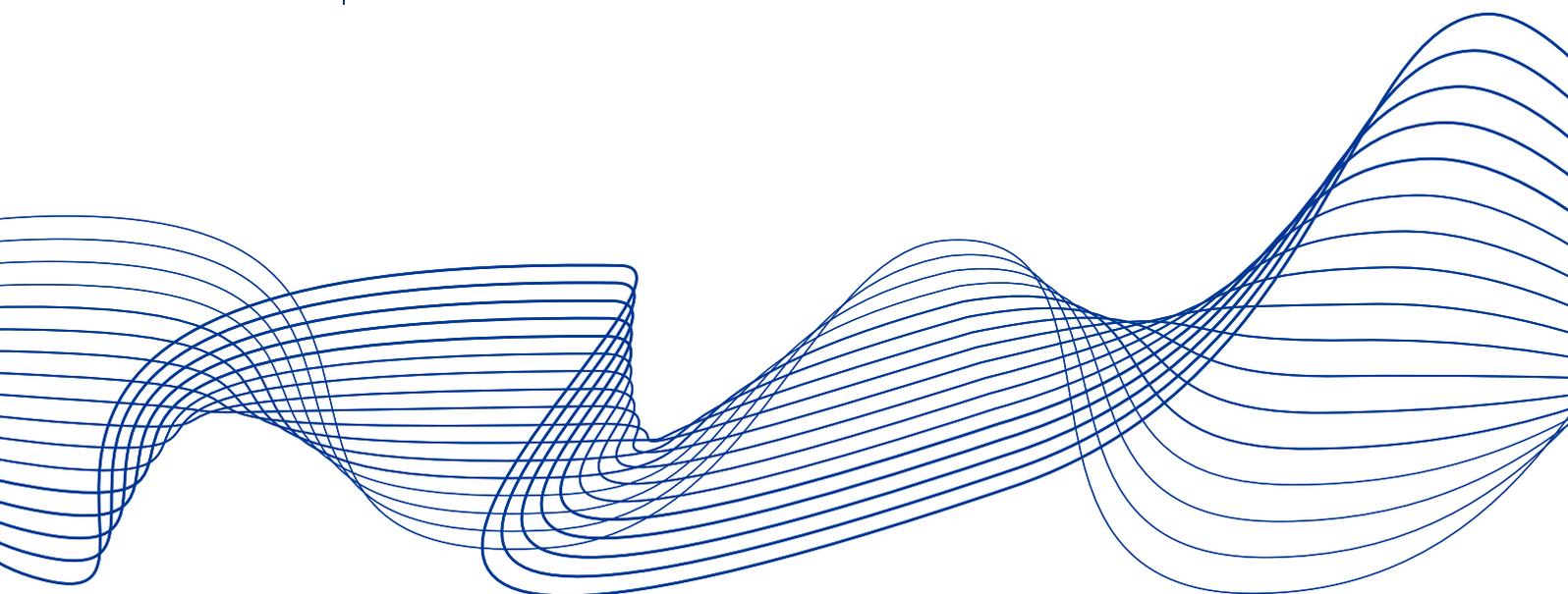


**Issues note on liquidity in  
the corporate bond and  
commercial paper  
markets, the procyclical  
impact of downgrades and  
implications for asset  
managers and insurers**

**May 2020**



**ESRB**  
European Systemic Risk Board  
European System of Financial Supervision

# Contents

<b>1</b>	<b>Introduction</b>	<b>2</b>
<b>2</b>	<b>Corporate bond market liquidity tensions</b>	<b>3</b>
<b>3</b>	<b>Procyclical impact of downgrades</b>	<b>8</b>
<b>4</b>	<b>Conclusions</b>	<b>13</b>
	<b>References</b>	<b>15</b>
	<b>Annex: Background charts</b>	<b>17</b>
	<b>Imprint and acknowledgements</b>	<b>21</b>



# 1 Introduction

**The coronavirus (COVID-19) pandemic and the measures necessary to contain it have brought a severe and unprecedented shock to Europe's economies.** Against this background, the General Board of the European Systemic Risk Board (ESRB) decided at its meeting on 2 April 2020 to focus its attention on five priority areas where coordination among authorities or across the EU is likely to be particularly important in order to safeguard financial stability.<sup>1</sup> One of those five priority areas concerns issues around market liquidity and illiquidity, with a particular focus on the implications for asset managers and insurers. Another priority area is concerned with the procyclical impact that downgrades of corporate bonds have on markets and entities across the financial system.

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<sup>1</sup> See ESRB (2020).

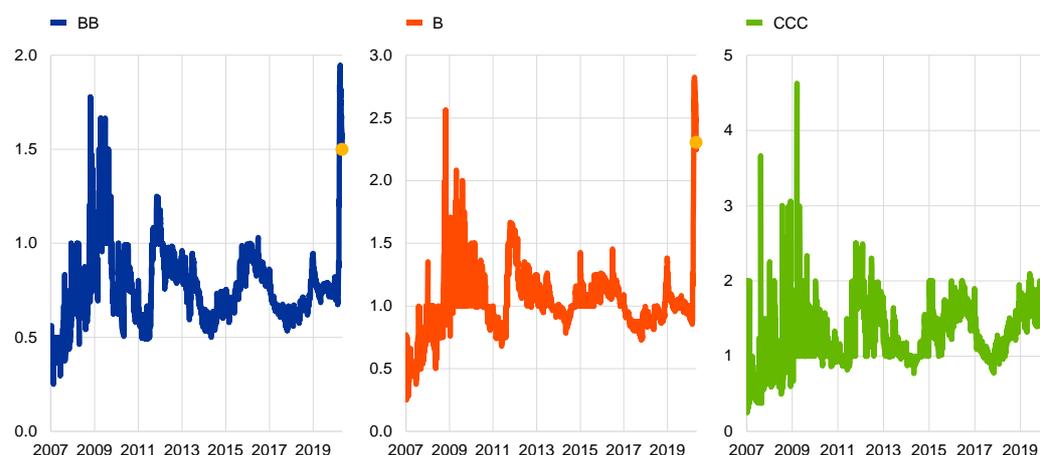


## 2 Corporate bond market liquidity tensions

**The onset of the COVID-19 pandemic saw a significant deterioration in corporate bond market liquidity, particularly in the high-yield (HY) segment.** The impairment of market liquidity has been most visible in the sharp widening of bid-ask spreads, which were higher than they were at the peak of the Global Financial Crisis for the HY segment during March and April. Since the end of April, bid-ask spreads have only slightly decreased. For the BBB segment, the bid-ask spreads are somewhat lower than during the peak of the Global Financial Crisis (see Charts 1 and A.1). 25% of corporate bonds have been traded at distressed levels (i.e., where the option-adjusted spread is greater than 1,000 basis points) and 80% at spreads above 500 basis points (see Charts A.2 and A.3).

