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INVESTMENTS**

## Core Matter

# A Deeper Look into Financial Vulnerabilities

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- Almost ten years of record low interest rates have raised leverage in the non-financial sector as well as investors' tolerance for riskier and less liquid instruments. As a result, the average quality of corporate debt has worsened.
- Credit risk has shifted away from banks to asset managers. Mutual funds' exposure to lower quality debt has climbed, raising the risk of fire sales in case of rating downgrades; additionally, their asset-liabilities liquidity mismatch has widened.
- At the same time, Private Equity fund managers have fast increased their exposure to direct lending, by sharing credit and illiquidity risks with final investors. Asset managers have then become important players the credit arena and analyzing their behavior can provide early signals of asset price moves.
- As the cycle turns, the very high share of outstanding securities at risk of turning in to High Yields in case of a downgrade could become problematic. Anticipating rating changes using market-based signals will become even more useful.
- Tail risks for Financials have decreased, but the low interest rate environment has exacerbated poor profitability.

The almost decade-long period of low interest rates has triggered a sharp change in the behavior of economic agents, with investors struggling to get decent returns on low-risk assets. Nonbank financial intermediaries have increased their tolerance for credit and illiquidity risk (see Appendix A). Non-financial corporations have taken advantage of the situation, markedly stepping up borrowing, often to increase stock buybacks. This has made nonfinancial corporates' balance sheets more vulnerable. As the cycle turns, these fragilities are becoming more evident.

Overall the situation does not appear as precarious as it was (in hindsight) in 2007. But financial history has taught that it is virtually impossible to say what will trigger the next crisis and when it will happen.

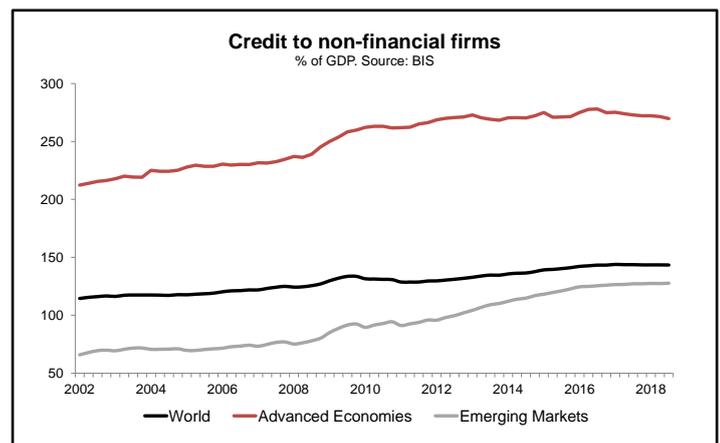
In this Core Matter we flag some of the areas of vulnerability originated by post-crisis "unhealthy" behaviors, which might turn the deceleration of the world economy we project for the next couple of years into a sharper and more prolonged slowdown, mostly by reducing credit flows. We also touch upon the surge in public debt (with a focus on the Italian fiscal situation) and the implications of low-for-longer bond yields for insurers and banks. We conclude with a few investment implications. In Appendix B we present a new tool designed to track financial market vulnerabilities in the euro area.

### Corporate debt: bigger and lower-quality

Leverage has soared in the last decade, and it is important to notice where this increase took place. Tighter regulations led to a sharp reduction of leverage by banks and house-

holds generally reduced their liabilities. The increase in government debt, triggered by the strong anticyclical policies in the immediate aftermath of the crisis, was not reversed in the following years. Quite the opposite: the recent fiscal expansion implemented by the US government, if not offset, will lead to a ballooning federal debt.

From a financial stability perspective, what probably matters the most, however, is the steady accumulation of liabilities by the private non-financial sector. According to data compiled by the Bank for International Settlements (BIS) credit to non-financial firms, as a share of world GDP, has gone up by nearly 20 pp since the beginning of the crisis.



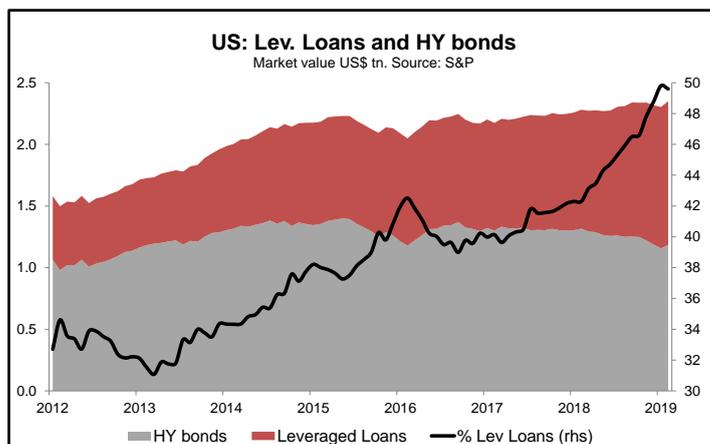
Much of the increase took place in China and other Emerging Markets, but the US situation is worth a closer look.

In its latest **Financial Stability Report**, the Federal Reserve highlight that corporate debt growth has outpaced GDP growth for the past ten years. According to BIS data, total debt by US non financial corporations reached 74.4% of GDP at the end of 2018, more than 2 pp above the pre crisis peak hit in 2008. Moreover, debt growth has been particularly strong among the riskiest borrowers, as a consequence of a loosening in lending standards.

As emphasized by the IMF in its **April 2019 Global Financial Stability Report**, the prolonged period of strong profitability (which has probably peaked) and low borrowing costs have enhanced debt servicing capability. This will help cope with a moderate downturn in growth and tightening financial conditions. However, the record high level of leverage can quickly become a problem in case of more severe stress.

Only 10% of new corporate debt issuances are purchased by banks. Strong demand by non-bank intermediaries, fueled by the search for decent returns, has allowed less secure borrowers to tap the bond market. In advanced economies, the share of BBB rated securities in bond indices has soared to just above one half of all the outstanding. In particular BBB-rated securities amount to 52% of those in the EUR IG Iboxx index; 11% are rated BBB-.

