Consultation Paper

Draft guidelines on stress test scenarios under the MMF Regulation

Responding to this paper

ESMA invites comments on all matters in this paper and in particular on the specific questions in Annex I. Comments are most helpful if they:

- respond to the question stated;
- indicate the specific question to which the comment relates;
- contain a clear rationale; and
- describe any alternatives ESMA should consider.

ESMA will consider all comments received by **1 December 2018.**

Responses to this consultation paper can be sent using the response form, via the ESMA website, under the heading 'Your input/Consultations'.

Publication of responses

All contributions received will be published following the close of the consultation, unless you request otherwise. Please clearly and prominently indicate in your submission any part you do not wish to be publically disclosed. A standard confidentiality statement in an email message will not be treated as a request for non-disclosure. A confidential response may be requested from us in accordance with ESMA's rules on access to documents. We may consult you if we receive such a request. Any decision we make not to disclose the response is reviewable by ESMA's Board of Appeal and the European Ombudsman.

Data protection

Information on data protection can be found at www.esma.europa.eu under the heading Legal Notice.

Who should read this paper?

This document will be of interest to (i) MMF managers and their trade associations, (ii) alternative investment funds and UCITS managers and their trade associations, as well as (iii) institutional and retail investors (and associations of such investors) investing in MMF.

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1 Executive Summary

Reasons for publication

Article 28 of the MMF Regulation provides that ESMA shall develop guidelines with a view to establishing common reference parameters of the stress test scenarios to be included in the stress tests managers of MMFs are required to conduct. These guidelines shall be updated at least every year taking into account the latest market developments. ESMA published the first set of these guidelines on 21 March 2018 ("the 2017 Guidelines" also referred to as ESMA34-49-115[1]).

With respect to section 4.8 of the 2017 Guidelines (*Guidelines on the establishment of common reference stress test scenarios the results of which should be included in the reporting template mentioned in article 37(4) of the MMF Regulation*), ESMA indicated that "*This section will in particular be updated so that managers of MMFs have the information needed to fill in the corresponding fields in the reporting template mentioned in article 37 of the MMF Regulation. This information will include specifications on the type of the stress tests mentioned in this section 4.8 and their calibration, as well as the way to report their results in the reporting template mentioned in article 37(4) of the MMF Regulation*".

This consultation paper (CP) represents the first step in the development of the specifications of the guidelines described above and sets out proposals on which ESMA is seeking the views of external stakeholders.

Stakeholder's views are especially sought on the methodology, including the methodology itself, risks factors, data and the calculation of the impact.

The calibration of the stress test scenarios is not part of the consultation. Some figures are included in this document for illustration purposes only. Therefore, we do not expect comments on those figures. However, any input from stakeholders on the way to calibrate the scenarios would be welcome.

Contents

Section 2 explains the background to our proposals. Sections 3 and 4 give detailed explanations on the content of the proposals and seek stakeholders' input through specific questions.

Annex I sets out the list of questions contained in this paper.

Annex II contains the legislative reference in the MMF Regulation in relation to the update of the guidelines on stress tests scenarios.

Annex III sets out the cost-benefit analysis related to the draft updated guidelines.

Annex IV contains the full text of the draft updated guidelines.

Next Steps

Responses to this consultation will help ESMA in finalising the guidelines (for publication). The final guidelines will include the calibration of the stress testing scenario for implementation.

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[1] https://www.esma.europa.eu/sites/default/files/library/esma34-49-115_mmf_guidelines_on_stress_tests.pdf

2 Background

1. The Regulation on Money Market Funds (MMFs) ('MMF Regulation') was published in the Official Journal on 30 June 2017. Article 28 of the MMF Regulation obliges each MMF to have in place sound stress testing processes that allow for the identification of possible events or future changes in economic conditions which could have unfavourable effects on the MMF. The MMF or its manager has to assess the possible impact that those events or changes could have on the MMF. The manager of a MMF must regularly conduct stress testing for different possible scenarios, and those stress tests must be based on objective criteria and consider the effects of severe plausible scenarios.

2. Article 28 of the MMF Regulation also provides that ESMA shall develop guidelines with a view to establishing common reference parameters of the stress test scenarios to be included in the stress tests managers of MMFs are required to conduct. ESMA is obliged to issue guidelines with a view to establishing common reference parameters of these stress test scenarios taking into account the following factors**:**

    a. hypothetical changes in the level of liquidity of the assets held in the portfolio of the MMF;

    b. hypothetical changes in the level of credit risk of the assets held in the portfolio of the MMF, including credit events and rating events;

    c. hypothetical movements of the interest rates and exchange rates;

    d. hypothetical levels of redemption;

    e. hypothetical widening or narrowing of spreads among indexes to which interest rates of portfolio securities are tied;

    f. hypothetical macro systemic shocks affecting the economy as a whole.

3. Although the Regulation does not prescribe a deadline for the issuance of the guidelines, the text (Article 28(7)) does specify that they need to be updated at least every year taking into account the latest market developments.

4. ESMA published the 2017 Guidelines in March 2018[2] and now intends to update these Guidelines to specify the related reporting template for MMFs as referred to in article 37 of the MMF Regulation.

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https://www.esma.europa.eu/sites/default/files/library/esma34-49-103_final_report_on_mmf_cp.pdf

stress-tests.pdf

5. With respect to section 4.8 of the 2017 Guidelines, ESMA indicated that "*This section will in particular be updated so that managers of MMFs have the information needed to fill in the corresponding fields in the reporting template mentioned in article 37 of the MMF Regulation[3]. This information will include specifications on the type of the stress tests mentioned in this section 4.8 and their calibration, as well as the way to report their results in the reporting template mentioned in article 37(4) of the MMF Regulation*".

6. The types of stress test and corresponding calibration are those referred to in paragraphs 5 and 47 of the 2017 guidelines which are as follows:

Risk factor	Calibration	Results
Liquidity		
Credit		
FX Rate		
Interest Rate		
Level of Redemption		
Spread among indices to which interest rates of portfolio securities are tied		
Macro		
Multivariate		

7. The following sections summarise the proposals of ESMA in relation to section 4.8 of the 2017 Guidelines for each risk factor mentioned in the previous paragraph.

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[3] and specified in the Implementing Regulation 2018/708

3 Guidelines on stress test scenarios

3.1 General features of the stress test scenarios of MMF

8. As mentioned in the previous section, according to the MMF Regulation the stress test scenarios shall at least take into consideration reference parameters that include the following factors:

- hypothetical changes in the level of liquidity of the assets held in the portfolio of the MMF;
- hypothetical changes in the level of credit risk of the assets held in the portfolio of the MMF, including credit events and rating events;
- hypothetical movements of the interest rates and exchange rates;
- hypothetical levels of redemption;
- hypothetical widening or narrowing of spreads among indices to which interest rates of portfolio securities are tied;
- hypothetical macro systemic shocks affecting the economy as a whole.

How are managers supposed to measure the impact of the shocks?

9. In terms of results, as mentioned in the 2017 Guidelines, impacts on the NAV and/or on the liquidity of the fund should be reported.

- If the Guidelines developed in this CP provide for a change in the value of an asset, this change can be directly applied to the NAV to measure the impact;
- If the Guidelines provide for a shock on a parameter used to value an asset, this shock will need to be translated into a change of value according to the existing regulations, accounting rules and best market practices. Typically the valuation of eligible instruments in the interest risk scenario will need to take their duration into account (when applicable) ;
- Specific Guidelines are provided to measure the impact of hypothetical levels of redemption.

What will be the calibration?

10.   In the context of the present CP, ESMA seeks consistency with the stress scenarios published by the other ESAs. The complete set of EBA and EIOPA stress test parameters can be found on their websites[4] [5].

11.   However, it is important to note in that context that the purpose of this exercise is different from the banking and insurance stress tests: in particular, the objective is not to assess capital adequacy. Therefore, the final calibration is likely to be different from the EBA and EIOPA stress tests. In accordance with its mandate ESMA will collaborate with the ESRB and the ECB for the calibration of the risk parameters. In this respect, input from respondents to the present consultation on the topic of stress test parameters might be taken into account for the purpose of the aforementioned calibration.

12.   Whenever necessary, unstressed parameters will also be provided.

What will be the final methodology?

13.   For every risk factor we are proposing one or several options. The final choice on these options will depend on the results of this consultation.

14.   As mentioned above, ESMA will update the Guidelines at least every year taking into account the latest market developments. When necessary the methodology will also be revised. It is important to note in that context that the parameters used for this consultation will need to be revised accordingly.

15.   For example, some of the following elements may be taken into consideration in future versions of the Guidelines:

- Consideration of Liquidity Management Tools which are available to the fund manager;
- Additional redemption requests generated by a decline in asset prices and resultant losses to remaining investors (second round effects);
- The behaviour of other market participants: does their level of selling (or buying) have the impact of a fire sale?
- Other elements of liquidity risk such as market depth and breadth could also be stressed potentially via a market impact function;
- The impact on investors of CNAV and LVNAV funds switching to market valuation;
- The possibility for a fund to switch to the amortized cost valuation method.

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[4] http://www.eba.europa.eu/documents/10180/2106649/2018+EU-wide+Stress+Test+Market+Risk+Scenario.pdf

[5] https://eiopa.europa.eu/Publications/Surveys/Technical%20Specifications.pdf

MMF portfolio

16.   MMFs may invest only in the eligible assets listed in the Article 9 of the MMF Regulation. In principle, all eligible instruments should be subject to the stress test. However, some assets are not capable of being stressed under all proposed scenarios, due to their risk characteristics. For example, all risk parameters may not have an impact on cash holdings.

17.   When funds hold shares of other MMFs, fund managers are expected to stress those assets. This can be done by using a "look-through" approach, i.e. applying the shock to the holdings of these MMFs and then to value MMF shares accordingly. Alternatively, fund managers can measure the impact of the stress on the rest of their portfolio and extrapolate the results to MMF shares.

18.   When funds use repos, derivatives or other collateralised transactions, the stress parameters should impact the collateral.

Use of market prices

19.   When fund managers use amortised cost, they are also required to compute a market price for the portfolio holdings and to measure the impact of the stress test on the NAV using available market prices.

Types of MMFs

20.   ESMA is of the view that the 2018 Guidelines on stress testing should give stressed parameters for the eligible assets and use the same parameters for all types of MMFs (short term and standard; CNAV, VNAV and LVNAV).

21.   According to Article 28(2) of the MMF Regulation, CNAV and LVNAV MMFs shall also estimate for the proposed stress tests, the difference between the constant NAV per unit or share and the NAV per unit or share.

Questions:

Q1: Do you agree that the impact of market stress should be primarily measured on the NAV?

Q2: Do you agree that some assets may not be stressed under all scenarios (in which case the scope of the assets that are subject to the individual stress tests will be clearly defined in the guidelines)? Or should ESMA include additional assumptions for those assets (e.g. a default by depositary banks in repaying cash holdings)?

Q3: Do you have views on the way to stress collateral in collateralised transactions (e.g. repos, derivatives)? It may especially involve increased counterparty risk or the need to post additional collateral.

Q4: Do you agree that the same market stress parameters should be used for all MMFs in order to measure the impact on NAV? Do you have views on the way to take into account the type of fund (short term and standard; CNAV, VNAV and LVNAV) to measure the impact on the fund?

Q5: Do you agree that a consistent approach between the ESAs should be attained? Where appropriate, which risk parameters need to be significantly different?

3.2 **Hypothetical changes in the level of liquidity of the assets held in the portfolio of the MMF**

22.   In times of market stress, liquidity risk of portfolio assets can materialise, thereby impacting on the value of a security. Market liquidity can be observed and measured along several dimensions. Liquidity risk is commonly referred to as the ability to sell and/or purchase an asset without impacting its market price. The liquidity of an asset depends on a number of factors, such as the size of the issuance and the market on which it is traded.

23.   The primary measure of liquidity is the difference between the bid and the ask prices i.e. the price at which a seller is ready to sell a certain quantity and the price at which a buyer is ready to buy a certain quantity. When the spread between bid and ask widens, the cost of trading increases, indicating that the asset has become less liquid. Measures of the bid-ask spread are commonly used to estimate execution costs actually paid by the trader and the premium requested by the liquidity provider.