Chart 1  
**Bid-ask spreads in euro-denominated HY NFC market**

(percentages of face value)



Sources: iBoxx and ECB calculations.  
Note: Latest observations are for 3 May 2020.

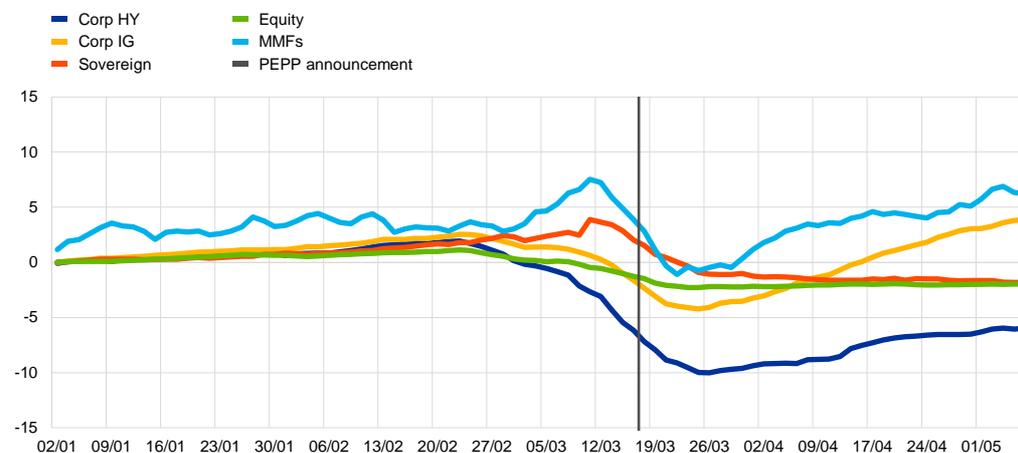
**The onset of the COVID-19 pandemic also saw significant redemptions from investment funds, particularly those with exposures to corporate bonds (see Chart 2).** In the case of HY bond funds, outflows as a percentage of total assets under management were the highest they had been since the Global Financial Crisis. The composition of outflows points to particularly acute vulnerabilities in funds investing in less liquid assets, which may, in some cases, be consistent with the presence of “first-mover advantage” dynamics. The mismatch between the redemption profile of some of these funds and the liquidity of their assets increases the risk of amplified pressures on asset valuations, particularly for less liquid assets or assets that have become temporarily illiquid. Investment funds and insurers with significant unit-linked portfolios may be forced to sell less liquid assets over a short period of time in order to meet redemptions. This could lead to higher mark-to-market losses by other financial institutions with exposures to the same or correlated assets or an abrupt tightening of financial conditions, with financial stability deteriorating further.



Chart 2

**Net flows for euro area domiciled funds**

(percentages of cumulated flows)



Sources: EPFR and ECB calculations.  
 Note: Latest observations are for 7 May 2020.

**Reasons for elevated redemption flows include increases in investors’ perceptions of risk and investors demanding cash for short-term liquidity management, with perceived “first-mover advantage” dynamics possibly also playing a role.** Investors in investment funds and unit-linked insurance products can redeem their investments at the net asset value (NAV) of the fund in question. The calculation of the NAV does not take into account, however, the liquidity costs associated with the sale of assets to meet redemption requests. The cost of meeting redemption requests made by transacting investors may therefore be borne by the remaining investors (if measures such as swing pricing or anti-dilution levies are not used by funds). This can give rise to a first-mover advantage, which can contribute to redemptions in times of stress.<sup>2</sup>

**The abrupt decline in market liquidity may have amplified falls in asset prices.** The onset of the COVID-19 pandemic saw large falls in asset prices, consistent with an underlying increase in risk given the large economic shock. Spreads on both HY and IG corporate bonds widened sharply in late February and early March (see Chart A.4), while new issuance of such bonds declined. Market prices of leveraged loans and collateralised loan obligations (CLOs) also fell sharply. The onset of the pandemic also saw pressures on the valuation of short-term commercial paper, with large increases in spreads on money market instruments. Although those market movements partly reflected fundamental changes in risk, they were probably also amplified by the sharp reduction in market liquidity. For example, the difference between the spreads on bonds and credit default swap (CDS) instruments widened, pointing to particular pressure on market liquidity in cash markets (see Chart A.5).

**The onset of the COVID-19 pandemic also saw significant disruption in the short-term commercial paper market, a key market for money market fund (MMF) investments.** MMFs

<sup>2</sup> See, for example, Goldstein et al. (2017), Jin et al. (2019), Zeng (2017) and Banegas et al. (2016).



are key purchasers of short-term financial and non-financial corporate debt, especially commercial paper. In normal times, MMFs can raise sufficient cash from maturing assets. Faced with large redemptions, however, MMFs may need to sell commercial paper, putting pressure on short-term bank and corporate funding markets. Indeed, in the period from 13 to 20 March, euro area MMFs experienced outflows totalling nearly 8% of their assets under management, driven by a global flight to safety and investors' increasing demand for cash. In the absence of alternative buyers, MMFs that were in need of liquidity ended up asking issuing banks to buy back their commercial paper.

**Market liquidity conditions and valuation pressures have since eased, with central banks taking steps to provide liquidity across a variety of markets.** On 18 March 2020, the ECB announced several monetary policy measures, which have had a positive impact on market liquidity<sup>3</sup>: first, a new pandemic emergency purchase programme (PEPP) was announced with an overall envelope of €750 billion; second, the range of assets eligible under the corporate sector purchase programme (CSPP) was expanded to include non-financial commercial paper; and third, collateral standards were eased by adjusting the main risk parameters in the collateral framework. The Federal Reserve System has also intervened and set up a funding backstop on corporate debt markets, which is an important consideration given that European firms also use capital markets to borrow in US dollars. On 9 April, the Federal Reserve announced, among other measures, an expansion of the Primary and Secondary Market Corporate Credit Facilities (PMCCF and SMCCF), up to a total of \$750 billion, and a broadening of their scope (see also the paragraph below on steps taken to mitigate the procyclical impact of downgrades).<sup>4</sup> The Federal Reserve has also introduced a Money Market Mutual Fund Liquidity Facility (MMLF), directly targeting commercial paper issued by both financial and non-financial institutions. That facility is open only to MMFs registered with the US Securities and Exchange Commission, however, so US dollar-denominated MMFs domiciled in Europe did not directly benefit from the Federal Reserve's actions.<sup>5 6</sup>