Leveraged loans make a particularly relevant case. Those are loans extended to firms which either are already highly indebted or have a thin credit record. This market has increased fast, especially in the US, where it now compares in size with that of HY bonds.



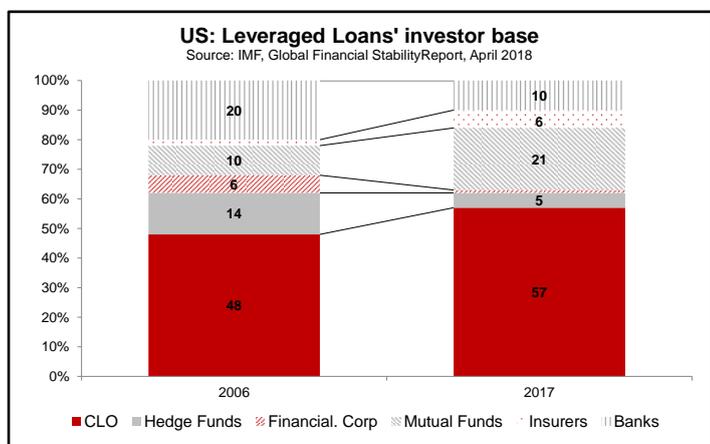
At the same time, as happened to corporate bonds, the protection offered to lenders has declined. As of end-2018 nearly 80% of all leveraged loans were Covenant-Lite, i.e. put very few constraints on the borrower in terms of collateral, debt service capability and repayment terms. That share was just above 20% in 2013.

The investor base has changed too. Banks can keep much less of these loans on their balance sheets. Therefore, the share sold to investors like mutual funds or securitized into Collateralized Loans Obligations (CLO) has increased markedly; according to Fed's data, CLOs fund more than 50% of outstanding Leveraged Loans in the US. Two thirds of CLOs are owned by non-bank institutions.

Data collected by the Bank of England show that US banks and insurers hold one third of outstanding leverage loans. The corresponding figure for the EU is less than 15%.

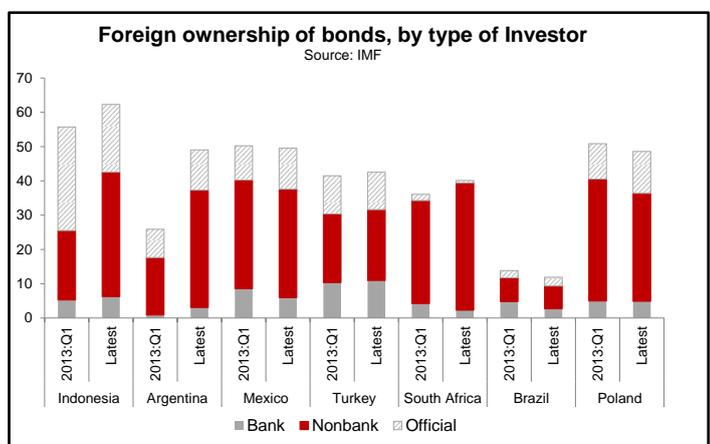
The regulation-induced withdrawal of banks from bond trading has reduced their market making capability. Inventories of corporate debt held by bank-affiliated broker-dealers declined in the US from \$29.2 billion at the end of 2013 to \$14.2 billion at the end of 2018, while the total corporate bond market increased by 36 percent.

This and the rapid growth in BBB and lower-rated securities issuance could have severe implications in case of an economic downturn and credit quality deterioration. Credit spreads might widen more significantly, and possibly with more volatility, than they have done in the past.



Turning to Emerging Markets (EMs), the vulnerability of debt to foreign exchange mismatch is less of an issue than in the past, according to the IMF.

While the incidence of foreign ownership (an indication of vulnerability to changes in market sentiment) has remained broadly stable over the last five years, its composition has changed significantly. In several large EMs, ownership by non-bank entities has increased a lot. The IMF reports that some big bond funds have an increasingly concentrated exposure to sovereign debt issued by large EMs which recently experienced turbulence, like Brazil and Mexico.

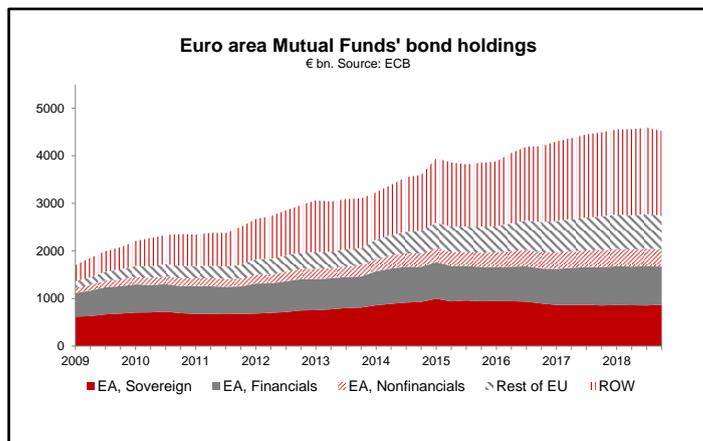


### Who owns what increasingly matters

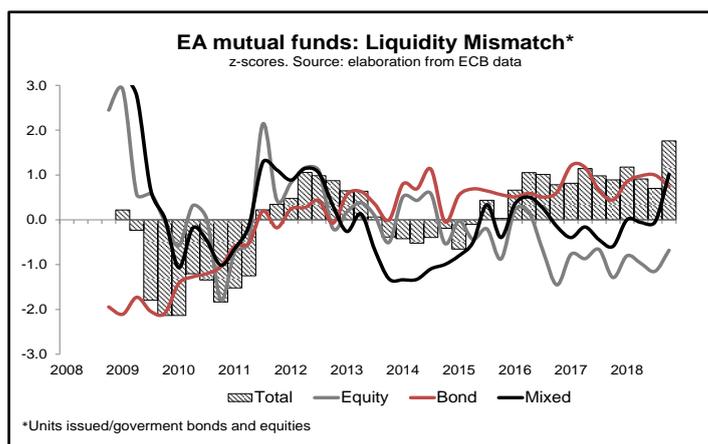
This leads to a second source of vulnerability, linked to asset managers and large investors. The search for yield is having a big impact on non-bank intermediaries' balance sheets, especially those of mutual funds, which in the euro area account for 20% of the financial assets held by the whole system. Vulnerability can take three forms:

1) First, the liability side of these institutions is mostly composed by units that investor can redeem at very short notice. Any **liquidity mismatch** with the asset side can therefore become a problem; a wave of withdrawals may trigger a forced sale, with low market liquidity potentially exacerbating the negative price impact.