24.   In stressed market conditions, a fund may need to apply a discount factor and sell an asset at a lower bid price than in normal liquidity conditions due to the relative absence of marketability. The potential loss due to the unfavourable liquidity condition would be reflected in the asset value.

25.   In the context of this CP, market liquidity impact will be simulated as a widening of bid-ask spread by type of security, and particularly in the case of government bonds and corporate bonds. The discount factors will be calibrated using commercial data[6] and based on past stress episodes with the indicative level of detail:

- Government bonds;
- Corporate bonds issued by financial institutions, by rating;
- Corporate bonds issued by non-financial institutions, by rating.

26.   To reflect the distinction between Short-Term Money Market Funds, which operate a very short weighted average maturity (WAM) and weighted average life (WAL), and Standard Money Market Funds which usually have a longer WAM and WAL, corporate and government debt securities are distinguished according to their residual maturity until the legal redemption:

- Less than or equal to 397 days;
- Between 398 days and 2 years.

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[6] Data used to calibrate sovereign and corporate bonds' discount factors are, respectively, from MTS trading platforms and IBOXX.

27. ESMA proposes two main options to implement the liquidity risk scenario of the MMF stress test. In both cases, discount factors could be calibrated only making use of commercial data[7].

Option 1: Calibrated discount factor

28. The discount factors for corporate and government bonds will be calibrated to reflect the increase in liquidity premia due to the deterioration of market liquidity conditions in a stress scenario.

- For each relevant security (i.e. corporate and government bonds), the discount factors should be applied to the bid prices used for the valuation of the fund observed in an active market[8] at the time of the reporting, according to their type and maturity, to derive an adjusted bid price.

- The manager of the MMF should estimate the impact of the potential losses by valuing the investment portfolio at the derived adjusted bid price, to determine the stressed NAV and report the impact as a percentage of the reporting NAV.

Option 2: Multiple quoted bid-ask spread

- For each relevant security (i.e. corporate and government bonds), the manager of the MMF should consider the quoted bid and ask prices observed in an active market at the time of the reporting.

- For each security, the stressed bid-ask spread should be calculated by multiplying the quoted bid-ask spread observed in an active market at the time of the reporting, as a percentage of the actual price, by fixed stress factor specific to each type of asset considered (e.g. corporate and sovereign bonds).

- The stress factors would be fixed taking into account relevant market practices (see Question 9).

29. The potential liquidity loss in case of forced liquidation should be then computed as the average of the spread (as %) between the last book price of each security and the Stressed Bid weighted by the asset's proportion in the portfolio.

30. The impact should be reported as a percentage of the reporting NAV.

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[7] The discount factors provided for illustrative purposes in this consultation paper are calibrated using data, respectively, from MTS trading platforms and IBOXX.

[8] The IFRS13 refers to an active market defined as a market in which transactions take place with sufficient frequency and volume to provide pricing information on an ongoing basis.

Draft Guidelines (please also see Annex IV)

Guideline	With respect to the level of changes of liquidity of the assets mentioned in Article 28(1)(a) of the MMF Regulation: Option 1: Calibrated discount factor 31. The asset manager will apply the discount factors calibrated by ESMA to reflect the increase in liquidity premia due to deterioration of market liquidity conditions in a stress scenario. 32. For each relevant security (i.e. corporate and government bonds), the discount factors should be applied to the bid prices used for the valuation of the fund at the time of the reporting, according to their type and maturity (see Table A and Table B), to derive an adjusted bid price (Bid_{adj}): $$Bid_{adj} = (1 - liquidity\ discount) * Bid\ price$$ 33. The manager of the MMF should estimate the impact of the potential losses by valuing the investment portfolio at the derived adjusted bid price, Bid_{adj}, to determine the stressed NAV and report the impact as a percentage of the reporting NAV: $$Asset\ liquidity\ risk\ impact\ (\%) = \frac{Reporting\ NAV - Stressed\ NAV}{Reporting\ NAV} * 100$$ **Table A: Government bonds[9] - discount factor (%)**

Country	< 397 days	Between 397 days and 2 years
Austria	0.204	0.878
Belgium	0.064	0.412
Denmark	0.148	0.867
Finland	0.320	0.402
France	0.125	0.234
Germany	0.092	0.255
Greece	0.457	5.678
Ireland	0.201	0.291
Italy	0.142	0.397
Netherlands	0.078	0.609
Poland	0.821	1.017
Portugal	0.539	0.607
Spain	0.119	0.499

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[9] The list of member States mentioned for illustrative purposes in Table A reports is meant to be non-exhaustive and limited by data availability.

Table B: Corporate - Investment grade - discount factor (%)

Category	< 397 days		Between 397 days and 2 years	
	Investment grade	High yield	Investment grade	High yield
Financials	1.209	1.934	4.721	7.553
Non-Financials	0.823	1.482	1.037	1.867

Option 2: Multiple quoted bid-ask spread

34. For each relevant security (i.e. corporate and government bonds), the manager of the MMF should consider the quoted bid and ask prices observed in an active market at the time of the reporting.

35. For each security, the stressed bid-ask spread should be calculated by multiplying the quoted bid-ask spread observed in an active market at the time of the reporting, as a percentage of the actual price, by fixed stress test factor specific to each type of asset considered (e.g. corporate and sovereign bonds).

$$Stressed\ bid\text{-}ask = Quoted\ bid\text{-}ask\ spread * Asset\text{-}class\ stress\ factor$$

36. As trading costs could become substantial in times of heightened stress and illiquidity, the stress factor should reflect the maximum loss due to the unfavourable liquidity condition for each relevant type of asset (e.g. corporate and government bonds).

37. The potential loss in case of forced liquidation should be then computed as the average of the stressed bid-ask spread weighted by the asset's proportion in the portfolio.

Questions

Q6. Do you have views on which factors are relevant for the determination/calibration of shocks?

Q7. Do you have a preference between the two proposed options: calibrated discount factor on bid prices; multiple quoted bid-ask spread?

Q8. What is your view on how to stress underlying assets not mentioned above (i.e. assets other than corporate and government bonds)? In your opinion are there asset classes not mentioned above that should be excluded from a quantitative assessment?

Q9. With reference to Option 2, do you think that the adoption of fixed stress factors for different asset classes is in line with practices? If so, which values for the fixed factors could be considered appropriate and plausible to capture stress on asset liquidity? Which elements should be identified and used to define the appropriate stress factor for each asset class? Is the reference to an "active market" clear enough or would you propose other criteria to define bid-ask spread observed?

Q10. Do you think that the volume of an asset held by the fund should be considered for the proposed stress factors (esp. the value of assets held compared with the underlying market)? Do you have any views on the methodology?

3.3 Hypothetical changes in the level of credit risk of the assets held in the portfolio of the MMF, including credit events and rating events

38.   ESMA proposes two options based on credit spread to implement the credit risk scenario of the MMF stress test, together with an additional credit stress.

Option 1: multiplying factor

39.   In this option, ESMA would define multiplying factors for credit spread, based on historical market data. The change in spread would affect the value of the securities[10] according to their duration. An MMF manager would have to reprice all securities and measure the impact on NAV.

40.   The main difficulty associated with using spreads is the challenge of measuring the credit spread for all securities, maturities and/or all ratings. Since many issuers do not have a CDS, ESMA would give instructions on how to tie the securities to an index, e.g. Itraxx.

Option 2: stressed credit spreads

41.   ESMA, in cooperation with the ESRB and the ECB, could publish changes in credit spreads to be used by fund managers, similarly to the EBA stress test.

42.   Similar to option 1, the change in spread would affect the value of the securities according to their duration. An MMF manager would have to reprice all securities and measure the impact on NAV.

43.   Similar to option 1, since many issuers do not have a CDS, it would necessitate tying the securities to an index, e.g. Itraxx.

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[10] The word "securities" in this document refers to MMFs eligible assets, unless specified otherwise.

Example of EBA stress test parameters

44. Sovereign spreads: The EBA stress test scenario simulates an increase of sovereign risk premium. The credit spread by country can thus be measured as the difference between the yield-to-maturity of a given sovereign's debt security and the swap rate for the same currency and maturity. $CreditSpreadBond = Bond$ yield- interest rate $SWAP$ (where the swap term equals the maturity of the bond).

45. The tables below are the specification templates of the EBA scenario: government bond yield shock and interest rate yield shock.

Government bond yield* shocks absolute changes (basis points)								
Country	3M	1Y	2Y	3Y	5Y	7Y	10Y	10Y+
Austria								
Belgium								
Bulgaria								
Cyprus								
Croatia								
Czech Republic								
Denmark								
Finland								
France								
Germany								
Greece								
Hungary								
Ireland								
Italy								
Latvia								
Lithuania								
Luxembourg								
Malta								
Netherlands								
Poland								
Portugal								
Romania								
Slovakia								
Slovenia								
Spain								
Sweden								
UK								

Interest rate yield shocks absolute changes (basis points)

GEO	Country	Description	1M	3M	1Y	2Y	3Y	5Y	7Y	10Y	10Y+
EU	EA	Interest rate SWAP on the Euro									
EU	Bulgaria	Interest rate SWAP on the Bulgarian Lev									
EU	Croatia	Interest rate SWAP on the Croatian Kuna									
EU	Czech Republic	Interest rate SWAP on the Czech Koruna									
EU	Denmark	Interest rate SWAP Danish Krone									
EU	Hungary	Interest rate SWAP on the Hungarian Forint									
EU	Poland	Interest rate SWAP Polish Zloty									
EU	Romania	Interest rate SWAP Romanian Leu									
EU	Sweden	Interest rate SWAP Swedish Krona									
EU	UK	Interest rate SWAP British Pound									

46. <u>Corporate spreads:</u> The table below displays the EBA corporate spread shock template by rating, for financial and non-financial corporates.

Corporate credit spreads for EU countries *absolute changes (basis points)*					
Country	**Type**	**AAA**	**AA**	**A**	**BBB**
EU	*Financial*				
	Non-financial				
Austria	*Financial*				
	Non-financial				
Belgium	*Financial*				
	Non-financial				
Denmark	*Financial*				
	Non-financial				
France	*Financial*				
	Non-financial				
Germany	*Financial*				
	Non-financial				
Italy	*Financial*				
	Non-financial				
Netherlands	*Financial*				
	Non-financial				
Portugal	*Financial*				
	Non-financial				
Spain	*Financial*				
	Non-financial				
Sweden	*Financial*				
	Non-financial				
UK	*Financial*				
	Non-financial				

Additional credit stress: default of the MMF's two main exposures

47. In addition to the credit stress (option 1 or option 2) the Guidelines would require the managers of MMFs to simulate the default of their two main exposures (including deposits, repos and derivatives) considered at group level (all entities from the group being in default). The purpose of this additional stress is to capture concentration and counterparty risk, particularly for exposures that are not impacted by the credit spread shock. The resulting impact on NAV would then be reported separately from the credit risk scenario based on credit spread.

Draft Guidelines (please also see Annex IV)

Guidelines	*Option 1*
	With respect to the levels of changes of credit risk of the asset mentioned in Article 28(1)(b) of the MMF Regulation, managers of MMFs should measure the impact of an increase in credit spread, according to the following rules:
	• *For each security, managers of MMFs should apply the multiplying factor communicated by ESMA.*
	• *For each security, managers of MMFs should translate the corresponding change in spread into a haircut.*
	• *Managers of MMFs should measure the impact of the cumulated haircuts in percentage of NAV.*
	Option 2
	With respect to the levels of changes of credit risk of the asset mentioned in Article 28(1)(b) of the MMF Regulation, managers of MMFs should measure the impact of an increase in credit spread, according to the following rules:
	• *For each security, managers of MMFs should apply the increase in spread communicated by ESMA.*
	• *If no spread is available for an instrument, managers of MMFs should use the shock on the reference index given by ESMA.*
	• *For each security, managers of MMFs should translate the corresponding change in spread into a haircut.*
	• *Managers of MMFs should measure the impact of the cumulated haircuts in percentage of NAV.*
	Additional scenario

	• *Managers of MMFs should also simulate the default of their two main exposures. The resulting impact on NAV would then be reported.*

Questions

Q11. Do you have views on which factors are relevant for the determination/calibration of shocks?

Q12. Do you have a preference between the two proposed options: spreads multiplied by a factor or ESMA credit spread parameter?