**Liquidity tensions in bond markets led to divergence between the prices of bond exchange-traded funds (ETFs) and the value of the underlying bonds, but the Federal Reserve's decision to include ETFs in its asset purchase programme has helped to ease those tensions.** In April, the total NAV of US-domiciled ETFs tracking corporate bonds stood at €16 billion, compared with around €73 billion EU-domiciled ETFs. In March, prices for ETFs tracking corporate bond indices and the NAV of the bonds they held diverged. This may have reflected frictions in the ETF intermediation chain, as authorised participants would normally align prices through an arbitrage mechanism. Low levels of liquidity in the underlying assets may have hindered this arbitrage mechanism, which normally closes such spreads, as ETF prices internalise the low level of liquidity in the underlying bonds. At the request of asset managers, several major index providers – such as FTSE Russell, ICE and IHS Markit – decided on a rebalancing holiday of one month at the end of March (meaning that no bonds would be excluded from indices, in order to

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<sup>3</sup> See ECB (2020b).

<sup>4</sup> See Federal Reserve (2020a) and (2020b). These programmes benefit from the support of the US Treasury via an initial equity investment of \$75 billion.

<sup>5</sup> The MMLF benefits from \$10 billion of credit protection provided by the US Treasury. See Federal Reserve (2020c).

<sup>6</sup> BIS (2020) provides an analysis of strains in money market funds exacerbating the stress in US dollar short-term funding during the COVID-19 crisis.

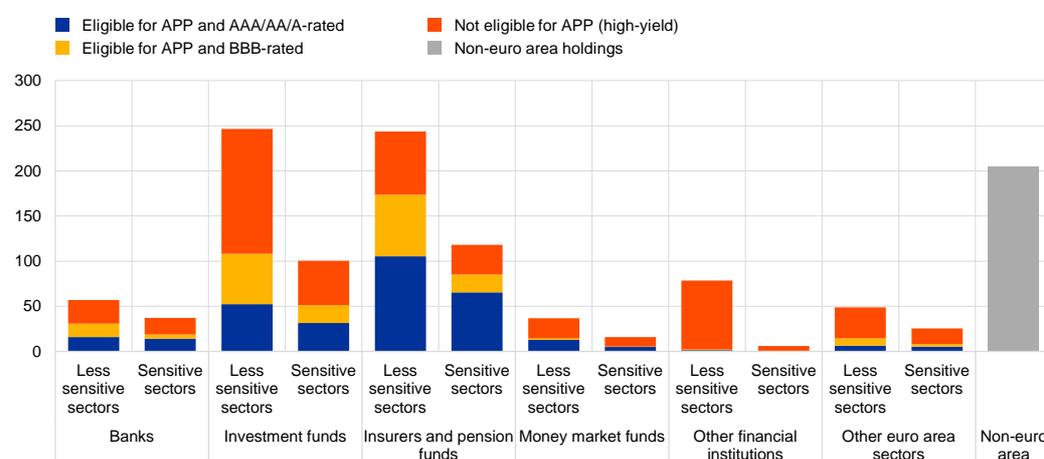


avoid forced selling in the context of illiquid markets).<sup>7</sup> On 9 April, the Federal Reserve announced its intention to include eligible corporate bond portfolios in the form of ETFs in its asset purchase programme, which has led to a reduction in NAV spreads.<sup>8</sup> On 11 May, the Federal Reserve Bank of New York announced it will begin purchasing eligible ETFs from 12 May.<sup>9</sup>

**Further redemptions from investment funds and unit-linked insurance products and downgrades of non-financial corporations (NFCs) could aggravate the tensions observed in the liquidity of corporate bond markets.** Together, investment funds and insurers (including via their unit-linked products) hold more than half of the estimated outstanding stock of NFC bonds in the euro area (see Chart 3). Any further redemption pressure from open-ended funds with short redemption periods could result in fund managers selling assets, leading to a further deterioration in liquidity conditions in corporate debt markets. Downgrades would also force passive funds to sell the bonds of issuers losing their IG status, causing disruption in the HY corporate bond market. This could contribute to adverse spillovers on the investment and solvency positions of other financial institutions with exposures to those assets (such as investment funds, insurers, pension funds and banks). They, in turn, could be forced to sell those assets or decide to reallocate their investment portfolios in order to avoid an un-provisioned increase in their capital requirements and/or avoid breaching their risk limits (e.g., as defined in their investment mandates). This could also have an adverse impact on the cost and availability of market-based financing for NFCs.<sup>10</sup>

**Chart 3**  
**Holdings of debt securities issued by euro area NFCs, broken down by sensitivity to the coronavirus shock, ratings and ECB eligibility**

(EUR billions)



Sources: SHSS, CSDB and ECB calculations.

Notes: These outstanding amounts represent data for the third quarter of 2019 (direct holdings only) and cover all 19 euro area

<sup>7</sup> See Risk.net (2020).

<sup>8</sup> See Reuters (2020). One way that the Federal Reserve could intervene to reduce NAV spreads in ETFs would be by turning its existing programme into a secondary market liquidity scheme where it acts as an authorised participant of last resort for the ETF market. See McCauley (2020).

<sup>9</sup> See Federal Reserve Bank of New York (2020).

<sup>10</sup> See, for example, Financial Times (2020).



countries. “Sensitive sectors” are sectors that have been hit particularly hard by the coronavirus-related restrictions. These include mining, manufacturing, retail and wholesale trade, transport, accommodation and food services, and arts and entertainment (based on NACE codes).

**Similar dynamics could re-emerge in short-term funding markets.** Further redemptions from MMFs could result in a deterioration in the functioning of commercial paper markets. Downgrades of underlying entities borrowing through commercial paper could lead to valuation pressures for MMFs, which could trigger further redemptions. Severe stress in the MMF sector could have system-wide implications. Other investment funds and financial institutions such as insurers use MMF investments as part of their daily liquidity management. In addition, NFCs use MMFs as an alternative to bank deposits and for short-term cash management purposes. NFCs’ access to cash via MMFs supports the real economy and corporate financing (e.g., by helping with payroll expenses and other obligations to creditors).



