will require that standardized OTC contracts be cleared through CCPs. Bilateral margining for OTC derivatives contracts not cleared by a CCP will also ramp up the demand for collateral. Existing estimates of collateral demand range from EUR 150bn to EUR 1,220bn (Table V.03), resulting from differences in scope, the various assumptions made and the lack of comprehensive data. Given the uncertainties regarding these estimates, the median has been used to estimate additional demand at EUR 610bn.

Estimates of collateral demand in OTC derivatives markets V.03

Source[5]	Products	Resources	Collateral demand (EUR bn)
IMF (2012)	All	Additional initial margin	380
ISDA (2011)	IRS	Additional and variation margin	785
BIS (2012)	IRS and CDS	Total initial margin	560
Sidanius and Zikes (2012)	IRS and CDS	Total initial margin	150-630
Levels and Capel (2012)	All	Total initial margin	610-1,220

However, these estimates refer to the global OTC derivatives market and do not specify the share for the EU. An initial approach to proxying Europe's share relies on figures for exchange-traded derivatives by region, where Europe accounts for 35% of the global market. A second approach, using the share of OTC derivatives denominated in European currencies, shows Europe accounting for 44% of interest rate swaps and foreign exchange contracts. The average of the two figures is taken, i.e. 39.5%. By this

3 AMECO, the annual macro-economic database of the European Commission, is used.

4 Based on the quarterly reports published by The Risk Management Association.

5 References: IMF (2012), "Safe assets: financial system cornerstone", Global Financial Stability Report; ISDA (2011), "Margin and capital requirements for covered swaps entities", BIS (2012), "Collateral requirements for mandatory clearing of OTC derivatives", Sidanius, C. and Zikes, F. (2012), "OTC derivatives reform and collateral demand impact", Bank of England Financial Stability Paper No. 18.

reckoning additional collateral demand for OTC derivatives in Europe is EUR 240bn (39.5% of EUR 610bn).

As a result, additional demand for collateral is estimated at around EUR 1.24tn: EUR 1tn for the repo market and around EUR 0.24tn for OTC derivatives.

This figure would be lower if collateral were reused to a large extent, as is currently the case for most OTC derivatives transactions (around 70% according to the 2012 ISDA Margin Survey). However, CCPs may not allow the reuse of non-cash collateral, and in the repo market there is no estimate of the scale of reuse.

Other regulations, such as the Basel III liquidity standards, may also boost demand for high-quality assets through the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR). According to estimates by the European Banking Authority[6], the LCR and NSFR shortfall would be around EUR 1.2tn and EUR 1.3tn respectively. As a rough approximation we use the EBA estimates of EUR 1.20tn for the EU, as banks will have to comply by 2015, while for NFSR the deadline is 2018. This estimate is subject to uncertainty, as the estimated LCR shortfall does not allow for the fact that banks with LCR surpluses could sell or lend these assets, reducing overall demand for high-quality assets.

The increase in demand for collateral is therefore estimated at EUR 2.44tn for 2014 (EUR 1.20tn for the LCR, EUR 1tn for the repo market and EUR 0.24tn for the clearing of OTC derivatives).

Collateral scarcity and collateral shortage

Based on the estimates of supply and demand, it is possible to assess the current situation and potential future trends with regard to collateral.

Supply and demand of collateral in 2012

The supply of high-quality collateral is estimated at EUR 10.74tn and, with the inclusion of quasi high-quality collateral, at around EUR 12.39tn (Table V.04). A 4.5%[7] haircut is applied on sovereign debt, as the average ECB haircut for sovereign debt rated above or equal to A- is 2.8% and 7.8% for ratings below A- and above or equal to BBB-, and the respective shares of outstanding debt are 66% and 34%[8], resulting in a supply of collateral in the order of EUR 10.25tn. Using the same method for quasi high-quality collateral, the haircut is 5.9%, resulting in EUR 1.55tn. Overall supply after haircuts therefore works out at EUR 11.81tn (EUR 9.92tn using the estimate based on CDS implied ratings).