Q13. Do you see specific issues (e.g. implementation, non-standardisation, or similar) with either of the two options?

Q14. Do you agree with having an additional credit stress simulating the default of the fund's two main exposures?

Q15. The additional stress simulates the default of the fund two main exposures: when an exposure is collateralised, do you think that additional assumptions on the value of the collateral are necessary (i.e. if the defaulting counterparty is fully collateralised, and the value of the collateral is unchanged, there will be no impact)?

Q16. Do you think that additional assumptions are needed to calculate the loss given default in the additional scenario?

3.4 **Hypothetical movements of the interest rates and exchange rates. Hypothetical widening or narrowing of spreads among indices to which interest rates of portfolio securities are tied.**

48. ESMA suggests to develop risks parameters in close cooperation with the ESRB and the ECB to assess the hypothetical movements of interest rates, the widening of spreads among indices to which interest rates of securities are tied and exchange rates shocks. Results of the three scenarios would be reported separately.

49. Similar to the 2018 EBA and EIOPA stress tests, ESMA proposes to test yields shocks and to assess its impact on the NAV of the funds. The EBA scenario includes an upward shift in the yield curve and a widening in risk premia[11]. Similarly, the "Yield Curve up" scenario of the EIOPA stress test includes a shift of the swap rate by 85 bps in the EU and by more than 100 bps in other major advanced economies.

50. As mentioned earlier, it is important to note that the purpose of this exercise in the context of MMFs is different from the banking and insurance stress tests, which could lead to a different calibration. In particular, the objective is not to assess capital adequacy or the solvency capital requirement.

51. In addition to interest rate (IR) yield shocks, the parameters used for the EBA and EIOPA scenarios include Government bond yield shocks and FX shocks (for the detailed parameters please refer to the market risk scenario published by the EBA)[12]:

52. The EBA scenario templates for the government bond yield shock and interest rate yield shock can be found above (paragraph 45). The final 2018 Guidelines should provide a similar level of detail but with additional assumptions on short term maturities (especially six months).

FX shocks *relative changes (%)*			
GEO	**Description**	**Exchange rate name**	**Shock**
EU	*EURBGN represents 1 EUR per x BGN (Bulgarian Lev)*	**EURBGN**	
EU	*EURCZK represents 1 EUR per x CZK (Czech Koruna)*	**EURCZK**	
EU	*EURGBP represents 1 EUR per x GBP (British Pound)*	**EURGBP**	
EU	*EURHRK represents 1 EUR per x HRK (Croatian Kune)*	**EURHRK**	
EU	*EURHUF represents 1 EUR per x HUF (Hungarian Forints)*	**EURHUF**	
EU	*EURNOK represents 1 EUR per x NOK (Norwegian Krone)*	**USDNOK**	
EU	*EURPLN represents 1 EUR per x PLN (Polish Zloty)*	**EURPLN**	
EU	*EURRON represents 1 EUR per x RON (Romanian Leu)*	**EURRON**	
EU	*EURRSD represents 1 EUR per x RSD (Serbian Dinar)*	**EURRSD**	
EU	*USDSEK represents 1 USD per x SEK (Swedish Krona)*	**USDSEK**	
Rest of Europe	*EURCHF represents 1 EUR per x CHF (Swiss Franc)*	**EURCHF**	
Rest of Europe	*EURRUB represents 1 EUR per x RUB (Russian Ruble)*	**EURRUB**	
Rest of Europe	*EURTRY represents 1 EUR per x TRY (Turkish Lira)*	**EURTRY**	
North America	*USDCAD represents 1 USD per x CAD (Canadian dollar)*	**USDCAD**	
North America	*EURUSD represents 1 EUR per x USD (US Dollar)*	**EURUSD**	

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[11] It is worth noting that, as monetary policy is assumed to follow the expectations implied by the baseline scenario also under the adverse scenario, this increase should not be interpreted as being driven by monetary policy decisions.

[12] http://www.eba.europa.eu/documents/10180/2106649/2018+EU-wide+Stress+Test+Market+Risk+Scenario.pdf

Australia and Pacific	*AUDUSD represents 1 AUD per x USD (Australian Dollar)*	**AUDUSD**	
Australia and Pacific	*NZDUSD represents 1 NZD per x USD (New Zealand Dollar)*	**NZDUSD**	
South and central America	*USDARS represents 1 USD per x ARS (Argentine Peso)*	**USDARS**	
South and central America	*USDBRL represents 1 USD per x BRL (Brazilian Real)*	**USDBRL**	
South and central America	*USDMXN represents 1 USD per x MXN (Mexican Peso)*	**USDMXN**	
Asia	*USDCNY represents 1 USD per x CNY (Chinese Yuan Renminbi)*	**USDCNY**	
Asia	*USDHKD represents 1 USD per x HKD (Hong Kong Dollar)*	**USDHKD**	
Asia	*USDINR represents 1 USD per x INR (Indian Rupee)*	**USDINR**	
Asia	*USDJPY represents 1 USD per x JPY (Japanese Yen)*	**USDJPY**	
Asia	*USDKRW represents 1 USD per x KRW (South Korean Won)*	**USDKRW**	
Asia	*USDMYR represents 1 USD per x MYR (Malaysian Ringgit)*	**USDMYR**	
Asia	*USDSGD represents 1 USD per x SGD (Singapore Dollar)*	**USDSGD**	
Asia	*USDTHB represents 1 USD per x THB (Thai Baht)*	**USDTHB**	
Asia	*USDTWD represents 1 USD per x TWD (New Taiwan Dollar)*	**USDTWD**	
Africa	*USDZAR represents 1 USD per x ZAR (South African Rand)*	**USDZAR**	

53. For fixed-rate instruments, banks which carry out the EBA exercise use the same reference rate curve for all instruments denominated in a given currency, from the same vintage, and the reference rate tenor should align with the original maturity of the instrument. For floating rate instruments, instruments may be contractually linked to a particular reference rate, in which case this rate is used as the reference rate instead.

54. It is worth noting in this context that the use of sovereign or corporate yields may imply an increase of the credit spread. Indeed, the yield level of a bond generally includes a credit spread on top of the swap curve. Therefore, there may be an overlap with the scenario simulating a change in the level of credit risk. As a consequence, the results of the two scenarios should not be aggregated for the analysis in order to avoid double counting, unless it is possible to isolate the credit risk component of the yield.

Draft Guidelines (please also see Annex IV)

Guideline 3	*With respect to the levels of change of the interest rates and exchange rates mentioned in Article 28(1)(c) of the MMF Regulation, and with respect to the levels of widening or narrowing of spreads among indices to which interest rates of portfolio securities are tied as mentioned in Article 28(1)(e) of the MMF Regulation, managers of MMFs should apply stressed market parameters, according to the following rules:* • *Managers of MMFs should use the parameters published by ESMA: Interest rate yield shocks; Government bond yield shocks; FX shocks.* • *For fixed-rate instruments, managers of MMFs should use the same reference rate curve for all instruments denominated in a given currency, originated at the same time, and the reference rate tenor should align with the original maturity of the instrument. For floating rate instruments, instruments may be contractually linked to a particular reference rate, in which case this rate is used as the reference rate instead.*

	• *Managers of MMFs should revaluate their portfolio taking into account the new parameters separately: interest rates, exchange rates, bond yields; and express the impact of each risk factor as a percentage of NAV.*

Questions:

Q17. Do you have views on which factors are relevant for the determination/calibration of shocks?

Q18. Do you consider that the parameters used for the 2018 EBA scenario cover all the parameters needed for the purpose of the MMF scenario on interest rates and exchange rates, and the scenario on hypothetical widening or narrowing of spreads among indices to which interest rates of portfolio securities are tied? If not, which parameters should be added?

3.5 **Hypothetical levels of redemption**

55. MMFs may face redemption pressures challenging their ability to redeem holdings at the request of investors in a short period of time. Such pressures take the form of stressed outflows over a certain time horizon; for example one week.

56. It is to be noted that liquidating positions without distorting portfolio allocation[13] requires a technique known as slicing, whereby the same percentage of each asset type (or each liquidity class if the assets are categorised according to their liquidity, also known as bucketing) is sold, rather than selling the most liquid assets first. This is to be taken into account when processing such stress tests.

57. Based on commercial data, ESMA collected weekly outflows on the period 2007-2013 for a sample of around 480 funds, including institutional and retail funds. The stressed outflows were calibrated on the worst percentile of the period (see table). In addition, it is suggested to make the assumption that retail investors are more stable and thus to apply a smaller shock to them.

Outflows (% NAV)[14]

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[13] The portfolio allocation depends on the investment policy of the fund and the holding characteristics at the moment of the stress test, such as: type of assets (see the list of UCITS eligible assets), duration, credit rating, yield, issuer, currency, geography.

[14] Figures are for illustration only. The final calibration may differ.

Institutional investors	Retail investors
30%	15%

58. The assessment of the stress test needs to take into account the ability of the MMF to meet the redemption pressure. ESMA suggests to measure the impact in two ways:

- Reverse liquidity stress test: Assuming that the manager of the MMF wants to keep its strategy unchanged to ensure a fair treatment of all investors, it will be required to produce a self-assessment on the maximum size of outflows the fund can face in one week without distorting portfolio allocation (especially asset class, geographical allocation and sectoral allocation). This assessment should also take into account the capacity to comply with the weekly liquid assets requirements specified in Article 24(1) of the MMF Regulation;
- Weekly liquidity stress test: weekly outflows will be compared with available weekly liquid assets, considered as the sum of highly liquid assets and weekly maturing assets.

Example of the reverse liquidity stress test

59. The calculation of the reverse liquidity stress test would take the following steps:

- For each asset class managers of MMFs are expected to measure the weekly tradable amount (including maturing assets). Contrary to the weekly stress test this weekly tradable amount shall be based on the managers' assessment. The maximum size of outflows the fund can face in one week is determined in the following manner:
  - o The asset class with the lowest weekly tradable amount will determine the maximum size of outflows the fund can face in one week without distorting portfolio allocation. For example:
    - i. A MMF has a NAV of 100: asset A 60, asset B 20 and asset C 20;
    - ii. The weekly tradable amount are: A 30 (50% of asset A); B 15 (75%) and C 5 (25%);
    - iii. The maximum outflows the fund can face in one week without distorting portfolio allocation is 25%. Above 25% of outflows the manager of the MMF will not be able to sell asset C and will therefore distort the portfolio allocation.
  - o Alternatively, if after a certain percentage of outflows, the MMF is not able to comply with the requirements specified in Article 24(1), (for example the WAM becomes greater than 60 days), this percentage is considered as the maximum outflow the MMF can handle in the scenario.
- The manager of the MMF reports the lowest figure of the two, in percentage terms.

Example of the weekly liquidity stress test

60. The calculation of the weekly liquidity stress test would take the following steps:

- Assets would be classified as highly liquid (bucket 1), with a weight of 100%, or included in the bucket 2 if they can be liquidated within 1 week with a discount. The weights are based on Basel 3 Liquidity Coverage Ratio (LCR) rules and adapted for MMFs. The table below is based on Basel 3 LCR weights.
- CQS refers to "Credit Quality Steps", within the meaning of the ESAs' Opinion 2016 041.[15]

Assets	Article	CQS	weight
Financial instruments issued or guaranteed by the institutions set out in Article 9(1)(a) or the MMFR	9(1)(a)	1	100%
Cash and deposits with credit institutions (redeemable on demand without penalty)	9(1)(c)		100%
Other weekly maturing assets			100%
Other contractual cash inflow to be paid within 5 business days (including repos and callable instruments)			100%
= Weekly liquid assets (bucket 1)			
Financial instruments issued or guaranteed by the institutions set out in Article 9(1)(a) or the MMFR	9(1)(a)	2	85%
Other money market instruments	9(1)(a)	1	85%
Eligible securitisations and asset-backed commercial paper (ABCPs)	9(1)(b)	1	85%
Deposits with credit institutions (redeemable on demand with a penalty)	9(1)(c)		100%*
Units or shares of other MMFs	9(1)(g)	1	75%
= Weekly liquid assets (bucket 2)			

* after penalty

61. Those weights would be applied to the MMF portfolio:

How to apply the weights: explanation

Assets	Holdings	CQS1	Maturing <5 days	CQS2	Bucket 1	Bucket 2
Financial instruments issued or guaranteed by the institutions set out in Article 9(1)(a) or the MMFR	15	8	1	2	9	1.7

- Assets: description of the asset;
- Holdings: the fund holds 15% of its portfolio in "Financial instruments […] set out in Article 9(1)(a) or the MMFR", for example sovereign bonds;
- CQS 1: financial instruments rated CQS 1 represent 8% of the fund portfolio;
- Maturing <5 days: 7% of the portfolio is rated below CQS 1 (15-8), of which 1% of the portfolio matures within 5 days;

- CQS 2: financial instruments rated CQS 2 (and maturing>5 days) represent 2% of the fund portfolio;
- Bucket 1: financial instruments rated CQS 1 (8%) and financial instruments maturing within 5 days (1%) are included in the bucket 1 of weekly liquid assets (8%+1%=9%);
- Bucket 2: financial instruments rated CQS 2 (2%) are included in the bucket 1 of weekly liquid assets, with a weight of 85% (2%*85%=1.7%).

