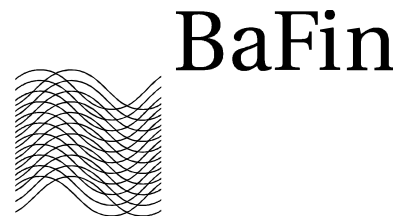


Report and guidelines

Liquidity stress testing in German asset management companies

Bundesanstalt für
Finanzdienstleistungsaufsicht



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Contents

1	Introduction.....	4
2	Germany's fund landscape – data and facts	5
3	Liquidity risks in investment funds	10
3.1	Definition of liquidity risk	10
3.2	Risk management	11
3.3	Current regulation of liquidity risks in Germany	12
3.4	Regulatory requirements for liquidity stress tests	15
3.5	Organisational requirements for stress tests.....	16
3.6	Responsibility of senior management.....	17
4	Monitoring liquidity risk in practice.....	17
4.1	Liquidity risk on the asset side.....	17
4.2	Liquidity risk on the liabilities side.....	20
4.3	Quantifying liquidity risk	22
5	Liquidity stress testing in German investment funds	23
5.1	Stress testing on the asset side	24
5.2	Stress tests for the liabilities side.....	26
5.3	Amalgamating the asset side and the liabilities side	27
5.4	Validation and backtesting	28
6	Risk analyses and reporting	29
7	Supervisory assessment.....	31
	Annex: Ongoing international projects	34

1 Introduction

The question of what role stress tests should play in the liquidity risk management of asset management companies (*Kapitalverwaltungsgesellschaften*) is the subject of widespread discussion at the moment. In its considerations regarding asset management, the Financial Stability Board (FSB) thus suggested that supervisory authorities should, at the least, give market participants supervisory guidance on sound liquidity risk management. European bodies, such as the European Systemic Risk Board (ESRB) and the European Securities and Markets Authority (ESMA), are also increasing their involvement with this topic at present. Lying behind the increased engagement with liquidity risk in investment funds (and asset management companies) is primarily the fear of "liquidity spirals", from a financial stability perspective. Liquidity spirals could lead to assets having to be sold as a result of large-scale redemptions of fund units in individual sectors or in a number of sectors, which would cause a sharp fall in prices and thereby potentially give rise to contagion effects. In order to gain a better understanding of these risks, the Federal Financial Supervisory Authority (*Bundesanstalt für Finanzdienstleistungsaufsicht* – BaFin) investigated companies' own rules for liquidity management and stress testing more closely, pursuing the notion that sound risk management at fund level is the first line of defence against the threat of contagion in the financial system. In the framework of this study, the specific risks of closed-ended funds were not investigated in more detail, as it can be assumed that such funds generally do not permit substantial redemptions during the fund's life.

In Germany, the provisions to mitigate liquidity risks in open-ended funds are principle-based, and compliance with these provisions is subject to BaFin's ongoing supervision. Asset management companies must have an appropriate liquidity risk management system in place and ensure that the investment strategy, liquidity profile and redemption policy are in line with each other. Furthermore, asset management companies must regularly conduct stress tests for all open-ended funds. These are to be conducted using both normal and exceptional liquidity conditions. Extraordinary liquidity management tools used in a distressed situation, such as redemption suspension, were not investigated in more detail in the framework of this study. These liquidity tools are also the subject of international debates at the present time, but it is not intended for such discussions to be further echoed in this paper. The overriding objective of the paper is to find out the status quo and take a closer look at the measures taken during ongoing business operations that can preemptively prevent emergency situations from arising. In the context of the international discussion regarding macroprudential or system-wide stress tests ("macro stress tests"), BaFin will work closely with the Deutsche Bundesbank.

In summer 2017, BaFin conducted a status quo analysis on liquidity management and liquidity stress testing practice at fund level at selected companies. The study was carried out on the basis of available documents as well as on-site meetings. This report provides a summary of the results and gives an overview of current practice in liquidity risk management and in liquidity stress testing at German asset management companies. On

certain points, the report highlights practices that BaFin considers to be desirable; these are intended to act as guidelines for the supervised companies within the framework of existing regulatory requirements.