Estimates of supply and demand of collateral V.04

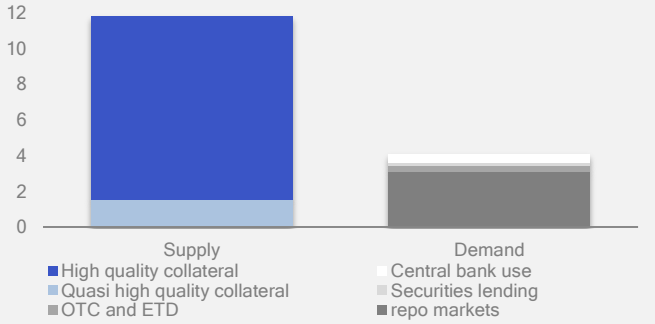
	2012	2014	Change 2012-2014
Demand	4.07	6.51	+2.44
of which:			
Repo market	3.10	4.10	+1
Securities lending	0.16	0.16	+/- 0
Central bank operations	0.50	0.50	+/- 0
LCR	-	1.20	+1.20
OTC and ETD	0.31	0.55	+0.24
Supply (after haircut)	11.81	12.63	+0.83
of which:			
High-quality collateral	10.25	11.08	+0.83
Quasi high-quality collateral	1.55	1.55	+/- 0
Supply-Demand	7.74	6.12	-1.61

Note: Estimates of supply and demand of collateral, EUR tn.
Sources: EU Commission, ESMA.

Demand for collateral is estimated at EUR 3.1tn for the European repo market, EUR 0.16tn for securities lending, EUR 0.50tn for ECB operations[9], EUR 0.17tn for exchange-traded derivatives[10] and EUR 0.14tn for OTC derivatives transactions, resulting in total demand of EUR 4.07tn in 2012.

There is thus no shortage of collateral at present, since the available collateral of EUR 11.81tn is significantly higher than current demand (EUR 4.07tn), as depicted in Chart V.05, even when the lower estimate is taken into account.

Supply and demand of collateral in Europe in 2012 V.05



Note: EUR trn. OTC and Exchange Traded derivatives (ETD) are merged in same category.
Sources: Dealogic, Eurostat, AMECO, ECB, BIS, ICMA, ESMA.

6 EBA (2012), "Results of the Basel III monitoring exercise based on data as of 31 December 2011".

7 An alternative approach could be to use data from CCPs on haircuts. LCH.Clearnet SA, for example, uses haircuts on sovereign bonds with a maturity between 3 and 7 years ranging from 1.50% for France and 1.63% for Germany to 6% for Belgium and 7.75% for Italy and Spain. Based on outstanding amounts, the average haircut would be 3.6%. This would be a lower bound, as bonds issued by some EU countries are not eligible for collateral by LCH.Clearnet (for example Greece, Ireland, Portugal, Bulgaria, the Czech Republic and Poland).

8 2.8%*66+7.8%*34=4.5%

9 Assuming that high-quality collateral represents 20% of the EUR 2.5tn collateral posted at the ECB.

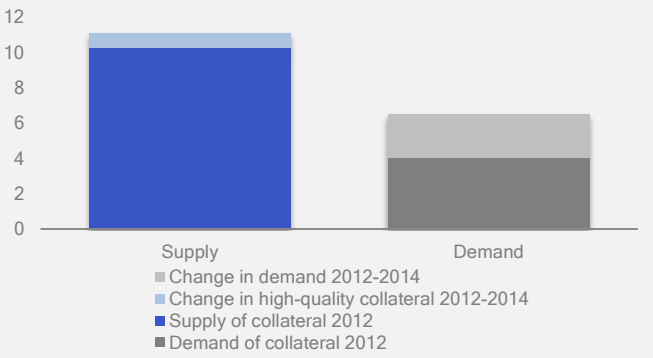
10 The collateral needed for exchange-traded derivatives is estimated at EUR 170bn, as Europe represents 35% of the global market, which could reach EUR 80tn end-2012, and assuming that on average collateral requirements are 0.61% of the notional value (0.61%*0.35*EUR 80tn=EUR 170bn).