## 3 Procyclical impact of downgrades

### **Large-scale downgrades by credit rating agencies could amplify the observed fall in asset values due to the deterioration of fundamentals, with cliff effects leading to the materialisation of systemic risk.**

Notwithstanding the extraordinary measures taken by governments and central banks across Europe and around the world, credit risk has increased. Downgrades by credit rating agencies can be expected to reflect that deterioration of fundamentals,<sup>11</sup> but usually do so with a time lag that can amplify the fall in asset values, particularly where downgrades create cliff effects. Since the end of March, the pace of downgrades and negative rating actions by credit rating agencies has accelerated in the NFC segments, similar to the situation observed after the collapse of Lehman Brothers (see Chart A.6 and A.7). The rating actions taken prior to mid-April were, however, underpinned by economic forecasts made in March, which were considerably more optimistic than the forecast recently published by the International Monetary Fund (IMF)<sup>12</sup>. The ECB has also forecast an unprecedented contraction in economic activity, with real GDP in the euro zone projected to decline by around 5%, 8% or 12% in 2020, depending on whether the impact of the pandemic ends up being mild, medium or severe.<sup>13</sup> Thus more downgrades can be expected as rating agencies update their forecasts, although the ultimate impact on issuers will vary depending on the circumstances. They have started to do so, but with a lag<sup>14</sup> relative to the IMF forecast.

### **Credit ratings indicate a relative riskiness of high quality versus low quality asset or issuer within a class or constituency (e.g., country).**

When rating agencies start to downgrade several issuers due to a global increase in credit risk, which can indicate the materialisation of systemic risk, it is likely that further downgrades will follow where this global increase in credit risk does not affect all issuers at the same time. Rating changes are correlated with cyclical indicators such as economic activity, default rates and credit spreads.<sup>15</sup> Contagion coming through economic interconnections can create a chain of events leading to large-scale downgrades and the materialisation of systemic risk. On Friday 17 April, rating agencies took rating actions on 1,000 US and EU CLO tranches, putting around 40% of the then BB and B-rated CLO tranche universe on negative watch or outlook.<sup>16</sup> Beginning of May, almost 60% of the outstanding BBB-rated NFCs bonds were put under a negative outlook by one of the five major CRAs (see Chart 4). This is another indication that more downgrades should be expected. While the issue of delayed, but massive, downgrades is not a new one,<sup>17</sup> a number of reforms have been implemented in recent years with a view to addressing the twin problems of “too little, too late” acknowledgement of significantly increased credit risk, and over-reliance on external credit ratings.

<sup>11</sup> But they also take into account the extraordinary measures implemented by governments and central banks.

<sup>12</sup> On 14 April, the IMF forecast a decline of 7.5% in the 2020 EU GDP year-on-year, see IMF (2020).

<sup>13</sup> See ECB (2020f).

<sup>14</sup> On 16 April, S&P changed its public forecast for the EU to -7.3%; and on 22 April, Fitch changed its forecast to -7%. Moody's has not published a revised forecast (with rating agencies under no obligation to publish forecasts), but one can safely assume that it has followed suit.

<sup>15</sup> See Moody's (2009).

<sup>16</sup> See Barclays (2020). CRAs assess the credit quality of the underlying loans and the tranches of the CLO securitisation structure. During downturns, loan issuers with limited leverage headroom are more likely to have problems dealing with the relevant crisis and are therefore more likely to be downgraded.

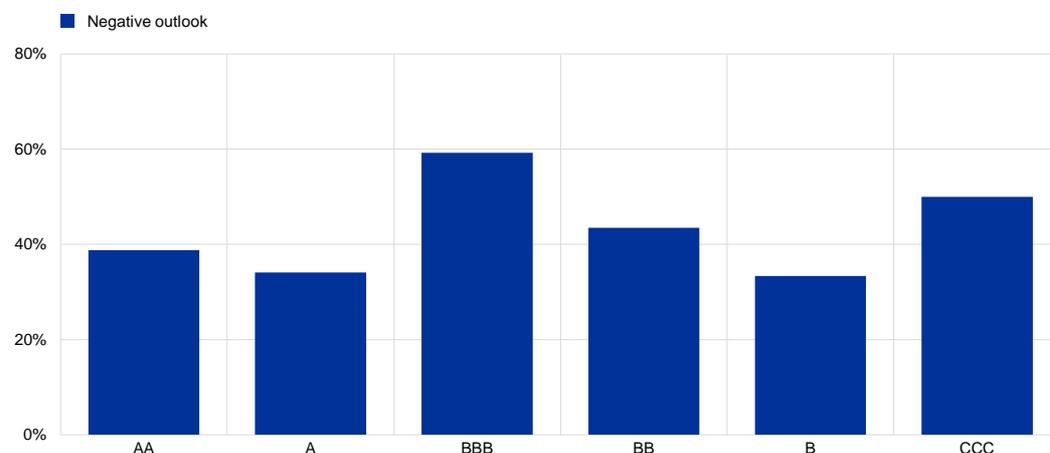
<sup>17</sup> See, for instance, Portes (2008).



Chart 4

**Portion of NFC securities with negative outlook, per rating**

(percentages of total number of securities per rating)



Sources: RADAR and ESMA calculations.

Notes: Corporate non-financial instruments (ISINs) with negative outlook rated by the Big 5 (Fitch, Moody's, S&P, Scope and DBRS) by category value over the total outlooks per category value. EU-27 and UK instruments. Ratings not withdrawn, as of 4 May 2020.

**Reforms implemented after the Global Financial Crisis have reduced reliance on external credit ratings, but according to a 2015 European Commission report,<sup>18</sup> regulation is still a key driver of the use of external ratings.**<sup>19</sup> For banks, the Commission reported in 2015: (i) that the Capital Requirements Regulation (CRR) and Capital Requirements Directive IV (CRD IV) were still largely reliant on external ratings for standardised approaches to the determination of credit risk, counterparty credit risk and market risk, as well as for large exposures; (ii) that liquidity provisions within the EU's regulatory framework also relied, to some extent, on external ratings; and (iii) that even under an internal ratings-based approach, the complexity of securitisation transactions and data availability issues might lead banks to use external ratings. Some of the cliff-effects are mitigated, however, as the same risk weights apply to BBB and BB-rated assets. For insurers, external credit ratings are used under the standard formula<sup>20</sup> and capital charges increase for downgraded assets, giving insurers incentives to follow ratings and assess whether they should disinvest from those downgraded assets, taking account of their asset-liability management and risk appetite. Solvency II limits that effect by requiring insurers to assess the credit quality of their larger and more complex exposures<sup>21</sup>. For asset management, external ratings continue to be widely used in investment mandates as a "common language" between investors and asset managers, with the use of ratings in investment mandates being driven primarily by sectoral legislation applicable to investors (banks, pension funds and insurers) and/or the investor's internal

<sup>18</sup> See European Commission (2015).