62. The following example is meant to be a plausible MMF portfolio.

   i. Managers are expected to map the corresponding of their portfolio with the CQS using the mapping table provided in annex III of ESAs Opinion 2016 041.

Assets	Holdings (in %)	CQS1	Maturing <5 days	CQS2	Bucket 1	Bucket 2
Financial instruments issued or guaranteed by the institutions set out in Article 9(1)(a) or the MMFR	15	8	1	2	9	1.7
Cash and deposits with credit institutions (redeemable on demand without penalty)	10				10	
Other contractual cash inflow to be paid within 5 business days (including repos and callable instruments)	1				1	
Deposits with credit institutions (redeemable on demand with a penalty)	15					14
Other money market instruments (Article 9(1)(a) or the MMFR)	40	2				1.7
Eligible securitisations and asset-backed commercial paper (ABCPs)	5	3				2.6
Units or shares of other MMFs	10	10				5
Other assets	5					
Total	**100**				**20**	**25**
Weekly liquid assets					**45**	

   ii. The sum of the weighted weekly liquid assets will be expressed in percentage of the redemption shock. In this example, the fund would meet a redemption shock of 30% with 20% of highly liquid assets (bucket 1) and 45% of total weekly liquid assets (bucket 1 and 2). The manager would then report the ratio (Weekly liquid assets)/(Weekly outflows) as a result, i.e. 67% (bucket 1) and 150% (bucket 1 and 2).

Additional scenario

63. In addition, the fund manager would have to simulate the redemption of its two main investors.

Draft Guidelines (please also see Annex IV)

Guidelines	With respect to the levels of redemption mentioned in Article 28(1)(d) of the MMF Regulation, managers of MMFs should apply the following stressed redemption scenarios:
	• *MMF face net weekly redemption requests from 30% of their institutional investors and 15% of their retail investors.*
	The stress test will assess the ability of the fund to meet the redemption pressures in two ways:
	1) *Reverse liquidity stress test: self-assessment of the maximum size of outflows the fund can face without distorting the portfolio allocation.*
	$$Result\ (\%) = \frac{Slice\ of\ the\ portfolio\ that\ can\ be\ liquidated\ without\ changing\ the\ portfolio\ allocation}{Weekly\ outflows} * 100$$
	In that scenario:
	- *Assets have to be sold in a consistent proportion;*
	- *Weekly liquid assets requirements specified in Article 24(1) should be met.*
	2) *Weekly liquidity stress test: weekly outflows derived from the monthly outflows will be compared with available weekly liquid assets, considered as the sum of highly liquid assets and weekly maturing assets.*
	$$Result\ (\%) = \frac{Weekly\ liquid\ assets}{Weekly\ outflows} * 100$$
	For the computation of the weekly liquid assets, manager will apply the following weights to their portfolio:

Assets	CQS	weight
Cash, deposits with credit institutions and financial instruments redeemable on demand without penalty		100%
Financial instruments issued or guaranteed by the institutions set out in Article 9(1)(a) or the MMFR	1	100%
Other financial instruments maturing within 5 business day		100%
Other contractual cash inflow to be paid within 5 business days (including repos)		100%

Weekly liquid assets (bucket 1)		
Financial instruments issued or guaranteed by the institutions set out in Article 9(1)(a) or the MMFR	2	85%
Other money market instruments	1	85%
Eligible securitisations and asset-backed commercial paper (ABCPs)	1	85%
Deposits with credit institutions and financial instruments redeemable on demand with a penalty		100%*
Units or shares of other MMFs	1	75%
Weekly liquid assets (bucket 2)		

*after penalty

It is important to note that the liquidity of any asset classes should not be taken for granted. It should always be checked in an appropriate manner: if there is any doubt regarding the liquidity of a security, the fund manager should not include it in the weekly liquid assets.

Additional scenario

The MMF faces net redemption of its two main investors.

The impact of the stress test should be assessed according to the reverse liquidity stress test and the weekly liquidity stress test methodology.

Questions

Q19. Do you have views on which factors are relevant for the determination/calibration of shocks?

Q20. Do you agree with the proposed approaches: a self-assessment on the maximum size of outflows the fund can face without distorting portfolio allocation; a comparison of stressed outflows with available weekly liquid assets? Do you need additional guidance for performing the self-assessment?

Q21. Reverse stress test: do you have views on how to assess the capacity to comply with the weekly liquid assets requirements specified in Article 24(1)?

Q22. Do you think there should be differentiated outflows assumptions for retail and institutional investors (e.g. higher outflows from institutional investors)? What is your view on the outflow factors calibrated by ESMA?

Q23. Do you have views on the weights that should be attributed to weekly liquid assets?

Q24. Do you agree with the additional stress test scenario simulating outflows from the two main investors?

3.6 **Hypothetical macro systemic shocks affecting the economy as a whole**

64. With respect to the identification of macro-systemic shocks affecting the economy as a whole mentioned in Article 28(1)(f) of the MMF Regulation, the choice of hypothetical macro systemic shocks will depend to a large extent on the latest developments in the market.

65. Such a scenario could simulate adverse macro-economic developments or use as a basis a major systemic event that affected the economy as a whole in the past, such as the Lehman Brothers bankruptcy event. In accordance with Article 32(2) of the Regulation establishing ESMA, the design of the stress scenario could be revised on an annual basis in cooperation with the ESRB.

66. In future versions of the Guidelines, ESMA intends to develop an ad hoc multi-variate scenario, with stressed parameters different from the individual scenarios. This would include a narrative, i.e. simulate the impact of a particular or historical stress event.

67. However, ESMA proposes to keep the methodology simple for the 2018 Guidelines and ask MMF managers to report the combined impact of the different risk scenarios, including the redemption shock. In other words, MMF managers would be asked to use the same parameters they used for the different scenarios, but in a combined fashion.

68. In concrete terms, the scenario supposes a "run" of some investors followed by a macro systemic shock. MMF managers would thus have to measure the combined effect of all risk factors at the same time. In most cases the results from the macro systemic shock should differ from the simple aggregation of the individual shocks, for example due to the non-linearity of the impacts.

Link between macro systemic shock and individual scenarios

	Risk factors	Results
Macro	- Liquidity - Credit - FX Rate - Interest Rate - Level of Redemption - Spread among indices to which interest rates of portfolio securities are tied	% NAV - weekly liquid assets/ NAV

- Managers will have to assess the combined impact of all risk factors on their fund.

- The combined impact is expected to be different from the sum of the stress test results of all individual risk factors.
- When necessary some risk factors will be excluded to avoid double counting (e.g. credit risk factor and spreads).

Sequencing:

1 Redemptions

- X% of investors ask for redemption
- Managers use weekly liquid assets to meet redemption request (as described under the section "hypothetical levels of redemption")

2 Risk factors

- Risks factors are applied to the fund after redemption. For example and depending on the options:
- Bid ask spread widen; and
- Credit spread increase; and
- The Euro appreciate; and
- There is an upward shift of the yield curve; and
- Spread of indices to which interest rates of portfolio securities are tied increase.

3 Results

- Manager reports:
- The % change of NAV of after redemption and risks factors;
- The weekly liquid asset in % of NAV after redemption and risks factors

Example

- Fund NAV is 100; the value of weekly liquid assets is 30;
- 25% of investors withdraw their investment: NAV = 100 – 25 = 75; the value of liquid assets is: Weekly liquid assets = 30-25 = 5
- Risk factors have a combined impact of -20%: NAV = 75- (20%*75)= 60
- Weekly liquid assets/NAV= 5/60=8.3% (in this example no value loss is assumed for liquid assets)
- The manager report: impact on NAV=-20%; Weekly liquid assets/NAV=8.3%

Draft Guidelines (please also see Annex IV)

Guideline	With respect to the identification of macro-systemic shocks affecting the economy as a whole mentioned in Article 28(1)(f) of the MMF Regulation, managers should: - *Assess the impact of the redemption shock on weekly liquid assets;* - *Measure the combined impact of the different risk scenarios after redemption;* - *Report the result as a percentage of NAV;* - *Report the value of weekly liquid assets after stress as a percentage of NAV.*

	Risk factors
Macro	- Liquidity - Credit - FX Rate - Interest Rate - Level of Redemption - Spread among indices to which interest rates of portfolio securities are tied
Results	% NAV - weekly liquid assets/ NAV

Questions

Q25. Do you agree that for the first update of the guidelines MMF managers could be asked to combine the impact of the different risk scenarios, including the liquidity shock?

4 Annexes

4.1 Annex I

Summary of questions

Q1 Do you agree that the impact of market stress should be primarily measured on the NAV?

Q2 Do you agree that some assets may not be stressed under all scenarios (in which case the scope of the assets that are subject to the individual stress tests will be clearly defined in the guidelines)? Or should we include additional assumption for those assets (e.g. default by depositary banks in repaying cash holdings)?

Q3 Do you have views on the way to stress collateral in collateralised transactions (e.g. repos, derivatives)? It may especially involve increased counterparty risk or the need to post additional collateral.

Q4 Do you agree that the same market stress parameters should be used for all MMFs in order to measure the impact on NAV? Do you have views on the way to take into account the type of fund (short term and standard; CNAV, VNAV and LVNAV) to measure the impact on the fund?

Q5 Do you agree that a consistent approach between the ESAs should be attained? Were appropriate, which risk parameters need to be significantly different?

Q6 Do you have views on which factors are relevant for the determination/calibration of shocks?

Q7 Do you have a preference between the two proposed options: calibrated discount factor on bid prices; Multiple quoted bid-ask spread?

Q8 What is your view on how to stress underlying assets not mentioned above (i.e. not corporate and government bonds)? In your opinion are there asset classes not mentioned above that should be excluded from a quantitative assessment?

Q9 Do you have any views on the calibration? With reference to Option 2, do you think that the adoption of fixed stress factors for different asset classes is in line with practices? Which elements should be identified and used to define the appropriate stress factor for each asset class?

Q10 Do you think that the volume of an asset held by the fund should be considered for the proposed stress factors (esp. the value of assets held compared with the size of the underlying market)? Do you have any views on the methodology?

Q11 Do you have views on which factors are relevant for the determination/calibration of shocks?

Q12 Do you have a preference between the two proposed options: spreads multiplied by a factor or ESMA credit spread parameter?

Q13 Do you see specific issues (e.g. implementation, non-standardisation, or similar) with either of the two options?

Q14 Do you agree with having an additional credit stress simulating the default of the fund's two main exposures?

Q15 The additional stress simulates the default of the fund two main exposures: when an exposure is collateralised, do you think that additional assumptions on the value of the collateral are necessary (i.e. if the defaulting counterparty is fully collateralised, and the value of the collateral is unchanged, there will be no impact)?

Q16 Do you think that additional assumptions are needed to calculate the loss given default in the additional scenario?

Q17 Do you have views on which factors are relevant for the determination/calibration of shocks?

Q18 Do you consider that the parameters used for the 2018 EBA scenario cover all the parameters needed for the purpose of the MMF scenario on interest rates and exchange rates, and the scenario on hypothetical widening or narrowing of spreads among indices to which interest rates of portfolio securities are tied? If not, which parameters should be added?

Q19 Do you have views on which factors are relevant for the determination/calibration of shocks?