Supply and demand for collateral for 2014

The supply of high-quality collateral is estimated to increase by EUR 0.85tn between end-2012 and 2014, resulting in EUR 0.82tn after a 4.5% haircut. The increase in demand for collateral is estimated at EUR 2.44tn in 2014. This valuation is close to that provided by Levels and Capel (2012), who concentrated only on the euro area and found that additional demand would be around EUR 2tn in 2014.

Since the increase in demand for collateral will be higher than the growth in supply, collateral will be scarcer in relative terms[11], but not in absolute terms, as supply would be EUR 6.12tn higher than demand. Whereas in 2012 supply represents around 290% of collateral demand, in 2014 it will account for around 190%. What is more, additional demand for high-quality collateral linked to other factors (such as flight to quality) could exacerbate collateral scarcity. Overall, the estimates show that the supply of collateral will be significantly higher than demand through 2012 to 2014 (Chart V.06).

Supply and demand of collateral in Europe in 2014 V.06



Note: EUR tn.
Sources: Dealogic, Eurostat, AMECO, ECB, BIS, ICMA, ESMA.

Issues linked to collateral scarcity

On the whole there is no shortage of collateral, but rather relative collateral scarcity. However, increases in relative collateral scarcity may heighten risks for the financial system.

Asset encumbrance

Financial institutions facing funding issues may pledge some of their assets to obtain secured funding. Asset encumbrance would increase the subordination of unsecured creditors and shift risk to unsecured creditors. In the event that the institution defaults the recovery rate would be lower, as secured creditors (counterparties in secured funding transactions) would be senior to unsecured creditors, leaving fewer assets available to the latter.

Use of lower-quality assets as collateral and greater reuse

As the relative scarcity of collateral would push up the price of high-quality assets, market participants could use lower-quality assets such as equities or exchange-traded funds. This could step up the risk for investors and financial stability as a sharp decline in prices would lead to margin calls which, in situations of stress, could trigger procyclical effects. However, this risk can be mitigated by adequate risk-management frameworks such as haircuts and concentration limits. Recently, collateral swaps (also called collateral upgrades) have started to be used as a tool for financial institutions to swap lower-quality collateral for high-quality collateral, although the figures are believed to be relatively low.

Another means of mitigation could be to widen the range of eligible collateral in central bank refinancing operations which substitute cash for illiquid collateral. This type of measure has already been implemented by the European Central Bank and the Bank of England through its Funding for Lending Scheme.

The reuse of collateral may alleviate the pressure on high quality collateral. Indeed if the collateral is reused once, EUR 100bn of assets can be used to collateralize EUR 200bn of transactions, reducing pressure on the supply of collateral. However, increased reuse would require i) transparent procedures to ensure that investors are protected and ii) that higher reuse does not increase interconnectedness significantly in the financial system. Recent estimates provided by Singh (2012)[12] indicate that collateral reuse declined from 3 to 2.5 between 2007 and 2011. Should this trend continue, an increase in reuse would not be expected in the forthcoming years.

Conclusion

Based on the estimates of collateral supply and demand in the EU, it appears that there is no shortage of collateral but rather relative collateral scarcity. In view of the potential financial stability risks linked to relative collateral scarcity, the availability and use of collateral needs to be monitored. The availability of collateral will thus remain a concern for a while. ESMA will continue to monitor key indicators in the Risk section of forthcoming Trends, Risks, and Vulnerabilities reports. The issue of collateral can be seen as a consequence of the sharp decline in unsecured markets linked to the lack of confidence in the financial system. Looking ahead, one challenge is to disentangle the increase in demand for collateral due to structural factors such as the regulation of OTC derivatives and Basel III and potential cyclical factors such as the rise in risk perception and the collapse of unsecured markets.

[11] See also the speech by Benoît Coeuré, Member of the ECB Executive Board, "Collateral scarcity – a gone or going concern?", 1 October 2012.

[12] Singh, M. (2012), "The (Other) Deleveraging", IMF working paper No. 12/179.