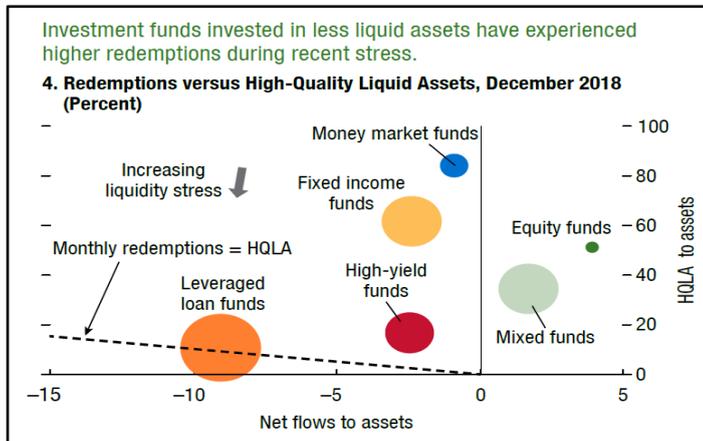
The composition of the asset side of euro area funds has changed a lot: the incidence of corporate and non-European debt has increased markedly, making those institutions potentially more vulnerable to changes in the economic outlook and/or market sentiment.



Therefore, the share of liquid assets (like advanced economies' sovereign bonds and equities) has decreased; looking at data provided by the ECB, it appears that the degree of mismatch between units sold to clients and less liquid assets (a quick proxy for imbalances) has reached historically high levels, especially for those entities more exposed to fixed income.



Low liquidity can become a problem in case of large withdrawals, which may become common when the turn of the cycle increases market volatility. In its latest [Global Financial Stability Report](#) (chapter 1, page 7), the IMF shows that, during the December 2018 turmoil, funds largely exposed to lower quality and less liquid assets experienced substantial net outflows, especially in the US.



Source: IMF, April 2019 Global Financial Stability Report. The size of the bubble indicates the dispersion of the outflows within the fund class. Based on the 50 largest global funds for each class.

Recently illiquidity problems emerged in for two large mutual funds. In early June a rather large (around € 4 bn) UK fund was suspended as the speed of redemption after a long period of underperformance could no longer be matched by asset sales. Moreover, in mid June, Morningstar suspended the rating of a €2.2 bn euro area fund over concerns about the “liquidity and appropriateness” of some corporate bond holdings.

The Financial Conduct Authority (FCA), the UK financial service regulator, has launched a report on the investment on illiquid asset by open ended funds, whose results should be published by the end of the summer.

In the consultation document which started the inquiry, FCA made three main suggestions:

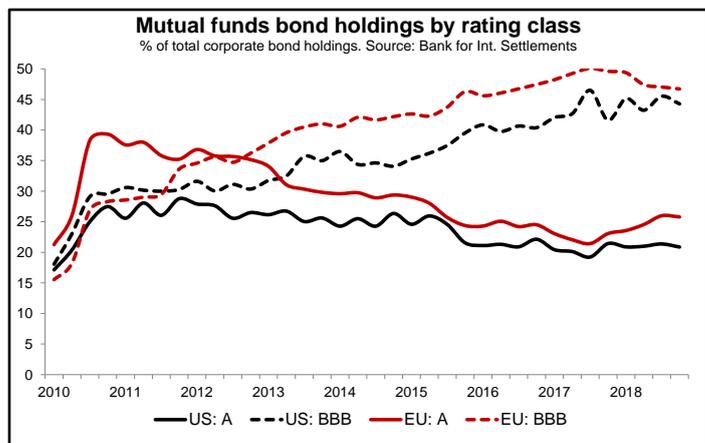
- Funds investing in in real estate and other illiquid assets should suspend trading if there is “material uncertainty” about the valuation of at least 20% of its investments.
- Fund managers should draw up “contingency plans” to help deal with liquidity risks
- Funds should disclose more information about the size of the liquidity risk, what tools are available to manage it and what would be the impact on retail investors should these tools be used.

2) Second, the increase in **BBB bonds** outstanding has affected mutual funds holdings. BIS data show that BBB-rated securities now account for nearly one half of the corporate bonds owned by Euro area mutual funds; that share was below 20% in 2010.

Several funds have rating-based mandates, which impose strict constraints to the quality of securities they can hold.

A wave of downgrades could then force funds to sell quickly a substantial share of their bond holdings, accelerating the negative price affect.

In its March 2019 Quarterly Report, the BIS wrote: “In 2009, when default rates reached record highs, the frequency of downgrades [from BBB to junk] was 11.4% in the United States and 16.3% in Europe. By 2017, this frequency had fallen to around 7% in both regions. Under reasonable assumptions, a return to 2009 downgrade rates could force portfolio rebalancing in excess of daily turnover in corporate bond markets.”



The potential price impact is amplified by the fact that mutual funds have become a much bigger player in the market for corporate bonds. ECB data show that mutual funds and central banks have basically been the only net buyers of nonfinancial corporate debt in the last two years.

Recent [research](#) by the Bank of France on a sample of French mutual funds shows that flows have a non negligible impact on bond prices and that outflows have a greater impact on yields than inflows. A 1% increase in funds' ownership of a bond reduces its yield-to-maturity by 7 bps whereas a 1% outflow raises it by 17 bps.

3) Third, a higher concentration of instruments in the hands of intermediaries more prone to cyclical behavior can have a big impact on prices via **herding**.

This applies also to ETFs, which offer liquidity on a daily basis; the IMF estimates that High Yield and EM bond ETF assets account for less than 5 percent of the total market value of underlying bond markets, but it more than tripled from 2010 to 2018.