Q20 Do you agree with the proposed approaches: a self-assessment on the maximum size of outflows the fund can face without distorting portfolio allocation; a comparison of stressed outflows with available weekly liquid assets?

Q21 Reverse stress test: do you have views on how to assess the capacity to comply with the weekly liquid assets requirements specified in Article 24(1)?

Q22 Do you think there should be differentiated outflows assumptions for retail and institutional investors (e.g. higher outflows from institutional investors).

Q23 Do you have views on the weights that should be attributed to weekly liquid assets?

Q24 Do you agree with the additional stress test scenario simulating outflows from the two main investors?

Q25 Do you agree that for the first update of the guidelines MMF managers could be asked to combine the impact of the different risk scenarios, including the liquidity shock?

4.2 **Annex II**

Legislative reference to update the guidelines on stress scenarios under article 28 of the MMF Regulation

According to the article 28(7) of the MMF Regulation "*ESMA shall issue guidelines with a view to establishing common reference parameters of the stress test scenarios to be included in the stress tests taking into account the factors specified in paragraph 1. The guidelines shall be updated at least every year taking into account the latest market developments*".

The present CP relates to the first update of the guidelines.

4.3 **Annex III**

Cost-benefit analysis

1. **Introduction**

69.   The MMF Regulation sets out a comprehensive framework for the regulation of MMFs within Europe. MMFs are AIFs or UCITS that are managed by alternative investment fund managers (AIFMs) or UCITS management companies or investment companies.

70.   The MMF Regulation establishes uniform rules regarding MMFs. It mandates ESMA to develop guidelines on stress tests scenarios, to be updated at least yearly. This proposed update is described above in this consultation paper, in relation to the stress tests the results of which shall be reported under the reporting template referred to in Article 37 of the MMF Regulation.

71.   This draft CBA is qualitative in nature. Should relevant data be received through the consultation process, ESMA will take it into account when finalising its guidelines and will include it in the CBA accompanying the final report.

2. **Technical options**

72.   The following options were identified and analysed by ESMA to address the policy objectives of the Guidelines required under the MMF Regulation.

73.   In identifying the options set out below ESMA was guided by the relevant MMF Regulation rules.

> #### 2.1. **Guidelines under Article 28(1)(a) of the MMF Regulation (hypothetical changes in the level of liquidity of the assets held in the portfolio of the MMF),**

Policy Objective	Under Article 37(4), the MMF Regulation indicates that managers of MMFs should conduct common reference stress test scenarios and report the results in the reporting template mentioned in article 37(4) of the MMF Regulation. The MMF Regulation specifies that the different risk factors shall be taken in consideration in the stress test scenarios, including:
	a. hypothetical changes in the level of liquidity of the assets held in the portfolio of the MMF;
	Under Article 28(7) of the MMF Regulation ESMA is requested to develop guidelines:
	A. that establish common reference parameters of the stress test scenarios;

	B. that are updated at least every year taking into account the latest market developments.
Baseline scenario	The baseline scenario should be understood for this CBA as the application of the requirements in the Level 1 Regulation (i.e. the provisions of Article 28 of the MMF Regulation) without any further specification, except those mentioned in the sections 4.1 to 4.6 of the published Guidelines on MMF stress tests. This would leave discretion to managers of MMF to determine the definition of risk factors, calculation methodologies, and presentation of results of the stress tests in the reporting template mentioned in the article 37 of the MMF Regulation. This could clearly lead to a lack of harmonisation in the application of the provisions of the MMF Regulation across the MMF industry on a potentially sensitive issue. Indeed, uncertainty on the abovementioned requirement could lead to a situation where some Member States would adopt stricter rules than others on the choice of the calculation methodologies and on the presentation of results of the stress tests, leading to greater uncertainty for investors of MMFs in the different Member States and lack of comparability of results.
Options	With respect to hypothetical changes in the level of liquidity of the assets held in the portfolio, the two options that are suggested could include: **Option 1:** Calibrated discount factor • The asset manager will apply the discount factors calibrated by ESMA to reflect the increase in liquidity premia due to deterioration of market liquidity conditions in a stress scenario. • For each relevant security (i.e. corporate and government bonds), the discount factors should be applied to the bid prices used for the valuation of the fund at the time of the reporting, according to their type and maturity (see Table A and Table B), to derive an adjusted bid price (Bid_{adj}): $$Bid_{adj} = (1 - liquidity\ discount) * Bid\ price$$ • The asset managers should estimate the impact of the potential losses by valuing investment portfolio at the derived adjusted bid price, Bid_{adj}, to determine the

	Stressed NAV and report the impact as a percentage of the reporting NAV:
	$$Asset\ liquidity\ risk\ impact\ (\%) = \frac{Reporting\ NAV - Stressed\ NAV}{Reporting\ NAV} * 100$$ **Option 2:** Multiple quoted bid-ask spread - For each relevant security (i.e. corporate and government bonds), the manager of the MMF should consider the quoted bid and ask prices observed in an active market at the time of the reporting. - For each security, the stressed bid-ask spread should be calculated by multiplying the quoted bid-ask spread observed in an active market at the time of the reporting, as a percentage of the actual price, by fixed stress test factor specific to each type of asset considered (e.g. corporate and sovereign bonds). $$Stressed\ bid\text{-}ask = Quoted\ bid\text{-}ask\ spread * Asset\text{-}class\ stress\ factor$$ - As trading costs could become substantial in times of heightened stress and illiquidity, the asset-class specific stress factor should reflect the maximum loss due to the unfavourable liquidity condition for each relevant asset class (i.e. corporate and government bonds). - The potential loss in case of forced liquidation should be then computed as the average of the Stressed bid-ask spread weighted by the asset's proportion in the portfolio.
Preferred Option	ESMA decided to consult on option 1 and 2.

2.2. Guidelines under Article 28(1)(b) of the MMF Regulation (hypothetical changes in the level of credit risk of the assets held in the portfolio of the MMF),

Policy Objective	Under Article 37(4), the MMF Regulation indicates that managers of MMFs should conduct common reference stress test scenarios and report the results in the reporting template mentioned in article 37(4) of the MMF Regulation. The MMF

	Regulation specifies that the different risk factors shall be taken in consideration in the stress test scenarios, including: b. hypothetical changes in the level of credit risk of the assets held in the portfolio of the MMF, including credit events and rating events; Under Article 28(7) of the MMF Regulation ESMA is requested to develop Guidelines: A. that establish common reference parameters of the stress test scenarios; B. that are updated at least every year taking into account the latest market developments.
Baseline scenario	The baseline scenario should be understood for this CBA as the application of the requirements in the Level 1 Regulation (i.e. the provisions of Article 28 of the MMF Regulation) without any further specification, except those mentioned in the sections 4.1 to 4.6 of the published Guidelines on MMF stress tests. This would leave discretion to managers of MMF to determine the definition of risk factors, calculation methodologies, and presentation of results of the stress tests in the reporting template mentioned in the article 37 of the MMF Regulation. This could clearly lead to a lack of harmonisation in the application of the provisions of the MMF Regulation across the MMF industry on a potentially sensitive issue. Indeed, uncertainty on the abovementioned requirement could lead to a situation where some Member States would adopt stricter rules than others on the choice of the definition of risk factors, calculation methodologies, and presentation of results of the stress tests, leading to greater uncertainty for investors of MMFs in the different Member States and lack of comparability of results.
Options	With respect to hypothetical changes in the level of credit risk of the assets held in the portfolio of the MMF, including credit events and rating events, the two options that are suggested could include: **Option 1:** The first option would base the stress test on credit spread to the extent possible : • For each security, managers of MMFs should apply the multiplying factor communicated by ESMA.

	• For each security, managers of MMFs should translate the corresponding change in spread into a haircut. • Managers of MMFs should measure the impact of the cumulated haircuts in percentage of NAV. **Option 2:** MMFs should measure the impact of an increase in credit spread, according to the following rules: • For each security, managers of MMFs should apply the increase in spread communicated by ESMA. • If no spread is available for an instrument, managers of MMFs should use the shock on the reference index given by ESMA. • For each security, managers of MMFs should translate the corresponding change in spread into a haircut. • Managers of MMFs should measure the impact of the cumulated haircuts in percentage of NAV. **Additional Option**: Managers of MMFs should also simulate the default of their two main exposures. The resulting impact on NAV would then be reported.
Preferred Option	ESMA decided to consult on option 1 and 2 and the additional option.

2.3.   Guidelines under Article 28(1)(c)(e) of the MMF Regulation (hypothetical movements of the interest rates and exchange rates *and* hypothetical widening or narrowing of spreads),

Policy Objective	Under Article 37(4), the MMF Regulation indicates that managers of MMFs should conduct common reference stress test scenarios and report the results in the reporting template mentioned in article 37(4) of the MMF Regulation. The MMF Regulation specifies that the different risk factors shall be taken in consideration in the stress test scenarios, including: c. hypothetical movements of the interest rates and exchange rates and, d. hypothetical widening or narrowing of spreads among indices to which interest rates of portfolio securities are tied Under Article 28(7) of the MMF Regulation ESMA is requested to develop guidelines:

	A. that establish common reference parameters of the stress test scenarios; B. that are updated at least every year taking into account the latest market developments.
Baseline scenario	The baseline scenario should be understood for this CBA as the application of the requirements in the Level 1 Regulation (i.e. the provisions of Article 28 of the MMF Regulation) without any further specification, except those mentioned in the sections 4.1 to 4.6 of the published Guidelines on MMF stress tests. This would leave discretion to managers of MMF to determine the definition of risk factors, calculation methodologies, and presentation of results of the stress tests in the reporting template mentioned in the article 37 of the MMF Regulation. This could clearly lead to a lack of harmonisation in the application of the provisions of the MMF Regulation across the MMF industry on a potentially sensitive issue. Indeed, uncertainty on the abovementioned requirement could lead to a situation where some Member States would adopt stricter rules than others on the choice of the definition of risk factors, calculation methodologies, and presentation of results of the stress tests, leading to greater uncertainty for investors of MMFs in the different Member States and lack of comparability of results.
Options	**Option 1:** With respect to hypothetical movements of the interest rates and exchange rates, and the hypothetical widening or narrowing of spreads among indices to which interest rates of portfolio securities are tied, managers of MMFs should apply stressed market parameters, according to the following rules: • Managers of MMFs should use the parameters published by ESMA: Interest rate yield shocks. Government bond yield shocks; FX shocks. • For fixed-rate instruments, managers of MMFs should use the same reference rate curve for all instruments denominated in a given currency, originated at the same time, and the reference rate tenor should align with the original maturity of the instrument. For floating rate instruments, instruments may be contractually linked to a particular reference rate, in which case this rate is used as the reference rate instead. • Managers of MMFs should revaluate their portfolio taking into account the new parameters separately: Interest rates,

	exchange rates, bond yields; and express the impact of each risk factor in percentage of NAV.
Preferred Option	ESMA decided to consult on option 1.