Hedge funds and prime brokers — systemic risk implications

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Hedge funds, prime brokers and their funding counterparties in repo markets provide an alternative to financial intermediation through traditional banking. In times of distressed financial markets, this alternative may be vulnerable to substantive price movements in the assets pledged as collateral, because prime brokers could start to hoard collateral and thus diminish the flow of intermediated funds. This could jeopardise hedge funds' liquidity; margins may tend to rise reducing the ability to raise liquid funds, making hedge funds more likely to be forced into fire sales of assets. In such a scenario, asset prices would experience downward pressure, and haircuts and margin calls could squeeze additional liquidity out of the hedge fund sector. Prime brokers may respond to this by hoarding more collateral, and at some point by sharply reducing the supply of collateral to the repo market. This would negatively impact repo market volumes, reducing liquidity and increasing the risk of an eventual market shut down. One important source of funding for the alternative financial intermediation chain could thus be severely impaired. In addition, such effect may spread to other repo market participants. Furthermore, the negative repercussions on prime brokers' main business could feed back into the banking system and contribute to its systemic vulnerability.

During the recent financial crisis two phenomena related to hedge funds and shadow banking have appeared as prominent features. First, funds left the hedge fund sector on a major scale (Figure V.01), and second, the market for secured funding, and in particular the repo market, experienced a strong decline in the supply of collateral. Both events raised concerns about the systemic stability of the hedge fund sector and the shadow banking system in general.

The analysis of the interdependence between the core of the hedge fund sector and the prime broker industry to be provided below illuminates those events and addresses the relevance of concerns over potential systemic vulnerability. Based on results derived from an econometric model, it illuminates mechanisms for potential risk transmission between the two sectors and contributes thereby to a functional understanding of potential vulnerabilities.

An alternative chain of financial intermediation

Hedge funds and prime brokers (Box V.02) together form an important chain of financial intermediation. They thus provide one of the alternatives to the traditional banking system often discussed under the term shadow banking. This particular funding chain mainly intermediates secured loans: hedge funds obtain cash loans from prime brokers and, in exchange, provide some of their previously acquired, relatively illiquid assets (or their securitized equivalent) as collateral. Prime brokers reuse that collateral in order to enter into repo contracts and to secure their own refinancing opportunities in money markets. To this purpose prime brokers engage mainly in overnight borrowing on repo markets, while they extend term lending to hedge funds. The latter provide long-term financing by engaging in long-term asset markets or extending loans with longer maturities. Hence, this form of financial intermediation provides both maturity transformation and risk transformation. Nevertheless, this specific form of intermediation differs from the usual one-way street within the banking world insofar as assets flow in two different directions. On the one hand, cash liquidity flows from the repo markets via prime brokers to hedge funds. On the other hand, securitized collateral liquidity flows from hedge funds to prime brokers and further on to the repo markets. In this way, hedge funds contribute substantially to the supply of collateral to repo markets.[1]

Note: Aggregated assets under management for the biggest 306 hedge funds identified as of 31.12.2011, USD bn.
Sources: TASS, HFR, Eurekahedge, Barclayshedge, ESMA.

Stability issues

The concerns about the vulnerability of this intermediation chain reflect on its very distinctive feature: the use of secured funding. Any threat to the collateral backing the credit volume extended generates a systemic risk to the entire system in the form of rising margins and collateral requests for the case of any wide-spread materialization. It thus increases the likelihood of fire sales and the associated perpetuation of decreases in asset prices.[2] In such a case, the core risks consist of potentially rising haircuts that would prevent the use of collateral for prime brokers' refinancing, the resulting danger of runs on prime brokers by repo lenders and hedge fund clients, and finally, runs on hedge funds themselves by their shareholders.[3]

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1 Singh, M. and Aitken, J. (2010): "The sizeable role of rehypothecation in the shadow banking system", IMF working paper No. 10/172.

2 Kamhbu, J., Schuermann, T. and Stiroh, K. J. (2007): "Hedge funds, financial intermediation and systemic risk", Economic Policy Review, Federal Reserve Board New York, 1-18.