The problem is not, however, confined to mutual funds or ETFs as the rest of asset managers have also been hunting for higher yields.

Considering ownership by individual instruments, the ECB shows a high degree of similarity in asset holdings across non-bank institutional investors. For example, investment funds invest 83% of their portfolios in securities also held by insurers.

**Overlapping holdings (% of total holdings)**

	Banks	Inv. funds	Insurers	Pens. Funds
Banks		62	58	52
Inv. Funds	77		83	78
Insurers	65	70		74
Pension Funds	37	77	74	

Source: ECB, data as of Q2 2018

A high degree of portfolio overlap, especially as long as relatively illiquid securities are concerned, can propagate and magnify the price effect of fire sales by an intermediary (e.g. a big investment fund hit by a surge in redemptions).

**Listed Private Equity funds as shadow banks**

Private Equity Fund managers (PE) are one of the main components of shadow banking in developed markets.

While traditionally focusing on Private Equity and Real Assets, such as Real Estate and Infrastructure, PE managers have recently increased their exposure to Private Credit.

This is done either by moving down the capital structure of their Private Equity holdings, mainly through Leveraged Loans or CLOs, or by offering direct credit to Middle Market companies, often replacing bank lending, or by purchasing back books from insurance companies.

The PE business model is based on taking direct exposure of at least 20% to the underlying AUM. The balance is subscribed by Private Equity/Debt Fund Investors. Exposures are illiquid, often leveraged, and concentrated in some areas of non-financial corporate credit. This makes them a possible source of financial vulnerabilities.

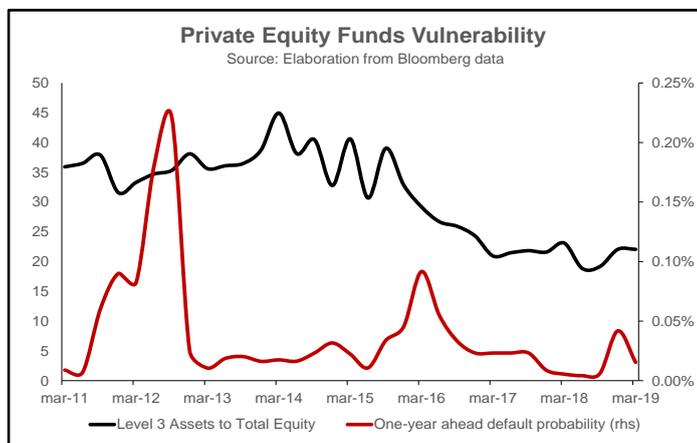
At the end of 2018, the eight largest listed PE managers had an AUM of more than \$ 600 bn in credit-related assets (leverage loans and private debt); this compares with a total Leveraged Loans + Private Credit universe estimated by the Banks of England in \$ 2.2 trn. The average exposure to Private Credit is 45% of total assets, and is growing fast (the average 5-year Compounded Annual Rate of this asset class is more than 15%). Most of these holdings relate to the US market. The European market is much smaller (around 15% of the US one), and mostly concentrated in the UK.

Name	Market Cap (\$ bn)	Tot. Assets (\$ bn)	AUM (\$ bn)	Private Equity AUM (\$ bn)	Real Assets AUM (\$ bn)	M.FundsH. Funds AUM (\$ bn)	Credit AUM (\$ bn)	Credit AUM (%)	Credit AUM Growth (2013-18 avg.)
Brookfield (CA)	45.9	256.3	342.0	42.0	296.0	4.0	4.0	1.2%	(*)
Blackstone (US)	43.5	28.9	472.2	130.0	136.0	77.8	127.5	27.0%	19.2%
KKR (US)	19.5	50.7	194.7	70.0	49.0	29.0	87.0	44.7%	28.3%
Apollo (US)	12.1	6.0	280.3	69.0	18.0		193.2	68.9%	20.9%
Oaktree (US)	7.9	10.4	119.6	16.9	12.0		66.5	55.6%	2.8%
Carlyle (US)	6.6	12.9	216.5	81.0	46.0	46.0	44.0	20.3%	4.7%
Ares (US)	5.2	10.2	130.7	23.5	11.3		95.5	73.1%	14.9%
Basket Total	140.7	375.4	1755.9	432.4	568.3	152.8	617.7	35.2%	15.2%

(\*) Brookfield has a long term target of Credit AUM of \$ 100. Last March, it has acquired 62% of Oaktree Capital.

Source: company reports

For each of these eight entities, we computed two indicators of financial fragility, the implied probability of default within one year (Marginal Probability of Default, MPD, sourced in Bloomberg) and the evolution of Level 3 Assets (i.e. very illiquid and whose fair value cannot be readily determined by input prices) over equity. The chart below shows their equally-weighted average.



In general, the Listed PE managers we consider show a higher level of vulnerability, measured both by the MPD and by Level 3 assets as compared to other financial institutions the current level of MPD compares with that of Deutsche and Commerzbank, which are considered to be among the

most distressed large players in the financials' universe. The recent dynamics appears relatively benign, but looking at the 2012 and 2016 experiences it is evident how quickly the situation can deteriorate in case of turbulence. Thankfully the share of very illiquid asset is trending down, and this may mitigate the impact of a crisis on these intermediaries. Further, even if their business entails high credit and illiquidity risk, their main reliance on Private Debt funding vehicles (whose maturity range between 5 to 7 years), which lock in investor capital until fund maturity, implies negligible ALM imbalances if compared to other types of shadow banking.