<sup>19</sup> And this is also the case for the US, see Partnoy (2017).

<sup>20</sup> This applies in particular for spread risk, market concentration risk and counterparty default risk.

<sup>21</sup> In the on-going review of Solvency II, the European Commission has asked EIOPA to advise on additional methods allowing for a wider use of alternative credit assessments, such as those EIOPA already proposed for the assessment of unrated debt.



rules. Moreover, as noted in a 2016 report by the European Commission,<sup>22</sup> the credit rating agency market is still highly concentrated, with the top three rating agencies holding a combined market share of 92%.<sup>23</sup> One major outcome of CRA III was the introduction of a requirement that financial institutions should carry out their own credit quality assessments and should not rely solely or mechanistically on credit ratings for assessment of the creditworthiness of an entity or financial instrument. This had the broader objective of making financial institutions work on their own forward-looking credit risk assessments, so that they could anticipate significant changes in credit risk early enough and reflect them in a timely manner, thus reducing their reliance on (and the impact of) external ratings. Nevertheless, this initiative has not been sufficient to address fully the issue of mechanistic reliance on credit ratings by financial institutions. There is a lack of alternative methods: internal measures and ratings are costly and difficult to set up for small institutions; market-implied ratings can be volatile and have a short-term nature; accountancy-based measures are limited to corporate debt and usable for regulatory purposes with difficulty.

**Such downgrades are particularly problematic for entities that lose their investment grade status, as they can create cliff effects.** Their funding costs will increase, be it via market-based finance or via credit institutions. Most of the BBB-rated bonds in Europe are held by investment funds (51%) and insurers (32%) – see Chart 5. Index-tracking funds will need to sell those fallen angels quickly if they are removed from the reference basket. This automaticity creates a cliff effect that has implications on other entities via market losses. Investment funds, insurers, pension funds and banks may decide or be forced to sell, whether because of outflows, risk limits or mandates, to adjust their investment allocation, or to manage their solvency positions (see Figure 1 for an overview of the various transmission channels). The NFC BBB market segment represents 60% of the total investment grade universe. In the European Economic Area (EEA), outstanding IG stocks have a total value of €736 billion (compared with €2,342 billion in the United States). That is three times the size of the EEA's HY market (with the equivalent market in the United States being twice the size of the US HY market), so it would be difficult for HY markets to absorb a large volume of (forced) sales of fallen angels. If we assume a repeat of the downgrade rate observed during the Global Financial Crisis (18% in a year for the euro area), the EEA's HY market would need to absorb €132 billion – half of its current size. This does not appear realistic, as the HY market is already showing signs of tensions and illiquidity. 30% of outstanding BBB-rated bonds in the EEA (50% in the United States) have been issued by NFCs operating in sectors that are particularly sensitive to the current restrictions. Approximately 10% of outstanding bonds and market loans are due to roll over this year, of which 50% are rated as investment grade.

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<sup>22</sup> See European Commission (2016).

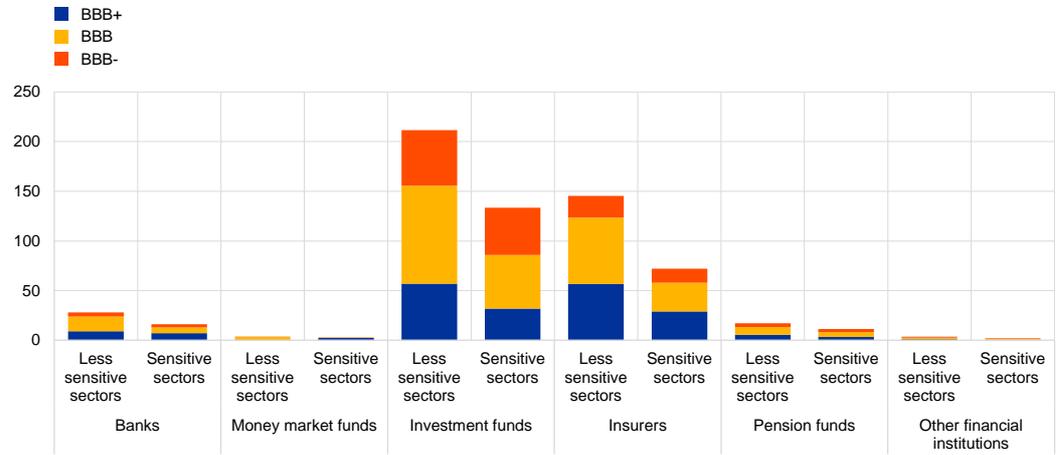
<sup>23</sup> See ESMA (2019).



Chart 5

**Outstanding BBB-rated NFC bonds, broken down by rating category and type of holder**

(EUR billions)

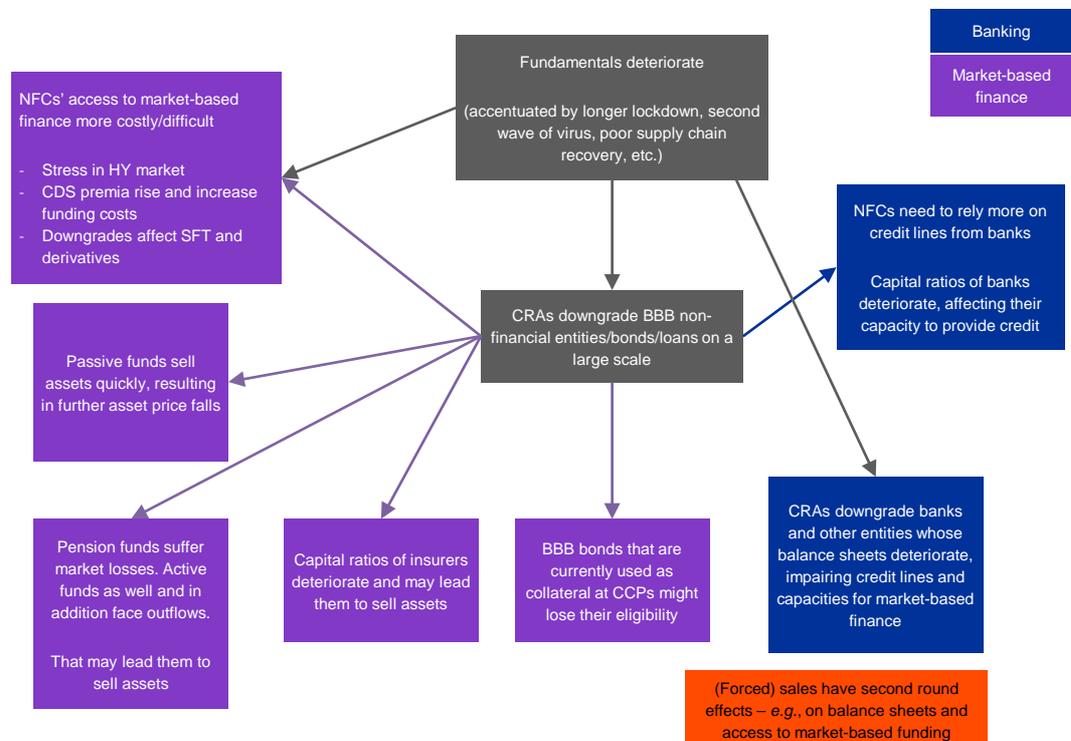


Sources: SHSS, CSDB, and ESRB Secretariat calculations.