2.4. Guidelines under Article 28(1)(d) of the MMF Regulation (hypothetical levels of redemption),

Policy Objective	Under Article 37(4), the MMF Regulation indicates that managers of MMFs should conduct common reference stress test scenarios and report the results in the reporting template mentioned in article 37(4) of the MMF Regulation. The MMF Regulation specifies that the different risk factors shall be taken in consideration in the stress test scenarios, including:
	e. hypothetical levels of redemption;
	Under Article 28(7) of the MMF Regulation ESMA is requested to develop Guidelines:
	A. that establish common reference parameters of the stress test scenarios;
	B. that are updated at least every year taking into account the latest market developments.
Baseline scenario	The baseline scenario should be understood for this CBA as the application of the requirements in the Level 1 Regulation (i.e. the provisions of Article 28 of the MMF Regulation) without any further specification, except those mentioned in the sections 4.1 to 4.6 of the published Guidelines on MMF stress tests. This would leave discretion to managers of MMF to determine the definition of risk factors, calculation methodologies, and presentation of results of the stress tests in the reporting template mentioned in the article 37 of the MMF Regulation. This could clearly lead to a lack of harmonisation in the application of the provisions of the MMF Regulation across the MMF industry on a potentially sensitive issue.
	Indeed, uncertainty on the abovementioned requirement could lead to a situation where some Member States would adopt stricter rules than others on the choice of the definition of risk factors, calculation methodologies, and presentation of results of the stress tests, leading to greater uncertainty for investors of

	MMFs in the different Member States and lack of comparability of results.
Options	With respect to hypothetical levels of redemption, the two options that are suggested could include:
	Option 1: MMF face high weekly redemption requests from both institutional investor and retail investors.
	The stress test will assess the ability of the fund to meet the redemption pressures in two ways:
	1) <u>Reverse liquidity stress test:</u> self-assessment of the maximum size of outflows the fund can face without distorting portfolio allocation.
	$$Result\ (\%) = \frac{\text{Slice of the portfolio that can be liquidated without changing the portfolio allocation}}{\text{Weekly outflows}} * 100$$
	In that scenario: - Assets have to be sold in a consistent proportion; - Weekly liquid assets requirements specified in Article 24(1) should be met.
	2) <u>Weekly liquidity stress test:</u> weekly outflows derived from the monthly outflows will be compared with available weekly liquid assets, considered as the sum of highly liquid assets and weekly maturing assets.
	$$Result\ (\%) = \frac{Weekly\ liquid\ assets}{Weekly\ outflows} * 100$$
	Additional option: The MMF faces net redemption of its two main investors.
	The impact of the stress test should be assessed according to the reverse liquidity stress test and the weekly liquidity stress test methodology.
Preferred Option	ESMA decided to consult on option 1 and the additional option.

2.5. Guidelines under Article 28(1)(f) of the MMF Regulation (hypothetical levels of redemption)

Policy Objective	Under Article 37(4), the MMF Regulation indicates that managers of MMFs should conduct common reference stress test scenarios and report the results in the reporting template mentioned in article 37(4) of the MMF Regulation. The MMF Regulation specifies that the different risk factors shall be taken in consideration in the stress test scenarios, including: f. hypothetical macro systemic shocks affecting the economy as a whole; Under Article 28(7) of the MMF Regulation ESMA is requested to develop guidelines: A. that establish common reference parameters of the stress test scenarios; B. that are updated at least every year taking into account the latest market developments.
Baseline scenario	The baseline scenario should be understood for this CBA as the application of the requirements in the Level 1 Regulation (i.e. the provisions of Article 28 of the MMF Regulation) without any further specification, except those mentioned in the sections 4.1 to 4.6 of the published Guidelines on MMF stress tests. This would leave discretion to managers of MMF to determine the definition of risk factors, calculation methodologies, and presentation of results of the stress tests in the reporting template mentioned in the article 37 of the MMF Regulation. This could clearly lead to a lack of harmonisation in the application of the provisions of the MMF Regulation across the MMF industry on a potentially sensitive issue. Indeed, uncertainty on the abovementioned requirement could lead to a situation where some Member States would adopt stricter rules than others on the choice of the definition of risk factors, calculation methodologies, and presentation of results of the stress tests, leading to greater uncertainty for investors of MMFs in the different Member States and lack of comparability of results.
Options	**Option 1:** With respect to hypothetical macro systemic shocks affecting the economy as a whole, managers should: - Assess the impact of the redemption shock on weekly liquid assets;

	- Measure the combined impact of the different risk scenarios after redemption; - Report the result as a percentage of NAV; - Report the value of weekly liquid assets after stress as a percentage of NAV.
Preferred Option	ESMA decided to consult on option 1.

3. Assessment of the impact of the various options

3.1. Hypothetical changes in the level of liquidity of the assets held in the portfolio of the MMF

Option 1	Qualitative description
Benefits	The two methods proposed are both implicitly based on the assumption that an asset can be liquidated by paying to the liquidity provider a price for immediacy, i.e. a fair discount. The liquidity discount, that is the reduction in the value of an asset by due to the worsened liquidity conditions, is an increasing function of the cost of trading and inversely related to the average holding period of an asset. However, the first factor plays a more relevant role as the MMFs and short-term MMFs portfolios are composed of short-term instruments. Under normal market conditions, it is common practice to refer to a price within the bid-ask spread as the most representative of fair value i.e. the price that would be received to sell an asset (IFRS13). Moreover, the IAS39 indicates that the price used for measuring the fair value of an asset should be adjusted in case of a significant change in economic circumstances and reflect then the amount that an entity would receive in abnormal conditions (e.g. forced transaction, involuntary liquidation or distress sale). In case of stress, the mid-market price of an instrument can remain stable even when the bid-ask widens and no transaction can occur because of the absence of a buyer and/or the lack of marketability. The potential loss would be instead reflected in a lower bid price than the one available under normal conditions in an active market. Calibrating the liquidity discount consistently with the assessment of prevailing sources of (systemic) risk for the EU financial system allows to better gauge the effects of asset liquidity risk under an extreme but plausible stress scenario.

Costs	The proposed approach is unlikely to lead to significant implementation costs to the extent that the discount are provided by ESMA and require little more computation.
	ESMA seeks the views of stakeholders on the costs of imposing haircuts as suggested above.

Option 2	Qualitative description
Benefits	The two methods proposed are both implicitly based on the assumption that an asset can be liquidated by paying to the liquidity provider a price for immediacy, i.e. a fair discount. The liquidity discount is an increasing function of the transaction costs and a decreasing function of the average holding period. However, the first factor plays a more relevant role as the MMFs and short-term MMFs portfolios are composed of short-term instruments.
	The use of the prevailing bid-ask spread takes into account the current market conditions, thus improving the plausibility of the scenario.
Costs	The quoted bid-ask spread may be large as posted bid and ask prices represent starting point of negotiations. Therefore, a quoted spread may misrepresent execution costs and assets' liquidity due to trades occurring within the quotes. The proposed approach may lead to some additional costs in the form of data collection and computation based on internal models.
	ESMA seeks the views of stakeholders on the costs of imposing such liquidity scenario.

3.2. Hypothetical changes in the level of credit risk of the assets held in the portfolio of the MMF, including credit events and rating events

Option 1	Qualitative description
Benefits	Credit spreads represent the price of credit risk on the market. Thus they can measure the short term value loss of a portfolio.

	Using a multiplying factor takes into account the current market conditions and thus reflect the risks prevailing at the moment of the stress.
Costs	The proposed approach may lead to some additional costs in the form of computation based on internal models, with a risk of heterogeneity of the results.
	Multiplying the credit spread may be a simplistic assumption in some cases. ESMA seeks the views of stakeholders on the costs of imposing haircuts as suggested above.

Option 2	Qualitative description
Benefits	Credit spreads represent the price of credit risk on the market. Thus they can measure the short term value loss of a portfolio.
	ESMA may provide the CDS spread for a wide range of securities, thus improving the consistency of the approach.
	If no spread is available for an instrument, reference indices given by ESMA can serve as a proxy.
Costs	The scenario needs to be calibrated by ESMA, the ESRB and the ECB, implying cost for those institutions.
	ESMA seeks the views of stakeholders on the costs of imposing haircuts as suggested above.

Additional option	Qualitative description
Benefits	Assessing the default of the 2 main counterparties would add a dimension of concentration risk to the scenario.
	It will especially assess risks related to concentration and credit risk stemming from assets which don't have a credit spread.
Costs	The proposed approach may not lead to significant additional costs due to the simplicity of the assumption.
	ESMA seeks the views of stakeholders on the costs of imposing such counterparty default scenario.

3.3. Hypothetical movements of the interest rates and exchange rates. Hypothetical widening or narrowing of spreads among indices to which interest rates of portfolio securities are tied

Option 1	Qualitative description
Benefits	Using ESMA stress test parameters, in cooperation with the ESRB, will ensure the consistency of the scenario.
Costs	The proposed approach may lead to some additional costs in the form of computation based on internal models. ESMA seeks the views of stakeholders on the costs of imposing such scenario.

3.4. Hypothetical levels of redemption

Option 1	Qualitative description
Benefits	Specifying outflows over a certain time horizon challenges MMFs capability to face redemption pressures in a short period of time. Liquidating positions without distorting portfolio allocation requires a technique known as slicing, whereby the same percentage of each asset type (or each liquidity class if the assets are categorised according to their liquidity, also known as bucketing) is sold, rather than selling the most liquid assets first. Using a reverse stress test and a weekly liquidity stress test captures both the slicing and bucketing approaches. Finally, using a self-assessment for the reverse stress test compensate for the weights imposed in the weekly liquidity stress test, and vice-versa.
Costs	The self-assessment of the reverse stress test may lead to some additional costs. ESMA seeks the views of stakeholders on the costs of imposing such scenario.

Additional option	Qualitative description

Benefits	MMFs may face difficulties if their investor base is concentrated. Assessing the redemption from the 2 main investors would add a dimension of concentration risk to the scenario
Costs	The proposed approach may not lead to significant additional costs due to the simplicity of the assumption. ESMA seeks the views of stakeholders on the costs of imposing haircuts as suggested above.

3.5. Hypothetical macro systemic shocks affecting the economy as a whole.

Option 1	Qualitative description
Benefits	Considering that a macro systemic shock may spread to all risk factors, ESMA proposes to keep the methodology simple for the first version of the guidelines and to ask the managers to report the combined impact of the different risk scenarios, including the redemption shock. In other words, they would be asked to use the same parameters they used for the different scenarios, but in a combined fashion. In future version of the guidelines, ESMA may develop an ad hoc multi-variate scenario, with stressed parameters different from the individual scenarios. It may especially include a narrative, i.e. simulate the impact of a stress event in particular.
Costs	The combined impact is expected to be different from the sum of the stress test results of all individual risk factors. ESMA seeks the views of stakeholders on the costs of imposing haircuts as suggested above.

4.4 **Annex IV (update in red to the ESMA34-49-115 Guidelines)**

1 Scope

Who?

1. These guidelines apply to: i) national competent authorities; and ii) money market funds and managers of money market funds as defined in Regulation (EU) 2017/1131 of the European Parliament and of the Council on money market funds[16] ('MMF Regulation').

What?

2. These guidelines establish common reference parameters for the stress test scenarios to be included in a MMF's stress tests conducted in accordance with Article 28 of the MMF Regulation.

When?

3. These guidelines apply from the dates specified in Articles 44 and 47 of the MMF Regulation ([instert date: dd/mm/yyyy]).

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[16] OJ L 30.06..2017, p.169/40.

2 Purpose

4. The purpose of these guidelines is to ensure common, uniform and consistent application of the provisions in Article 28(1) of the MMF Regulation. In particular, and as specified in Article 28(7) of the MMF Regulation, they establish common reference parameters of the stress test scenarios to be included in the stress tests taking into account the following factors specified in Articles 28(1) of the MMF Regulation:

a) hypothetical changes in the level of liquidity of the assets held in the portfolio of the MMF;

b) hypothetical changes in the level of credit risk of the assets held in the portfolio of the MMF, including credit events and rating events;

c) hypothetical movements of the interest rates and exchange rates;

d) hypothetical levels of redemption;

e) hypothetical widening or narrowing of spreads among indexes to which interest rates of portfolio securities are tied;

f) hypothetical macro systemic shocks affecting the economy as a whole.

5. In accordance with Article 28(7) MMF Regulation and the Implementing Regulation 2018/708, these guidelines will be updated at least every year taking into account the latest market developments. In 2018, the section 4.8 of these guidelines is in particular updated so that managers of MMFs have the information needed to fill in the corresponding fields in the reporting template mentioned in Article 37 of the MMF Regulation. This information includes specifications on the type of the stress tests mentioned in this section 4.8 and their calibration.

3 Compliance and reporting obligations

3.1 Status of the guidelines

6. In accordance with Article 16(3) of the ESMA Regulation national competent authorities and financial market participants must make every effort to comply with guidelines and recommendations.

3.2 Reporting requirements

7. Competent authorities to which these guidelines apply must notify ESMA whether they comply or intend to comply with the guidelines, with reasons for non-compliance, within two months of the date of publication by ESMA to [email address]. In the absence of a response by this deadline, competent authorities will be considered as non-compliant. A template for notifications is available from the ESMA website.

4 Guidelines on stress test scenarios under Article 28 of the MMF Regulation

4.1 Guidelines on certain general features of the stress test scenarios of MMF

Scope of the effects on the MMF of the proposed stress test scenarios

8. Article 28(1) of the MMF Regulation requires MMFs to put in place "sound stress testing processes that identify possible events or future changes in economic conditions which could have unfavourable effects on the MMF".