3 The dangers mentioned above are discussed in more detail in the following contributions: Gorton, G. and Metrick, A. (2012): "Securitized banking and the run on repo", Journal of Financial

Two types of institutions: hedge funds and prime brokers V.08

Hedge funds are investment vehicles that pursue absolute returns on their investments. They potentially invest into a broad range of financial assets and follow multiple investment strategies. Frequently, minimal investment requirements and restrictions apply to the eligibility of investors as well as to entry and exit conditions. In the EU hedge funds are currently only regulated if they qualify as mutual investment funds. However, as from 2013 the provisions of the Directive on Alternative Investment Fund Managers will apply to all hedge funds.

Prime brokers offer specialized services to large institutional investors. These services typically include securities lending, centralized securities clearing, custody services and cash management. Usually the services are provided by specialized subunits of investment banks or securities firms. Prime brokers generate their profits mainly by charging spreads on the costs and returns of the volumes which they administer on behalf of their clients.

Stability issues surrounding the relations between hedge funds and prime brokers

While vulnerabilities in the stability of the relationship between hedge funds and prime brokers can be evaluated in various ways, the use of a VEC model (Box V.03) enables an econometric analysis with the potential to identify the dynamics in the interactions of both market segments. This is of particular interest, because both market segments react to each other with a potential delay and adjust their behaviour in response to changing external conditions. Hence, the method employed for the generation of the empirical results delivers insights into the build-up of stress within this particular financial intermediation chain over time. In addition, the stress resolution mechanisms become apparent as well. To keep the readability of the current contribution at a maximum, all formal results are discarded and only the main qualitative results reported. The five main results of the model are discussed below.

1) In periods with no stress in financial markets, hedge funds and prime brokers act as complementary trading partners.

For both parties the excess returns they receive on the characteristic features of their business activities, i.e. the provision of prime brokerage services and the investment into potentially illiquid assets, are driven in the long run by the funding volumes intermediated by prime brokers. The excess return for prime brokers increases with the rise of their lending activities. Hedge funds earn higher returns attributable to portfolio illiquidity whenever prime brokers take additional risky securities onto their balance sheets and increase their financing on overnight repo markets. Hence increasing intermediation volumes tend to benefit both types of institution. The degree of the hedge fund sector's competition for prime broker loans determines allocation of the additional business profits between the two parties.

A Vector Error Correction (VEC) model for hedge funds and prime brokers[4] V.09

The econometric analysis employs five endogenous variables (denoted vector x) to depict the relation between hedge funds and prime brokers. First, the illiquidity premium of the 306 biggest global hedge funds is constructed as the residual of a univariate regression of their average monthly return on five asset-based strategy factors[5] and the negative portion of the global MSCI equity index[6]. Second, prime brokers' excess return is the residual of regressing growth in the average stock return index for the set of prime brokers that maintain relations with the 306 biggest global hedge funds on the Datastream global banking index as a measure of banking sectors' returns. The three other variables are overnight repo financing, term lending and the net holdings of securities by prime brokers taken from the FRBNY's prime dealer database. To explain exogenous factors (denoted as vector y) the following factors are employed: the monthly growth in the S&P Case-Shiller index for the top 20 US metropolitan areas, the fraction of annual growth in the same variable not explained by its monthly growth rate, Barclays's global aggregate bond index, the prices of gold and oil, the EUR/USD exchange rate, monthly growth in the TED spread and the risk spread between Moody's Baa yield and the 10Y US government bond. Finally a binary blip variable, which takes the value 1 (-1) for all periods in which the aggregated variance of the endogenous variables enters (leaves) the highest two decentiles of its distribution, and 0 otherwise, is employed as an instrument for the beginning and end of periods with stress in financial markets. All data is monthly and the sample comprises observations between July 2001 and December 2011. The set of data sources consists of TASS, Eureka, HFR, Barclayhedge, Bloomberg, Datastream, the Federal Reserve Bank of New York, Barclays, Moody's, Standard & Poors, the British Bankers' Association, Datastream, the website of Davis Hsieh and MSCI.