### The surge in government debt

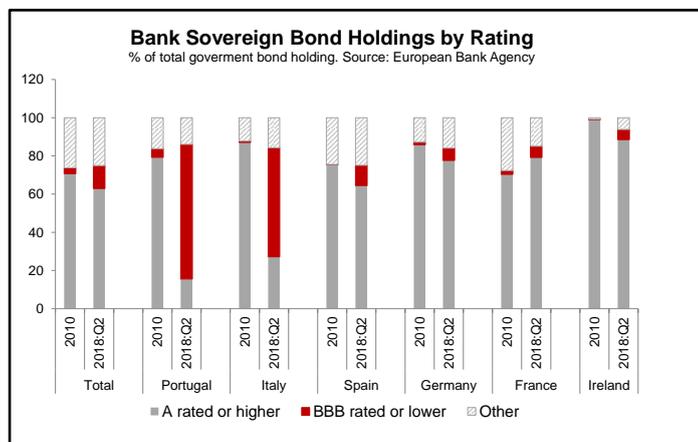
Another legacy of the crisis was the sharp increase in government debt as a result of the countercyclical fiscal policies put in place in 2009-2010. On top of that, the large unfunded tax cuts enacted by the Trump administration in 2017 are expected, according to the Congressional Budget Office, to lift US government debt to 93% of GDP in the next decade, from the current 77%. It stood at 40% at the end of 2008.

Rising debt for large countries like the US and Japan (where government debt is approaching 240% of GDP) does not appear at the moment a big concern for financial stability. First, these countries issue debt denominated in their own currency, which improves sustainability. Second, the increased demand for low-risk assets observed since the crises, as a result of higher risk aversion and tighter regulation, has so far ensured that new issuances are received smoothly by financial markets.

The situation appears different in some euro area countries. First of all, the downgrades that hit peripheral countries has led to wide differences in rating across countries. Germany and other Nordic countries retain top notch ratings, while Italy and Portugal stand at BBB, the second lowest tier in the Investment Grade segment. Therefore, these countries are in theory much more exposed to funding difficulties in case of a downgrade, although we believe that rating agencies would need very strong evidence before taking out the investment grade status to a euro area country. Moreover, the recent dovish twist by the ECB will further ease the pressure on yields.

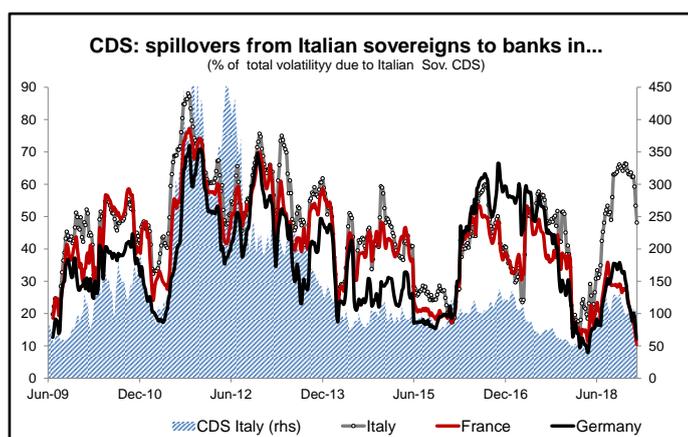
A second asymmetry relates the large exposure the banking sector has to domestic sovereign bonds, and the resulting risk of a "doom loop" between banks and sovereigns. Banks' exposure to sovereign debt has decreased in several countries, with the notable exception of Italy. There, at the end of 2018 euro sovereign bonds constituted 12% of banks' total assets, slightly above the peak reached in 2016. Banks in other peripheral countries, like Spain, still have quite a large exposure (just below 10%) to sovereigns, whereas in Germany and France it is lower than 3%.

Additionally, due in part to the large home bias in sovereign bond holdings, the exposure of selected euro area banks to BBB-rated bonds has increased since 2010. This makes credit institutions (especially in Italy and Portugal) potentially more exposed to mark-to-market losses, in case troubles stemming from a worsening in the fiscal outlook in a country spread to the broader BBB space.



Against this background, the renewed tensions on Italy's fiscal sustainability have so far resulted in relatively limited spillovers from higher BTP and Italian CDS spreads to the rest of the euro area financial sector. Using a recently developed statistical methodology, the Diebold-Yilmaz spillover index, it is possible to compute how much the volatility in Italy's sovereign CDS contributed to that of euro area banks'.

Looking at the biggest euro area banks, it seems that the problem is limited to Italian entities. At the peak of the tension on the draft of the 2019 budget, in Q4 2018, BTPs accounted for around 30% of the volatility in German and French banks' CDS, down from the over 70% seen during 2010/11 crisis. Yet this share shot up to above 60% for Italian institutions.



The poor growth outlook for Italy (we expect GDP to stay flat in 2019), the large unfunded increase in expenditure enacted by the government and the decision to reverse part of the pension reforms create new risks. Moreover, the current tensions within the EU may complicate a stronger economic policy coordination (for example, pro-growth reforms in Italy in exchange of more risk sharing on debt), which would help reduce vulnerabilities.

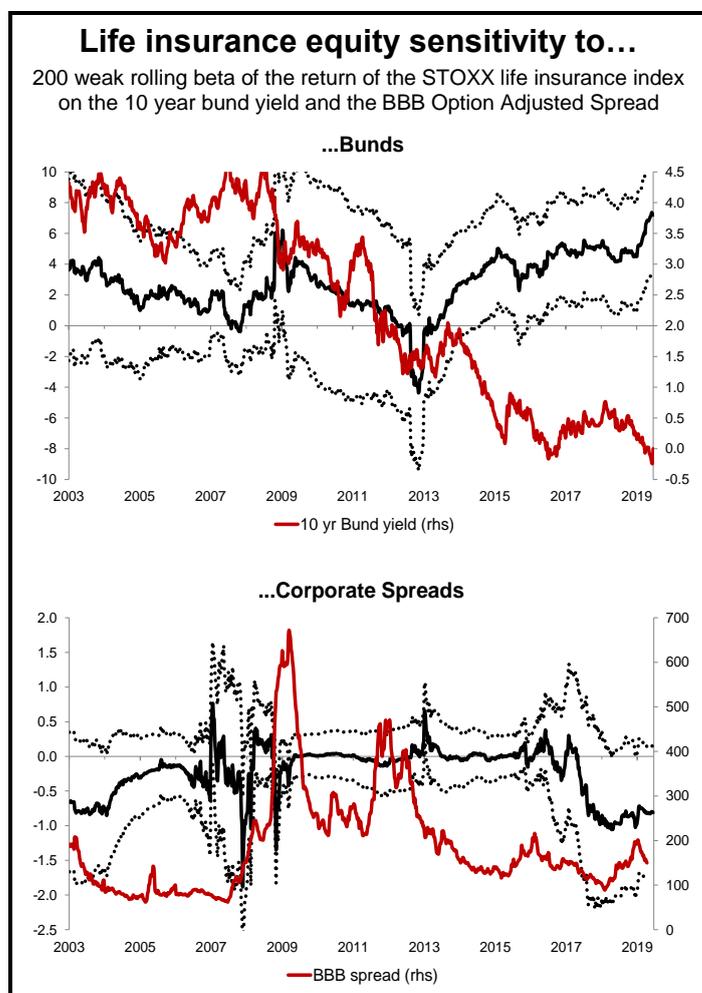
While a crisis akin to 2011 remains a tail risk, a major turbulence may still spill over to other large European countries; the French financial system holds Italian assets worth 14% of French GDP. The figure for Germany is much lower (3.1%).