9. This leaves room for interpretation on the exact meaning of the "effects on the MMF", such as:
- impact on the portfolio or net asset value of the MMF,
- impact on the minimum amount of liquid assets that mature daily or weekly as referred to in Article 24(c) to 24(h) and Article 25(c) to 25(e) of the MMF Regulation,
- impact on the ability of the manager of the MMF to meet investors' redemption requests,
- impact on the difference between the constant NAV per unit or share and the NAV per unit or share (as explicitly mentioned in Article 28(2) of the MMF Regulation in the case of CNAV and LVNAV MMFs),
- impact on the ability of the manager to comply with the different diversification rules as specified in Article 17 of the MMF Regulation.

10. The wording of Article 28(1) of the MMF Regulation should include various possible definitions. In particular, the stress test scenarios referred to in Article 28 of the MMF

Regulation should test the impact of the various factors listed in Article 28(1) of the MMF Regulation on both i) the portfolio or net asset value of the MMF and ii) the liquidity bucket(s) of the MMF and/or the ability of the manager of the MMF to meet investors' redemption requests. This broad interpretation is in line with the stress-testing framework of the AIFMD, which includes both meanings in its Articles 15(3)(b) and 16(1). The specifications included in the following sections 4.2 to 4.7 therefore apply to stress test scenarios on both aspects mentioned above.

11. With respect to liquidity, it is to be noted that liquidity risk may result from: (i) significant redemptions; (ii) deterioration of the liquidity of assets; or (iii) a combination of the two.

Historical scenarios and hypothetical scenarios

12. With respect to both stress test scenarios on i) the portfolio or net asset value of the MMF and ii) the liquidity bucket(s) of the MMF and/or the ability of the manager of the MMF to meet investors' redemption requests, managers could use the factors specified in sections 4.2 to 4.7 using historical and hypothetical scenarios.

13. Historical scenarios reproduce the parameters of previous event or crises and extrapolate the impact they would have had on the present portfolio of the MMF.

14. While using historical scenarios, managers should vary the time windows in order to process several scenarios and avoid getting stress test results that depend overly on an arbitrary time window (e.g. one period with low interest rates and another with higher rates). By way of example, some commonly used scenarios refer to junk bonds in 2001, subprime mortgages in 2007, the Greek crisis in 2009 and the Chinese stock market crash in 2015. These scenarios may include independent or correlated shocks depending on the model.

15. Hypothetical scenarios are aimed at anticipating a specific event or crisis by setting its parameters and predicting its impact on the MMF. Examples of hypothetical scenarios include those based on economic and financial shocks, country or business risk (e.g. bankruptcy of a sovereign state or crash in an industrial sector). This type of scenario may require the creation of a dashboard of all changed risk factors, a correlation matrix and a choice of financial behaviour model. It also includes probabilistic scenarios based on implied volatility.

16. Such scenarios may be single-factor or multi-factor scenarios. Factors can be uncorrelated (fixed income, equity, counterparty, forex, volatility, correlation, etc.) or correlated: a particular shock may spread to all risk factors, depending on the correlation table used.

Aggregation of stress tests

17. In certain circumstances, in addition, managers could use aggregate stress test scenarios on a range of MMFs or even on all the MMFs managed by the manager. Aggregating results would provide an overview and could show, for example, the total volume of assets held by all the MMFs of the manager in a particular position, and the potential impact of several portfolios selling out of that position at the same time during a liquidity crisis.

Reverse stress testing

18. In addition to the stress test scenarios discussed in this section, the inclusion of reverse stress testing may also be of benefit. The intention behind a reverse stress test is to subject the MMF to stress testing scenarios to the point of failure, including the point where the regulatory thresholds set up in the MMF Regulation, such as those included in its Article 37(3)(a) would be breached. This would allow the manager of a MMF to have another tool to explore any vulnerabilities, pre-empt, and resolve such risks.

Combination of the various factors mentioned in the following sections 4.2 to 4.7 with investors' redemption requests

19. All factors mentioned in the following sections 4.2 to 4.7 should be tested against several levels of redemption. This is not to say that at first, managers should not also test them separately (without combining them with tests against levels of redemption), in order to be able to identify the corresponding respective impacts. The way this combination of the various factors mentioned in the following sections 4.2 to 4.7 with investors' redemption requests could be carried out is further specified in each of these sections.

20. In that context, some hypothesis on the behaviour of the manager with regard to honouring the redemption requests could be required.

21. A practical example of one possible implementation is given in Appendix.

Stress tests in the case of CNAV and LVNAV MMFs

22. Article 28(2) of the MMF Regulation indicates that in addition to the stress test criteria as set out in Article 28(1), CNAV and LVNAV MMFs shall estimate for different scenarios, the difference between the constant NAV per unit or share and the NAV per unit or share. While estimating this difference, and if the manager of the MMF is of the

view that this would be useful additional information, it may also be relevant to estimate the impact of the relevant factors included in sections 4.2 to 4.7 on the volatility of the portfolio or on the volatility of the net asset value of the fund.

<u>Non-exhaustiveness of the factors mentioned in the following sections 4.2 to 4.7</u>

23. The factors set out in the following sections 4.2 to 4.7 are minimum requirements. The manager would be expected to tailor the approach to the specificities of its MMFs and add any factors or requirements that it would deem useful to the stress test exercise. Examples of other factors that could be taken into account include the repo rate considering MMFs are a significant player in that market.

24. More generally the manager should build a number of scenarios, with different levels of severity, which would combine all the relevant factors (which is to say that there should not just be separate stress tests for each factor – please also refer to the following sections 4.2 to 4.7).

4.2 Guidelines on the establishment of common reference parameters of the stress test scenarios in relation to hypothetical changes in the level of liquidity of the assets held in the portfolio of the MMF

25. With respect to the level of changes of liquidity of the assets mentioned in Article 28(1)(a) of the MMF Regulation, managers could consider such parameters as:
- the gap between the bid and ask prices;
- the trading volumes;
- the maturity profile of assets;
- the number of counterparties active in the secondary market. This would reflect the fact that lack of liquidity of assets may result from secondary markets related issues, but may also be related to the maturity of the asset.

26. The manager could also consider a stress test scenario that would reflect an extreme event of liquidity shortfall due to dramatic redemptions, by combining the liquidity stress test with a bid - ask spread multiplied by a certain factor while assuming a certain redemption rate of the NAV

4.3 Guidelines on the establishment of common reference parameters of the stress test scenarios in relation to hypothetical changes in the level of credit risk of the assets held in the portfolio of the MMF, including credit events and rating events

27. With respect to the levels of changes in credit risk of the asset mentioned in Article 28(1)(b), guidance on this factor should not be too prescriptive because the widening or narrowing of credit spreads is usually based on quickly evolving market conditions.

28. However, managers could, for example, consider:
- the downgrade or default of particular portfolio security positions, each representing relevant exposures in the MMF's portfolio;
- the default of the biggest position of the portfolio combined with a downgrade of the ratings of assets within the portfolio;
- parallels shifts of the credit spreads of a certain level for all assets held in the portfolio.

29. With respect to such stress tests involving the levels of changes of credit risk of the asset, it would also be relevant to consider the impact of such stress tests on the credit quality assessment of the corresponding asset in the context of the methodology described in Article 19 of the MMF Regulation.

30. The manager should, for the purpose of combining different factors, combine changes to the level of credit risk of the assets held in the portfolio of the MMF with given levels of redemptions. The manager could consider a stress test scenario that would reflect an extreme event of stress due to uncertainty about the solvency of market participants, which would lead to increased risk premia and a flight to quality. This stress test scenario would combine the default of a certain percentage of the portfolio with spreads going up together while assuming a certain redemption rate of the NAV.

31. The manager could also consider a stress test scenario that would combine a default of a certain percentage of the value of the portfolio with an increase in short term interest rates and a certain redemption rate of the NAV

4.4 Guidelines on the establishment of common reference parameters of the stress test scenarios in relation to hypothetical movements of the interest rates and exchange rates

32. With respect to the levels of change of the interest rates and exchange rates mentioned in Article 28(1)(c) of the MMF Regulation, managers could consider stress testing of

parallel shifts of a certain level. More specifically, managers could consider depending on the specific nature of their strategy:

   i.   an increase in the level of short term interest rates with 1-month and 3-month treasury rates going up simultaneously while assuming a certain redemption rate;

   ii.   a gradual increase in the long term interest rates for sovereign bonds;

   iii. a parallel and/or non parallel shift in the interest rate curve that would change short, medium and long interest rate;

   iv. movements of the FX rate (base currency vs other currencies).

33. The manager could also consider a stress test scenario that would reflect an extreme event of increased interest rates that would combine an increase in short-term interest rates with a certain redemption rate. The manager could also consider a matrix of interest rates / credit spreads.

4.5 Guidelines on the establishment of common reference parameters of the stress test scenarios in relation to hypothetical levels of redemption

34. With respect to the levels of redemption mentioned in Article 28(1)(d) of the MMF Regulation, managers could consider redemption stress tests following from historical or hypothetical redemption levels or with the redemption being the maximum of either a certain percentage of the NAV or an opt-out redemption option exercised by the most important investors.

35. Stress tests on redemptions should include the specific measures which the MMF has the constitutional power to activate (for instance, gates and redemption notice).

36. The simulation of redemptions should be calibrated based on stability analysis of the liabilities (i.e. the capital), which itself depends on the type of investor (institutional, retail, private bank, etc.) and the concentration of the liabilities. The particular characteristics of the liabilities and any cyclical changes to redemptions would need to be taken into account when establishing redemption scenarios. However, there are many ways to test liabilities and redemptions. Examples of significant redemption scenarios include i) redemptions of a percentage of the liabilities ii) redemptions equal to the largest redemptions ever seen iii) redemptions based on an investor behaviour model.

37. Redemptions of a percentage of the liabilities could be defined based on the frequency of calculating the net asset value, any redemption notice period and the type of investors.

38. It is to be noted that liquidating positions without distorting portfolio allocation requires a technique known as slicing, whereby the same percentage of each asset type (or each liquidity class if the assets are categorised according to their liquidity, also known as bucketing) is sold, rather than selling the most liquid assets first. The design and execution of the stress test should take into account and specify whether to apply a slicing approach or by contrast a waterfall approach (i.e. selling the most liquid assets first).

39. In the case of redemption of units by the largest investor(s), rather than defining an arbitrary redemption percentage as in the previous case, managers could use information about the investor base of the MMF to refine the stress test. Specifically, the scenario involving redemption of units by the largest investors should be calibrated based on the concentration of the fund's liabilities and the relationships between the manager and the principal investors of the MMF (and the extent to which investors' behaviour is deemed volatile).

40. Managers could also stress test scenarios involving redemptions equal to the largest redemptions ever seen in a group of similar (geographically or in terms of fund type) MMFs or across all the funds managed by the manager. However, the largest redemptions witnessed in the past are not necessarily a reliable indicator of the worst redemptions that may occur in the future.

41. A practical example of one possible implementation is given in Appendix.

4.6 Guidelines on the establishment of common reference parameters of the stress test scenarios in relation to hypothetical widening or narrowing of spreads among indexes to which interest rates of portfolio securities are tied

42. With respect to the extent of a widening or narrowing of spreads among indexes to which interest rates of portfolio securities are tied as mentioned in Article 28(1)(e) of the MMF Regulation, managers could consider the widening of spreads in various sectors to which the portfolio of the MMF is exposed, in combination with various increase in shareholder redemptions. Managers could in particular consider a widening of spreads going up.

4.7 Guidelines on the establishment of common reference parameters of the stress test scenarios in relation to hypothetical macro systemic shocks affecting the economy as a whole

43. With respect to the identification of macro-systemic shocks affecting the economy as a whole mentioned in Article 28(1)(f) of the MMF Regulation, guidance on this item should not be prescriptive because the choice of hypothetical macro systemic shocks will depend to a large extent on the latest developments in the market.

44. However, ESMA is of the view that managers could use an adverse scenario in relation to the GDP. Managers could also replicate macro systemic shocks that affected the economy as a whole in the past.

