Guidelines

Guidelines on stress tests scenarios under Article 28 of the MMF Regulation
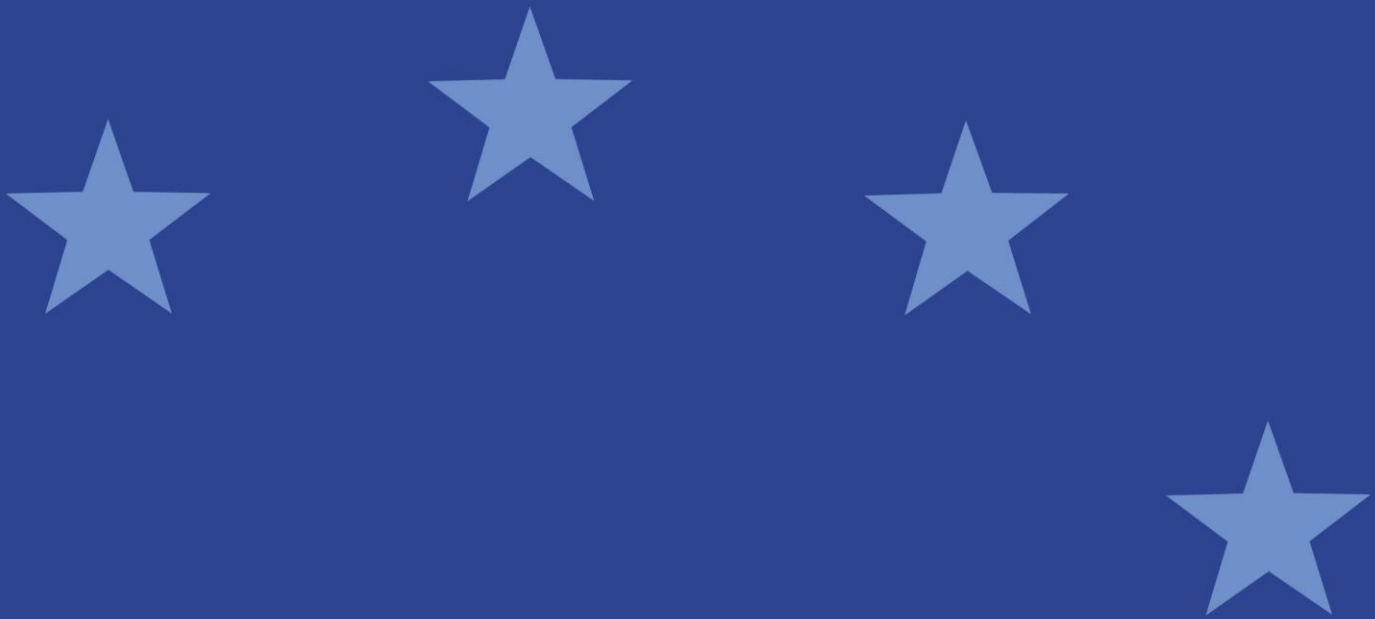
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1 Scope

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[1] ('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.

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[1] 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, these guidelines will be updated at least every year taking into account the latest market developments. The section 4.8 of these guidelines 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.

3 Compliance and reporting obligations

3.1 Status of the guidelines

6. This document contains guidelines issued under Article 16 of the ESMA Regulation. 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 1(A).

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.

Non-exhaustiveness of the factors mentioned in the following sections 4.2 to 4.7

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 1(B).

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 1(C).

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.

5 Annex

5.1 Appendix 1

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.

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

2.

 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.