Notes: These outstanding amounts represent data for the fourth quarter of 2019 (direct holdings only). SHSS data cover all 19 euro area countries, plus Bulgaria, the Czech Republic, Denmark and Romania. Rating refers to the lowest rating from DBRS, Fitch, Moody's or S&P, as of 4 May 2020. For details of "sensitive sectors", see the note accompanying Chart 3. Holdings from Eurosystem are not reported in this chart.

Figure 1

**Overview of transmission channels for bond downgrades**



Source: ESRB Secretariat.



**Supervisors and central banks have already taken steps that can help to mitigate some of the procyclical effects of downgrades.** In response to the COVID-19 pandemic, banking supervisors have temporarily allowed banks to operate below the level of capital defined by the Pillar 2 Guidance, the combined buffer requirement and the liquidity coverage ratio, without judging negatively those that make use of these relief measures.<sup>24</sup> In addition, many supervisory authorities have called on banks and insurers to delay their distribution of dividends and variable remunerations.<sup>25</sup> This will strengthen the capacity of those financial institutions' ability to withstand credit events such as large-scale downgrades. Regarding monetary policy instruments, on 22 April the ECB announced changes to its collateral framework to alleviate the impact of rating downgrades on the availability of collateral:<sup>26</sup> marketable assets and issuers of those assets that were rated at least BBB- on 7 April 2020 will retain their eligibility in terms of the provision of collateral in the event of rating downgrades, as long as their rating remains at or above BB. This rule change will apply until September 2021. In the corporate sector purchase programme (CSPP), a downgrade below IG level does not trigger automatic sales, as the Eurosystem is not required to sell its holdings in the event of a loss of eligibility. Moreover, by applying a first-best rating rule for eligibility, the Eurosystem can purchase assets from issuers that the market may qualify as "fallen angels". Looking beyond Europe, the Federal Reserve's programmes in the NFC segment since 9 April 2020, while focused mainly on the IG universe, also allows purchases of ETFs seeking exposure to US HY corporate bonds. The Federal Reserve does not take account of rating actions that have taken place since 22 March in the context of its primary purchasing programme (PMCCF) and its secondary market facility, as long as at least two agencies continue to rate the asset or issuer in question at remains BB- or higher.<sup>27</sup>

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<sup>24</sup> See ECB (2020a).

<sup>25</sup> See, for example ECB (2020c), EBA (2020) and EIOPA (2020).

<sup>26</sup> See ECB (2020d) and (2020e).

<sup>27</sup> See Federal Reserve (2020a) and (2020b). See footnote 4.



## 4 Conclusions

**The sharp fall seen in asset prices around the time of the onset of the COVID-19 pandemic was accompanied by significant redemptions from some investment funds and a deterioration in financial market liquidity.** While market conditions have stabilised more recently, largely thanks to decisive actions by central banks in the EU and around the world, investment funds or (unit-linked) insurance products may see further redemption pressures if the macroeconomic outlook worsens by more than is currently anticipated.

**The number of downgrades and negative rating actions by credit rating agencies has increased in the NFC segment since the end of March and is likely to increase further.**

Downgrades by credit rating agencies can be expected to reflect the deterioration of fundamentals, but they usually do so with a time lag, which may lead to procyclical effects. The rating actions taken prior to mid-April were underpinned by economic forecasts published in March, which were considerably more optimistic than the IMF's recent forecast. The number of issuers put under a negative outlook by CRAs (see Chart 4) shows that more downgrades can be expected as rating agencies update their forecasts.

**Ultimately, in an environment of unprecedented uncertainty, there may be limits to the extent to which private sector actions – even with co-ordinated supervisory interventions – can maintain market liquidity and the smooth functioning of markets.** Indeed, it has been the unprecedented and timely actions taken by central banks in Europe and around the world since the onset of the COVID-19 pandemic that have had a decisive impact on liquidity conditions across a range of asset markets.

**Central banks across Europe have stressed their determination to take additional steps, if and when necessary, to avoid a procyclical tightening of financing conditions and to ensure the smooth transmission of their monetary policy actions.** In addition to fundamental shocks to the risk profile and creditworthiness of NFCs, the functioning of corporate bond and commercial paper markets could be disrupted by the potential simultaneous behaviour of financial institutions. Investment funds and insurers account for around 83% of EU financial institutions' total exposure to BBB-rated NFCs, i.e. €562 billion. MMFs are key investors in commercial paper markets. Further redemption pressure from open-ended funds with short redemption periods or from MMFs could result in fund managers selling assets, leading to a further deterioration in liquidity conditions in corporate debt and commercial paper markets. Downgrades would also force passive funds to sell bonds issued by entities losing their IG status, causing disruption in the HY corporate bond market.<sup>28</sup> This could contribute to adverse spillovers on the market values of investments and solvency positions of other financial institutions with exposure to those assets (such as active funds, insurers, pension funds or banks). They, in turn, could be forced to sell those assets or decide to reallocate their investment portfolios in order to manage un-provisioned increases in their capital requirements. This could also have an adverse impact on the cost and availability of market-based financing for NFCs.

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<sup>28</sup> See ESMA (2020).



**The potential deterioration of the liquidity of certain market segments, as described in this issues note, requires further analysis to assess its possible systemic impact.** At its meeting on 6 May 2020, the General Board of the ESRB decided to coordinate a top-down analysis, with the European Supervisory Agencies and the European Central Bank, to assess the impact of a common scenario of large-scale downgrades across all parts of the financial sector. This should enable policy-makers to evaluate further the risks that downgrades, which may lead to sales from financial institutions, could among other disruptive effects aggravate the liquidity tensions observed on the HY corporate debt segment and have procyclical consequences. These are the issues which this note seeks to elucidate and for which the top-down exercise will give further evidence.