## The impact of low for longer rates on insurers

The sharp downturn in Bund yields raised again concerns on the impact of a protracted period of low yields on the profitability and capital position of euro area life insurers. Low yields may make it more difficult to deliver the guaranteed returns embedded in traditional policies. The negative impact from the duration mismatch between assets and liabilities appears to be lower, as Solvency II is forcing companies to close this gap.

Our outlook for bund yields does not see any increase from the current depressed level, with a downside risk due to still anemic inflation and uncertain growth making the prospects of another round of asset purchases by the ECB likely. The pressure on life insurers' balance sheet from low yield is mitigated by a more prudent duration management, but at the same time higher exposure to corporate bonds have increased the risks from a surge in credit spreads.

The increasing impact of low risk free rates and wider corporate spreads on profitability and ultimately capital positions has been duly noticed by financial markets; euro area life insurance equity has become increasingly sensitive to Bund yields, especially since the ECB embarked on its QE programs, and to corporate spreads, as shown by the charts below.



The results of the December 2018 stress test exercise on the 42 largest European insurance groups help shed light on how strong the pressure from lower yields may be. In a scenario characterized by low growth, a flattening of the yield curve (10 year swap down by 80 bps and 1 year swap

down by 11 bps since end of 2017), and higher longevity, seven groups would end up with a Solvency Capital Ratio below the required value.

EIOPA reckons that, overall, the sector appears adequately capitalized. Moreover, the product mix offered is changing towards products which less vulnerable to low interest rates (like unit-linked policies), so it can be argued that that for the time being the biggest threat from a low interest rate environment is to profitability, rather than capitalization.

## Banks: low risks, but profitability is a challenge

The ongoing deleveraging and, in the euro zone, the steady decumulation of NPLs and the (so far, at least) low contagion of country specific stress reduce tail risk for banks. But the prospects of lower for longer rates, especially in the euro area, coupled with very sluggish growth, increase the challenges to profitability. In particular, banks will necessarily have to diversify to non interest sources of income.

Recent research by the IMF shows that too big a reliance on some forms of non-interest income can have repercussions on stability at both the single institution and system level. Retail oriented non-interest income activities are shown to be complimentary to lending. When loans are high with respect to assets banks are more inclined to use its existing retail client base to engage in retail-oriented activities (like credit card fees or commissions on insurance products), which lead to more stable profits and stronger benefits from diversification. On the other hand, when loans are low with respect to asset, banks tend to choose market oriented non-interest income services (underwriting, trading, investment banking services). These tend to yield more volatile and procyclical income and provide limited diversification benefits. Therefore, looking at how income is generated can provide indications on both the sustainability of banks' profits and of possible system-wide vulnerabilities.

## Conclusions and implications for investors

Overall, risks in the financial system appear to be limited, as the lack of large imbalances in the banking sector has reduced the likelihood of systemic events. However, leverage has increased to very high levels in the non-financial sector and is taking the form of riskier and less liquid debt instruments.

Vulnerabilities, especially those arising from new issues and ownership concentration of credit-risk sensitive assets appear higher in the US than in Europe. In the euro area, the main source of vulnerabilities stems from relatively low growth and its negative impact on bank profitability (Appendix B presents a broader view).

Risk has shifted from banking to other areas of the financial system, especially mutual funds and private equity managers. In theory, this should help spread risk among several highly diversified intermediaries. In practice, the search for yield has led non-bank-institutions to hold very similar investment portfolios. This may amplify the negative price reaction of large outflows in some part of the system. Moreover, while central banks have the tools to address bank liquidity shortages, no such mechanisms exist for to support liquidity in non-bank intermediaries.

The recent dovish pivot by the major central banks is a mixed blessing for financial stability. The possibility that ECB will start another round of QE, possibly targeting corporate bonds, and the fact that the Fed will be more likely to use its balance sheet as a policy tool clearly reduce the risks

in the near term, but potentially increase them longer run. Lower risk of an economic downturn leading to a repricing of risk will come at the costs of a more aggressive search for yield and increasing imbalances fueled by the low cost of borrowing.

Some lessons for investors can be drawn:

First of all, while our tactical view on credit remains constructive, some caution is needed on corporate bonds (especially in the lowest rated buckets) in the medium term:

- The class as a whole has become more responsive to cyclical downturns as its quality in terms of rating and liquidity worsened.
- In particular the stock of BBB securities has increased markedly.
- The increase in corporate bond holdings by intermediaries susceptible to runs add to the downside risks to prices.

The large movements in spreads in Q4 2018 and the first months of 2019 were accompanied and, in all likelihood, amplified by large operations by retail mutual funds, especially in the US. This showed what could be the impact of the combination of increased perceived credit risk and drying market liquidity.

Second, given the current low yield environment, investing in assets like private equity and debt appears enticing. However, as we go deeper into the credit cycle, care should be exercised in looking at valuations and default expectations before entering illiquid credit asset classes, more so in the European markets, which lack a long historical track record.

By the same token, the prospect of a decline in corporate profitability will put to the fore the issue of the deterioration of covenants in leveraged loans products. This calls for higher caution and selectivity in this segment. The analysis presented in this report points to the need to look at a broader set of indicators, in order to decide whether and how to adjust portfolios, especially the exposure to credit risk.