Since several endogenous variables are non-stationary, a vector error correction (VEC) model with the form

$$\Delta x_t = \alpha\beta x_{t-1} + \sum_{i=1}^{2} \gamma_i \Delta x_{t-i} + \delta y_t + \varepsilon_t$$

is employed. The optimal model is selected from a set of 60 potential configurations using criteria including tests for cointegration (trace statistic, maximal eigenvalue, AIC), the average adjusted R^2 of the model and test statistics for the autocorrelation, heteroscedasticity and normality of residuals. In addition, lag exclusion and structural break tests are employed. Based on those tests a model with two lags and two cointegration vectors (column (row) dimension of α (β)) including constants is chosen. For this model the residuals (ε) still feature heteroscedasticity as well as an elevated kurtosis. Visual data inspection traces this back to the data volatility in 07-08. Hence these features are accepted, but accounted for by discarding all estimators not meeting the 5% significance level. Finally, all results have been reproduced in a series of robustness checks for models with differing cointegration specifications, for a hedge fund illiquidity premium constructed on the base of asset weights, for a hedge fund illiquidity premium created by applying the filtering method at the individual fund level, for potentially omitted exogenous variables and for a smaller subset of funds. These modifications neither improved the fit of the model, nor did they change the qualitative results substantially. This was interpreted as endorsing the model type originally identified.

2) In the short run, excess returns on prime brokerage and hedge fund illiquidity are determined mainly by asset and commodity prices and perceived risks.

In general, the excess returns for prime brokers and hedge funds are squeezed by rising asset or commodity prices. Increases in asset prices push up returns for the banking sector and therefore tend to reduce prime brokers' excess returns, while escalating commodity prices, as the drivers for hedge funds' returns stemming from liquid markets, diminish the proportion of hedge funds' returns generated by the illiquid features of their portfolios. A notable exception is the trend in real estate prices, to which both excess returns and prime brokers' lending and refinancing volumes react positively. This illustrates that holding

Economics, 104, 425-451. Brunnermeier M.K. (2009): "Deciphering the 2007-2008 liquidity and credit crunch", Journal of Economic Perspectives, Vol. 23, 2201-2238.

4 The box describes the model presented in Hespeler, F. and Witt, C. (2012): "The systemic dimension of hedge fund illiquidity and prime brokerage", mimeo. The full paper will be forthcoming in the ESMA Working Paper Series in the near future.

5 Fung, W. and Hsieh, D.A. (2001): "The risk in hedge fund strategies: Theory and evidence from trend followers", Review of Financial Studies, Vol. 10, 313-302.

6 Ang, A., Gorovyy S. and van Imwegen, G. B. (2011): "Hedge fund leverage", Journal of Financial Economics, Vol. 102, 102-126.

illiquid real-estate assets is an important means of reaping high yields for the hedge fund sector, while prime brokers engage in the associated securitisation process needed to refinance those assets. With respect to risks, changes in the default risk of corporate bonds act as an incentive for prime brokers to hold more securities, while the associated asset price reactions impact negatively on hedge funds' illiquidity premia. In addition it should be noted that the excess returns on prime brokerage are particularly persistent over time.

3) A high level of stress in financial markets tends to impair the intermediation chain formed by hedge funds and prime brokers, since prime brokers start to hoard liquid securities.

In the short run, entering a period of high market stress, which is indicated by a sudden increase in the volatilities of the observed variables, impacts hedge funds and prime brokers quite similarly. In both cases, the suppliers of their respective funding ask for higher compensation. Hence the excess returns on prime brokerage are reduced as a result of higher refinancing costs, while hedge funds' illiquidity premia, which are a component of shareholders' compensation, increase. At the same time, prime brokers ramp up their outright securities holdings and their financing volumes on repo markets but do not adjust their lending volumes. They thus start to hoard securities. This reaction is an attempt to hold down refinancing costs and prevent potential runs by their hedge fund clients who, due to prime brokers' heightened refinancing risks, have an incentive to recuperate the collateral they posted.[7] Prime brokers therefore impede the refinancing opportunities and flow of liquidity to hedge funds.

4) An interruption in the financial intermediation chain formed by hedge funds and prime brokers may force hedge funds to deleverage.