45. Examples of such global stress test scenarios that the manager could consider are provided in Appendix.

4.8 Guidelines on the establishment of common reference stress test scenarios the results of which should be included in the reporting template mentioned in Article 37(4) of the MMF Regulation

46. In addition to the stress tests managers of MMFs conduct taking into account the requirements included in the sections 4.1 to 4.7 of these guidelines, managers of MMFs should conduct common reference stress test scenarios the results of which should be included in the reporting template mentioned in Article 37(4) of the MMF Regulation.

47. Managers of MMF should include in the reporting template mentioned in Article 37(4) of the MMF Regulation the results of the following stress tests:

Risk factor	Calibration	Results
Liquidity		
Credit		
FX Rate		
Interest Rate		
Level of Redemption		

Spread among indices to which interest rates of portfolio securities are tied		
Macro		
Multivariate		

48. In terms of results of the abovementioned reported stress test, given that the two main goals of the stress tests are to measure the impact of given shocks on the NAV and the impact on liquidity, both impacts should be reported.

49. With respect to the first iteration (2018) of the stress test scenarios, the following calibration should be taken into account in relation to the reporting of the results mentioned in the previous paragraph.

Level of changes of liquidity

50. With respect to the level of changes of liquidity of the assets mentioned in Article 28(1)(a) of the MMF Regulation:

Option 1: Calibrated discount factor

51. The fund will apply the discount factors calibrated by ESMA to reflect the increase in liquidity premia due to deterioration of market liquidity conditions in a stress scenario.

52. For each relevant security (i.e. corporate and government bonds), the discount factors should be applied to the bid prices used for the valuation of the fund at the time of the reporting, according to their type and maturity (see Table A and Table B), to derive an adjusted bid price (Bid_{adj}):

$$Bid_{adj} = (1 - liquidity\ discount) * Bid\ price$$

53. The manager of the MMF should estimate the impact of the potential losses by valuing the investment portfolio at the derived adjusted bid price, Bid_{adj}, to determine the stressed NAV and report the impact as a percentage of the reporting NAV:

$$Asset\ liquidity\ risk\ impact\ (\%) = \frac{Reporting\ NAV - Stressed\ NAV}{Reporting\ NAV} * 100$$

Table A: Government bonds[17] - discount factor (%)

Country	< 397 days	Between 397 days and 2 years
Austria	0.204	0.878
Belgium	0.064	0.412
Denmark	0.148	0.867
Finland	0.320	0.402
France	0.125	0.234
Germany	0.092	0.255
Greece	0.457	5.678
Ireland	0.201	0.291
Italy	0.142	0.397
Netherlands	0.078	0.609
Poland	0.821	1.017
Portugal	0.539	0.607
Spain	0.119	0.499

Source: MTS, ESMA calculations

Table B: Corporate - Investment grade - discount factor (%)

Category	< 397 days		Between 397 days and 2 years	
	Investment grade	High yield	Investment grade	High yield
Financials	1.209	1.934	4.721	7.553
Non-Financials	0.823	1.482	1.037	1.867

Source: MTS, ESMA calculations

Option 2: Multiple quoted bid-ask spread

54. For each relevant security (i.e. corporate and government bonds), the manager of the MMF should consider the quoted bid and ask prices observed in an active market at the time of the reporting.

54. For each security, the stressed bid-ask spread should be calculated by multiplying the quoted bid-ask spread observed in an active market at the time of the reporting, as a percentage of the actual price, by an asset-class specific stress factor:

$$Stressed\ bid\text{-}ask = Quoted\ bid\text{-}ask\ spread * Asset\text{-}class\ stress\ factor$$

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[17] The list of member States mentioned for illustrative purposes in Table A reports is meant to be non-exhaustive and limited by data availability.

55. As trading costs could become substantial in times of heightened stress and illiquidity, the asset-class specific stress factor should reflect the maximum loss due to the unfavourable liquidity condition for each relevant asset class (i.e. corporate and government bonds).

56. The potential loss in case of forced liquidation should be then computed as the average of the stressed bid-ask spread weighted by the asset's proportion in the portfolio.

Level of change of credit risk

57. With respect to the levels of changes of credit risk of the asset mentioned in Article 28(1)(b) of the MMF Regulation, managers of MMFs should apply stressed rating migrations to the MMF holdings, according to the following rules:

Option 1

- For each security, managers of MMFs should apply the multiplying factor communicated by ESMA.
- For each security, managers of MMFs should translate the corresponding change in spread into a haircut.
- Managers of MMFs should measure the impact of the cumulated haircuts in percentage of NAV.

Option 2

- For each security, managers of MMFs should apply the increase in spread communicated by ESMA.
- If no spread is available for an instrument, managers of MMFs should use the shock on the reference index given by ESMA.
- For each security, managers of MMFs should translate the corresponding change in spread into a haircut.
- Managers of MMFs should measure the impact of the cumulated haircuts in percentage of NAV.

Additional scenario

- Managers of MMFs should also simulate the default of their two main exposures. The resulting impact on NAV would then be reported.

Levels of change of the interest rates and exchange rates and levels of widening or narrowing of spreads among indexes to which interest rates of portfolio securities are tied

58. With respect to the levels of change of the interest rates and exchange rates mentioned in Article 28(1)(c) of the MMF Regulation, and with respect to levels of widening or narrowing of spreads among indexes to which interest rates of portfolio securities are tied as mentioned in Article 28(1)(e) of the MMF Regulation, managers of MMFs should apply stressed market parameters, according to the following rules:

- Managers of MMFs should use the parameters published by ESMA: Interest rate yield shocks:. Government bond yield shocks; FX shocks.
- For fixed-rate instruments, managers of MMFs should use the same reference rate curve for all instruments denominated in a given currency, originated at the same time, and the reference rate tenor should align with the original maturity of the instrument. For floating rate instruments, instruments may be contractually linked to a particular reference rate, in which case this rate is used as the reference rate instead.
- Managers of MMFs should revaluate their portfolio taking into account the new parameters separately: interest rates, exchange rates, bond yields; and express the impact of each risk factor as a percentage of NAV.

<u>Levels of redemption</u>

59. With respect to the levels of redemption mentioned in Article 28(1)(d) of the MMF Regulation, managers of MMFs should apply the following stressed redemption scenarios:
- MMFs face net weekly redemption requests from 30% of their institutional investors and 15% of their retail investors.

60. The stress test should assess the ability of the fund to meet the redemption pressures in 2 ways:

1) <u>Reverse liquidity stress test:</u> self-assessment of the maximum size of outflows the MMF can face without distorting portfolio allocation.

$$\text{Result } (\%) = \frac{\begin{array}{c}\text{Slice of the portfolio that can be liquidated}\\\text{without changing the portfolio allocation}\end{array}}{\text{Weekly outflows}} * 100$$

61. In that scenario:
- Assets have to be sold in a consistent proportion;
- Weekly liquid assets requirements specified in Article 24(1) should be met.

2) <u>Weekly liquidity stress test:</u> self-assessment of the maximum size of outflows the MMF can face without distorting portfolio allocation.

$$\text{Result } (\%) = \frac{\text{Weekly liquid assets}}{\text{Weekly outflows}} * 100$$

62. For the computation of the weekly liquid assets, manager will apply the following weights to their portfolio:

Assets	CQS	weight
Cash, deposits with credit institutions and financial instruments redeemable on demand without penalty		100%
Financial instruments issued or guaranteed by the institutions set out in Article 9(1)(a) or the MMFR	1	100%
Other financial instruments maturing within 5 business day		100%
Other contractual cash inflow to be paid within 5 business days (including repos)		100%
Weekly liquid assets (bucket 1)		
Financial instruments issued or guaranteed by the institutions set out in Article 9(1)(a) or the MMFR	2	85%
Other money market instruments	1	85%
Eligible securitisations and asset-backed commercial paper (ABCPs)	1	85%
Deposits with credit institutions and financial instruments redeemable on demand with a penalty		100%*
Units or shares of other MMFs	1	50%
Weekly liquid assets (bucket 2)		

*after penalty

63. It is important to note that the liquidity of any asset classes should not be taken for granted. It should always be checked in an appropriate manner: if there is any doubt regarding the liquidity of a security, the fund manager should not include it in the weekly liquid assets.

Additional scenario:

64. The MMF faces net redemption of its two main investors. The impact of the stress test should be assessed by managers of MMFs according to the reverse liquidity stress test and the weekly liquidity stress test methodology.

Macro-systemic shocks affecting the economy as a whole

65. With respect to the identification of macro-systemic shocks affecting the economy as a whole mentioned in Article 28(1)(f) of the MMF Regulation, managers should:

- Assess the impact of the redemption shock on weekly liquid assets;
- Measure the combined impact of the different risk scenarios after redemption;
- Report the result as a percentage of NAV;
- Report the value of weekly liquid assets after stress as a percentage of NAV.

	Risk factors
Macro	- Liquidity - Credit - FX Rate - Interest Rate - Level of Redemption - Spread among indices to which interest rates of portfolio securities are tied
Results	% NAV - weekly liquid assets/ NAV

5 Appendix

A.

Example of stress combining the various factors mentioned in sections 4.2 to 4.7 with investors' redemption requests

A practical example of one possible implementation of the section "Combination of the various factors mentioned in the following sections 4.2 to 4.7 with investors' redemption requests" is given below.

The table below estimates the losses incurred by the MMF in the event of redemptions or market stress (credit or interest rate shocks).

First scenario: credit premium shock of 25 bps

Second scenario: interest rate shock of 25 bps

	Three largest investors (25%) ↓								Very stable investors (15%) ↓	
Redemptions	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%
Initial portfolio			2 bps	3 bps	5 bps	6 bps	8 bps	9 bps	11 bps	12 bps
First scenario	7 bps	9 bps	13 bps	18 bps	24 bps	32 bps	45 bps	66 bps	110 bps	236 bps
Second scenario	3 bps	4 bps	6 bps	9 bps	12 bps	16 bps	21 bps	28 bps	38 bps	85 bps
WAL (days)	105	117	131	149	169	192	219	249	290	320

This stress test shows that a redemption by the three largest investors (25% of net assets) would push the weighted average life (WAL) beyond the 120-day regulatory threshold (for a short-term money market fund) and cause the portfolio to lose in the region of 2-3 bps under normal conditions. The same level of cumulative redemptions with a 25 bps rise in interest rates would cause a loss of around 13-18 bps.

B.

Example of Redemptions based on an investor behaviour model, in accordance with the breakdown of liabilities by investor category. This implies the simulation of the behaviour of each type of investor and establishes a simulation based on the composition of the liabilities of the MMF.

Example of investor classification and simulation of their behaviour (the figures shown are not real): Investor type	Record redemptions for this investor type		
	Over one day	Over one week	Over one month
Large institutional	25%	75%	100%
Group entity (bank, insurance, own account)	20%	40%	40%
Investment fund	20%	65%	100%
Small institutional	10%	25%	40%
Private banking network	15%	40%	75%
Retail investor with distributor A	5%	10%	20%
Retail investor with distributor B	7%	15%	20%

Stressed redemptions for this investor category

Large institutional	75%
Group entity (bank, insurance, own account)	0% (in agreement with the AMC)
Investment fund	65%
Small institutional	25%
Private banking network	40%
Retail investor with distributor A	10%
Retail investor with distributor B	15%

In order to build such a simulation of this kind, the manager needs to make assumptions about the behaviour of each investor type, based in part on historical redemptions. In the example above, the manager has noted that the retail investors who invested through distributor A are historically slower to exit in the event of difficulty, but that they exhibit the same behaviour over one month as retail investors who invested through distributor B. This fictitious example shows a possible classification that the manager may use based on the data available on the liabilities of the MMF and the behaviour of its investors.

C.

66. Examples of global stress test scenarios that the manager could consider:

67.

i. the Lehman Brothers' event with the calibration of all relevant factors one month ahead of the failure of this firm;

ii. A) a scenario including a combination of the 3 following factors: i) a parallel shift in interest rate (x) ii) a shift in credit spreads (y) and iii) a redemption stress (z));

iii. B) a scenario including a combination of the 3 following factors: i) a parallel shift in interest rate (x) ii) a shift in credit spreads (y) and iii) a redemption stress (z)) Variables x, y and z being the worst figures/shifts experienced by the fund, on an independent basis, for the last 12 months.