First of all, the next wave of downgrades might imply a non-negligible migration of corporates into the non-IG bucket, with possibly large second round price effects due to forced sales. Therefore, the use of corporate and macro fundamentals in order to anticipate rating changes can be complemented by market-based measures of default probability, like the Merton's Distance to Default metrics, (see the section on Private Equity for a first example at work). Artificial Intelligence tools are also being developed for capturing early warning signals of credit deterioration.

Secondly, the increased importance of mutual funds implies that looking at redemption flows and portfolio recomposition can provide some early warning signals of impending price volatility. In this report we used aggregate monthly data compiled by the ECB, available with a two-month delay. Private providers, like Lipper, have fund-level information at higher frequency.

The challenges to financial stability we surveyed in this report are somehow "conventional" as they are related to the behavior of financial institutions. However, the financial system is getting more vulnerable to other factors. One that is gaining prominence is climate change. As stressed by the ECB in its latest [Financial Stability Report](#), European finan-

cial institutions, first of all non-life insurers, are heavily exposed to climate related charges. Exposure takes two main forms:

- Through the impact of more frequent and severe weather events on insurers and lenders' balance sheets
- Via the uncertainty on the timing and speed of the transition to a low-carbon economy. This will affect financial markets through the valuation of the firms more exposed to policy action.

Financial regulators are very active on this relatively new issue, but policy action still limited by the lack of adequate data.

## APPENDIX A: RISK APPETITE AND CREDIT CYCLES

In this section, we provide some evidence on how swings in risk appetite can drive the credit cycle. More precisely, when risk appetite is high (low), credit/GDP grows faster (slower) than average, and the likelihood of a financial crisis increases (decreases) as well. <sup>1</sup>

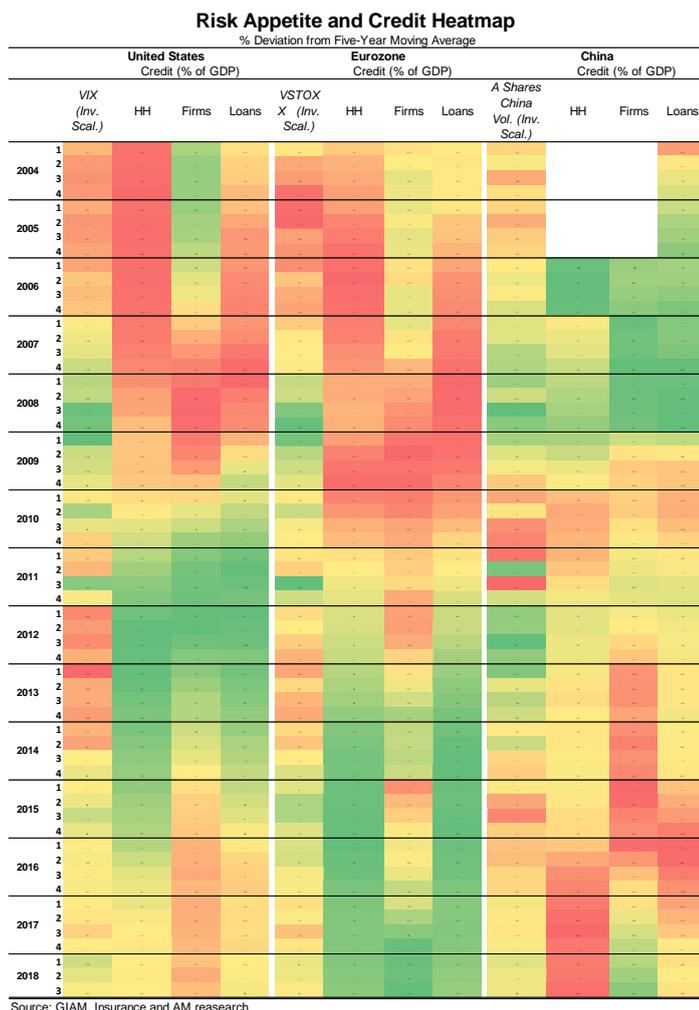
The Risk Appetite and Credit Heatmap on the right is, a new tool created by GIAM Insurance and AM Research in order to visualize this important relationship. For each major economic hub (the US, the EZ and China), we report relating the quarterly levels of a Risk Appetite index, measured by the local stock market volatility index <sup>2</sup> and the Credit/GDP ratio for the three major institutional sectors (Households, Corporations and Bank Lenders). Each value is computed as the difference from the current level and the five-year rolling average. A red (green) box indicates an above (below) average level. The data, from 2003 to 2018, cover almost two full credit cycles.

Our data tend to agree with the hypothesis that an abnormally high-risk appetite drives an increase in credit/GDP in the near future, even if the abnormal expansion of credit materializes into different sectors depending on the circumstances.

We have two major cycles. The first one had its peak in the Global Financial Crisis of 2007-2009, where an abnormally high level of risk appetite in the West (2003-2006) drove a large increase in Credit to Households (mostly in Mortgages), mostly, but not fully, financed by Bank Credit. In this case, Government credit – not reported in the chart - just increased after the crisis due to bank bailouts and fiscal accommodation (the data also shows that China and EM only imported the crisis).

The second cycle is still ongoing and has two separate hubs. In the US, the post crisis increase in risk appetite (2010-2014) is mostly channeled into an expansion to Credit to Corporations rather than to Households, and this is only partially financed by Bank Credit (the balance of net financing is likely to come from shadow banks). The other hub is China<sup>3</sup>, where local investors have also experienced swings in risk appetite during the same period. The high-risk appetite of 2010-11 led to an increase of credit to firms, mostly, but not entirely, coming from the official banking sector. A new risk appetite peak in 2013 mainly drew new credit to Households instead

Overall, our most recent data show a higher measure of vulnerability for China (and EM) than for the West. Unless monetary and fiscal authorities counter them, these regions are the most likely to experience a major market and macro correction



<sup>1</sup> Our tool is inspired by the a paper by J. Danielsson, M.Valenzuela and I. Zer, titled "Learning from History: Volatility and Financial Crises", Review of Financial Studies, 7/2018

<sup>2</sup> The volatility indexes are the Vix for the US market, the VDax for the EuroZone and the Alpha Share China Volatility Index (an average of the Shanghai and Hang Seng Implied volatility) for China.