According to the empirical results, hedge funds would react to the curtailment of their refinancing opportunities by deleveraging. This would happen most likely if they were faced with additional need for liquidity and could not issue new shares at very short notice. The negative price effects associated with the deleveraging process would lower the value of the collateral posted and eventually trigger a sequence of margin calls and haircuts that aggravate the initial stress. Potentially the system could enter into a vicious cycle completely interrupting intermediation through prime brokers.

5) The burden of adverse shocks on hedge funds' illiquidity premia, on prime brokers' refinancing volumes in repo markets and on outright holdings by brokers erodes the profitability of hedge funds more strongly than the one of prime brokers.

Unexpected adverse shocks to prime brokers' net positions in securities tend to reduce either their lending or their financing volumes, depending on whether the shock refers more to the conditions in the market for collateralized funding or to the conditions in repo markets. In the first case the reduced supply of collateral by hedge funds automatically would reduce lending. In the second case the reduced supply of funds could force prime brokers to scale back their lending. Both cases would hamper the refinancing of illiquid assets by hedge funds. Accordingly, their illiquidity premia also would fall. On the other hand, prime brokers' excess returns are relatively robust over time and hardly affected by these types of shock in the short run. Similarly, a direct shock to hedge funds' illiquidity premia would have little impact on short-term excess returns for prime brokers. But doubts about the solvency of hedge funds may prompt prime brokers to scale down their lending volumes. They would rebalance their balance sheets by increasing their security holdings and, in the longer run, by reducing their refinancing volumes. Competition for prime broker loans would rise, enabling brokers to pass on the adverse effects on excess returns to hedge funds. A negative shock to prime brokers' refinancing opportunities would force them to reduce their lending and may create an incentive to buffer the contraction in lending by holding the pledged securities outright as long as they still have spare liquidity. Again, prime brokers can employ competitive pressure to pass on possible negative repercussions on their excess returns to hedge funds.

Summarizing the findings, it appears that in periods of financial stress a well-functioning financial intermediation chain built on secured lending is exposed to the risk of a shortage of collateral. If this risk materialises, the final lender in the intermediation chain, i.e. hedge funds, would be forced into deleveraging. This would impair the value of their own assets as well as the collateral already posted with prime brokers or transferred to borrowers in the repo markets. In addition, in the event that materialisation of the risk is triggered by a shock to either the illiquidity of hedge funds, the repo markets or to the risk buffer held by prime brokers in the form of outright securities, the major part of the costs of the materialized risk would have to be borne by the hedge fund industry.

Conclusions

Within the financial intermediation chain formed by hedge funds, prime brokers and their funding partners in repo markets, the central vulnerability turns out to be connected to the value of the posted collateral which takes mainly the form of assets pledged by hedge funds. According to the empirical results presented, any materialising threat to the value of those assets could force prime brokers into hoarding collateral as a risk buffer against potential runs by either hedge funds or repo counterparties. In this case, prime brokers would increase the scarcity of collateral and eventual force hedge fund into fire sales. Asset prices would stumble triggering a series of haircuts and margin calls, and this could squeeze additional liquidity out of the hedge fund sector. In response prime brokers might intensify their collateral hoarding and reduce their supply of collateral to repo markets. Consequently repo markets could be less liquid and the original source of funding for

[7] This point is also discussed in Singh M. and Aiken, J. (2009): "Deleveraging after Lehman – some evidence from rehypothecation", IMF working paper No. 09/42.

the financial intermediation chain might be severely reduced.

In addition to this functional vulnerability, a couple of other minor risks should be pointed out. The considerable sensitivity of both prime brokers and hedge funds to trends in house prices indicates that any trend reversal in booming real estate markets has the potential to destabilise hedge funds' excess profitability and set in motion adverse systemic effects within this particular chain of financial intermediation. Furthermore, the fact that prime brokers are closely related to systemically important banks implies that any vulnerability within this part of the shadow banking system also imposes a risk on the traditional banking system. The two systems can thus hardly be seen as substitutes with one able to buffer disruptions in the other.


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