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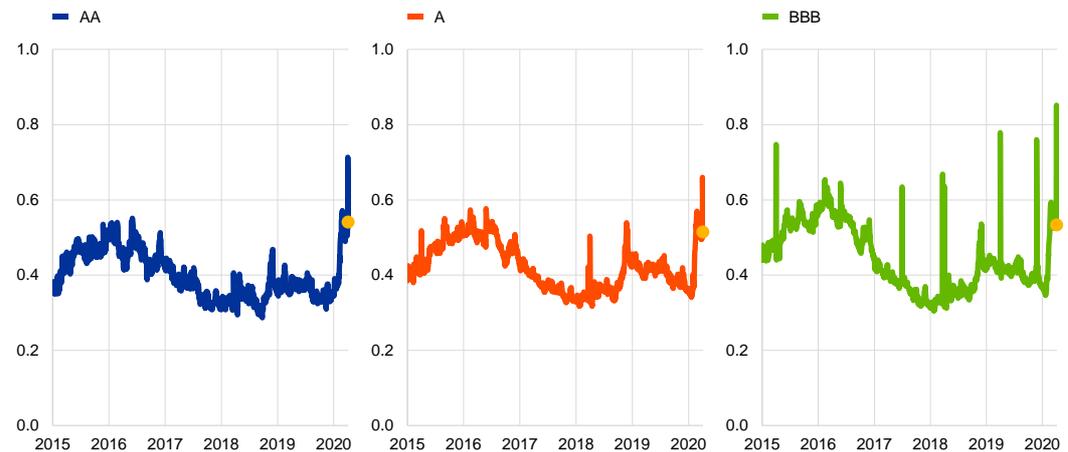


## Annex: Background charts

Chart A.1

### Bid-ask spreads in euro-denominated IG NFC market

(percentages of face value)



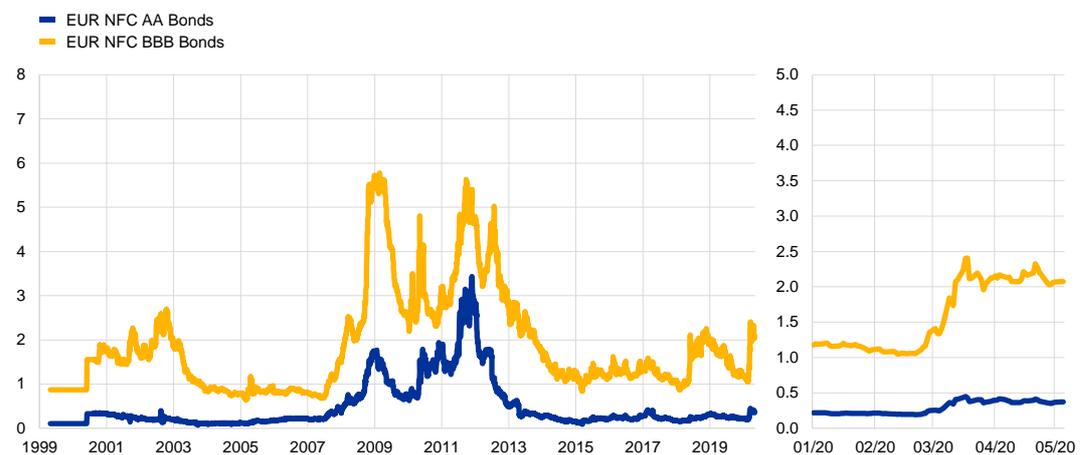
Sources: iBoxx and ECB calculations.

Note: Latest observations are for 4 May 2020.

Chart A.2

### Option-adjusted spreads for euro-denominated IG corporate bonds

(percentages)



Sources: Bloomberg and ECB calculations.

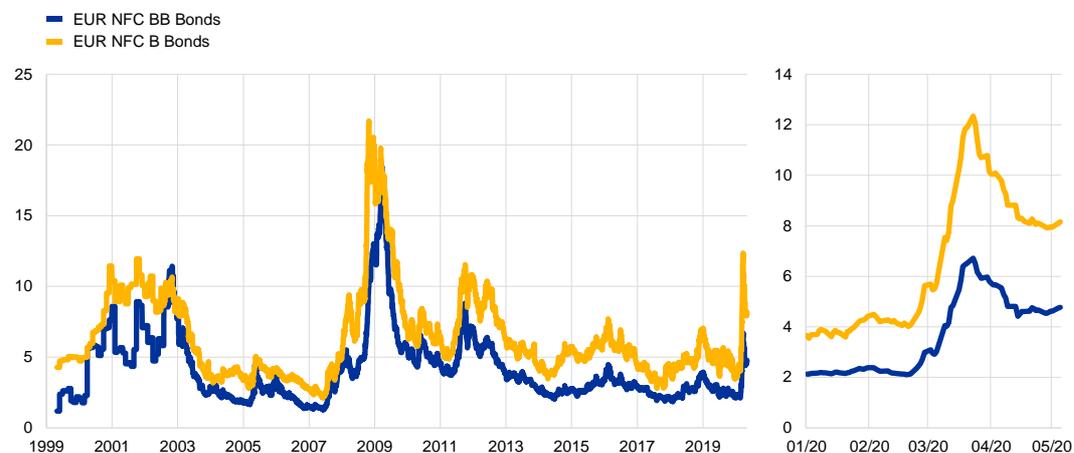
Note: Latest observations are for 5 May 2020.



Chart A.3

**Option-adjusted spreads for euro-denominated HY corporate bonds**

(percentages)

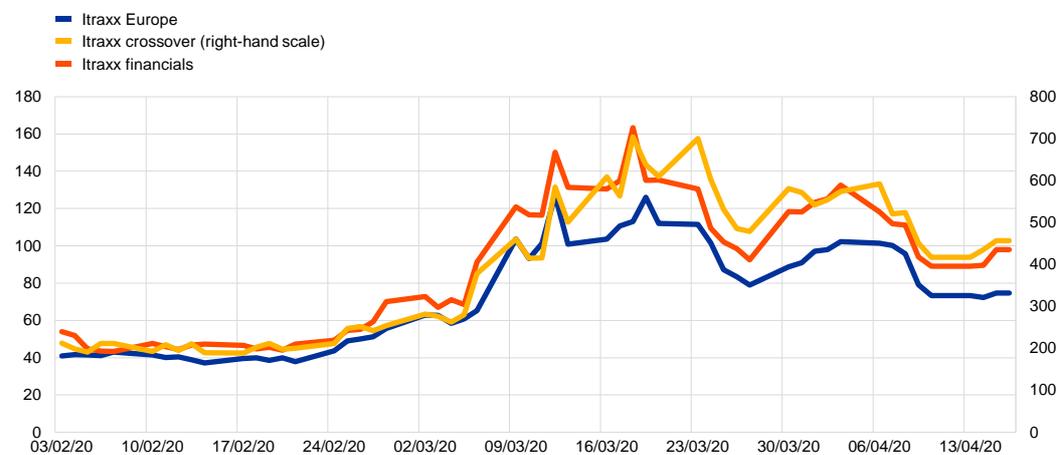


Sources: Bloomberg and ECB calculations.  
 Note: Latest observations are for 5 May 2020.