<sup>3</sup> A similar pattern is observed for Emerging Markets at large.

## APPENDIX B: A FINANCIAL SYSTEM VULNERABILITY INDICATOR FOR THE EURO AREA

This Appendix presents a tool we developed to track the possible sources of vulnerability in the Euro area financial system.

The emergence of financial instability normally occurs in two phases:

- Financial imbalances, leverage and risk mispricing lead to the buildup of systemic risk.
- As the cycle matures, inflation goes up and financial conditions tighten. This increases the likelihood of a shock (say, a spike in corporate spreads) that may be amplified and transmitted to the whole system due to the fragilities and the interconnectedness among financial institutions.

Early warning models calibrated on past episodes and individual sectors (e.g. banks) may fail to capture the evolving nature of systemic risks. Therefore, we follow an alternative approach, introduced by the IMF, which looks at a very comprehensive set of indicators, graphically summarizing the information they provide. The aim is to spot where vulnerabilities are more likely to emerge, given that shocks are inherently difficult to predict (and prevent).

We consider four main areas, asset markets, banks and money market funds, non-bank financial intermediaries (life insurers and mutual funds) and the non-financial private sector. We take the macroeconomic environment and the trend in bank profitability as sources of background risk and then identify five sources of vulnerability:

- High level of risk appetite, leading to risk mispricing
- Leverage
- Maturity and liquidity mismatch
- Interconnectedness across sectors
- Fragmentation across Euro area countries

We collect a set of indicators using both price and stock/flow variables (see table in the next column). Each series is standardized and for each vulnerability/sector pair we construct an index by taking the simple average of the relevant standardized variables.

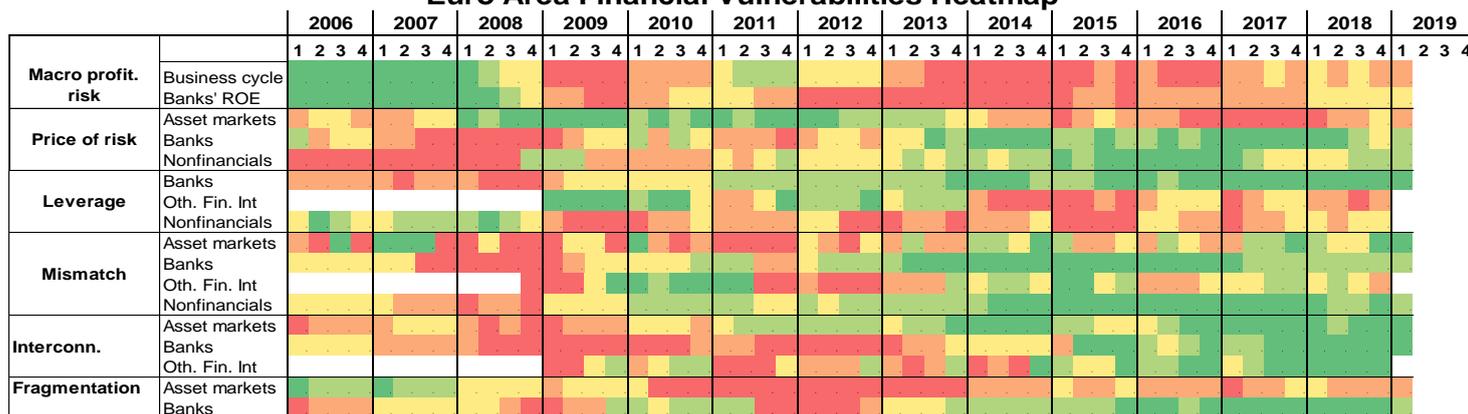
Macro and Banking sector background risk					
- Euro area yoy GDP growth - Current core and one year ahead expected inflation, expressed as deviation from the 2% implicit ECB target. Larger deviation increases the likelihood of central bank action. - Banks' profitability is measured by the average ROE of the Datastream Euro Area Banking index					
	Valuation/ Risk appetite	Leverage	Liq. & mat. mismatch	Interconnectedness	Fragmentation
<b>Asset markets</b>	- Corp. bond spread & duration (Barclays euro index) - Term premium on 10 yr Bund - P/E (MSCI) - CAPE (DAX) - VSTOXX		- Bid-ask spread on bonds - Return to volume ratio - Bund future price volatility	- Contagion in asset prices volatility (Diebold Yilmaz index)	- Std. dev 10 year yields
<b>Banks &amp; Money Market Funds</b>	- Lending standards (ECB Survey)	- Leverage ratio (Capital/assets)	- Loans to deposits s/t liab (% total) - Euribor-OIS spread	- interbank loans (% total) - Derivatives (liab)/asset - Debt % of GDP	- Std. dev of intr. rates on new loans - Std. dev credit growth
<b>Other fin. int</b>		- Investment funds: leverage - Insurers/Pension Funds: Leverage	- Investment Funds: Liq. Mismatch - Ins./P.Funds: s/t debt as % assets	- IF % holding of MFI debt /equity - IF, Insurers, PF: derivatives (l)/asset	
<b>Private nonfinancials</b>	- % of CCC rated bonds in Barclays euro index - House Price to income - Comm. Prop price to VA	- HH, NFC debt ratios, level and yoy growth - NPLs (IT, FR, SP), level and yoy growth	- NFC s/t debt (% of liab.)		

The heat map (below) is then built considering the quintiles of the empirical distribution of the indexes. In addition to the overall heat map, drilldowns by sector or type of vulnerability are available on request.

### The situation at the end of Q1 2019.

- Relatively weak GDP growth and subdued inflation keep macro background risk elevated. Bank profitability continues to improve but remains low by historical standards.
- Indication of risk mispricing appears in asset markets, due especially to a low term premium on Bunds.
- Leverage and liquidity/maturity mismatch appear a problem only in non-bank intermediaries.

Euro Area Financial Vulnerabilities Heatmap



Source: GIAM, Macro & Market Research

Low High

# Imprint

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