Chart A.4

**Corporate spreads**

(basis points)



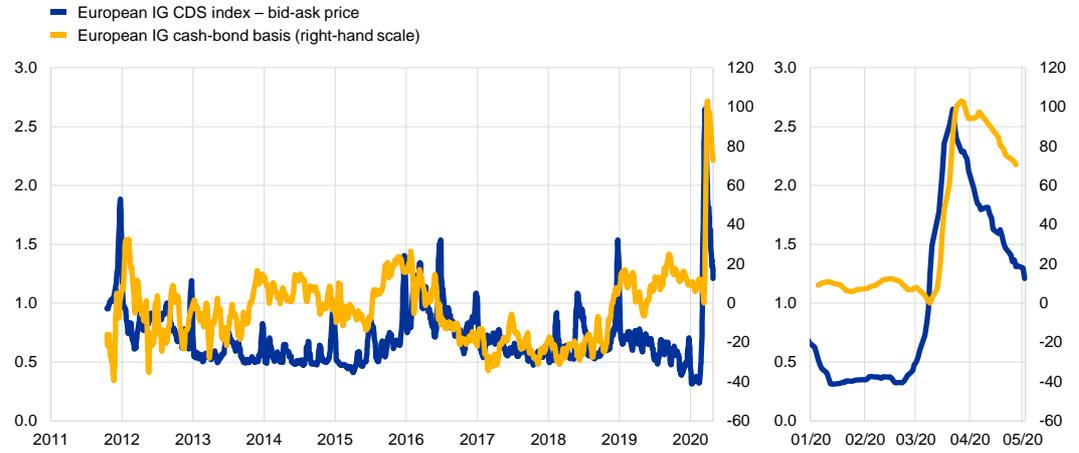
Sources: Refinitiv Eikon and ESMA calculations.  
 Notes: CDS spread on European IG corporates (Itraxx Europe), HY corporates (Itraxx Crossover) and European financials.  
 Latest observations are for 16 April 2020.



Chart A.5

**Bid-ask spread for the Itraxx Europe IG CDS index and the European IG bond and CDS basis**

(basis points)

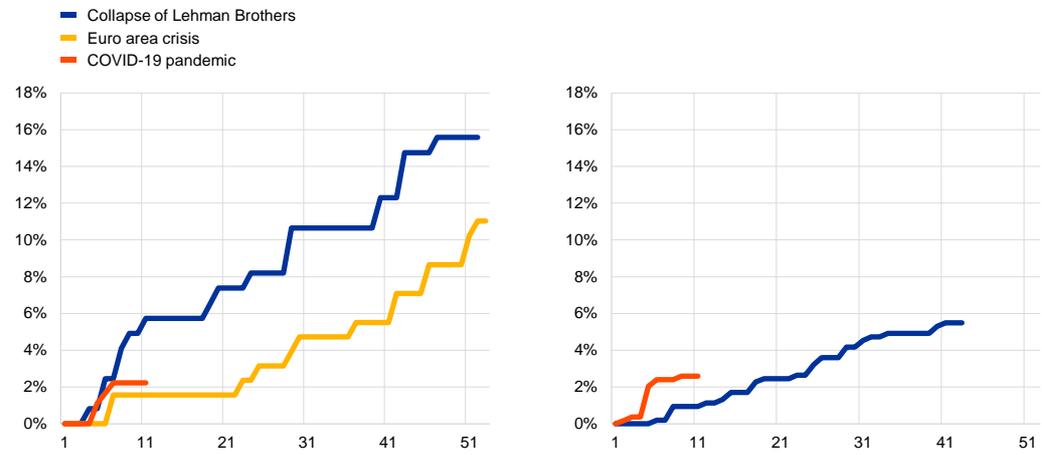


Sources: Bloomberg and ECB calculations.  
 Note: Latest observations are for 5 May 2020.

Chart A.6

**Downgrades of BBB debt after the collapse of Lehman Brothers and today, euro area and United States**

(cumulative percentages of NFCs' ratings per week)



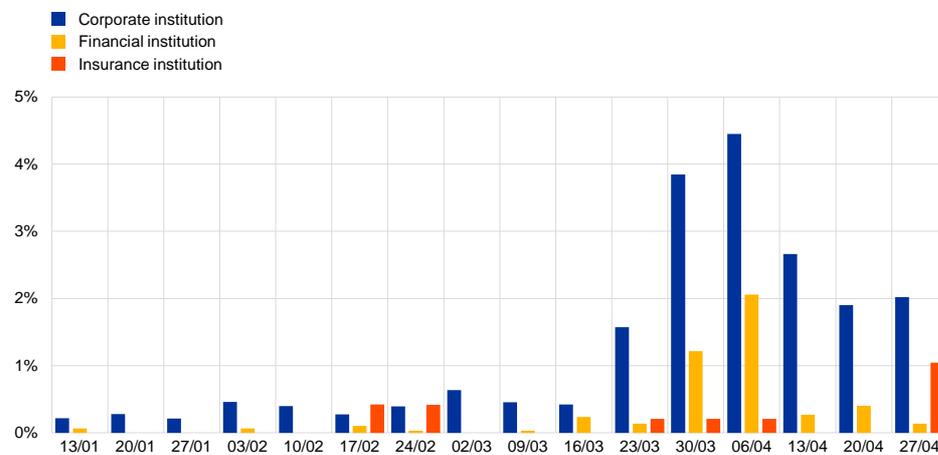
Sources: S&P and ECB calculations.



Chart A.7

**Issuers with at least one bond downgraded in 2020**

(percentages of issuers)



Sources: RADAR and ESMA calculations.

Note: Percentage of issuers with at least one bond downgraded over the total of outstanding issuers rated by the big 5 CRAs (Fitch, Moody's, S&P, DBRS, Scope) per rating type.



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Postal address      60640 Frankfurt am Main, Germany  
Telephone            +49 69 1344 0  
Website                [www.esrb.europa.eu](http://www.esrb.europa.eu)

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