2 Germany's fund landscape – data and facts

The structure of German asset management companies that manage open-ended funds is very heterogeneous. At the top end there are six companies that each manage more than €100 billion, while at the other end there are still 39 companies that have less than €1 billion under management.¹ These numbers alone suggest some significant differences in aspects of the companies' business models and risks, a supposition which was confirmed in the course of this study.

Table 1: German asset management companies by size (as at May 2017)

Size category	No.	Market share	Volume (€bn)
> €100bn	6	56%	1,115
€10 to €100bn	20	36%	717
€1 to <€10bn	41	8%	151
<€1bn	39	0%	2
Total	106²	100%	1,984

The total volume across German investment funds has risen steadily over the past few years and in June 2017 amounted to €2tn, with the majority of the fund volume coming from the investments of institutional investors in special funds (€1.51tn) and the remaining €481bn from retail funds.

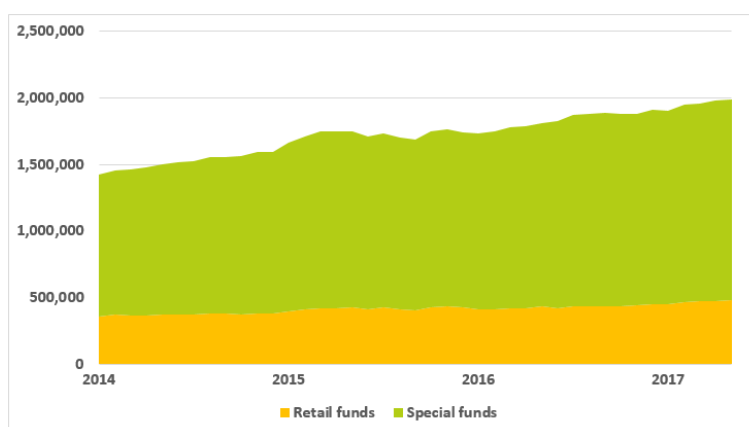


Figure 1: Assets under management of German retail and special funds (in €bn)

¹ It is to be noted that certain groups have several asset management companies as subsidiaries, and these would need to be grouped together for an overall picture. Smaller companies are often investment stock corporations (*Investmentaktiengesellschaften*).

² Unless stated otherwise, the figures and tables shown in this report are based on BaFin's internal databases and calculations, which in some cases draw on the Deutsche Bundesbank's investment fund statistics.

Looking at the fund structure in more detail, it is evident that open-ended special funds represent by far the largest number of funds established in Germany (4,312). The next-biggest group is UCITS funds³ (1,420), i.e. open-ended retail funds that comply with the UCITS Directive. Open-ended retail AIFs⁴ (including mixed funds (*gemischte Sondervermögen*), other common funds and open-ended real estate funds) make up 297 of the funds.

Table 2: Structure of German funds by type of fund

Fund	Dec 2014	Dec 2015	Dec 2016	June 2017
UCITS	1,312	1,397	1,398	1,420
Open-ended retail AIFs ⁵	339	330	319	297
Open-ended special AIFs	3,918	4,160	4,281	4,312

At a European level, German funds account for just under 4% of net fund assets in UCITS funds (Luxembourg 36%, Ireland 18%), but for 28% of net fund assets in alternative investment funds (AIFs), which includes special funds (France 18%, Luxembourg 11%, Ireland 9%).

Table 3: Net fund assets in the European fund industry by country
(as at end of Q1 2017, source: EFAMA)

	Total		AIF		UCITS	
	€m	Share	€m	Share	€m	Share
France	1,880,168	12.7%	1,020,575	18.0%	859,593	9.4%
Germany	1,937,711	13.1%	1,592,806	28.0%	344,904	3.8%
Ireland	2,204,913	14.9%	536,478	9.4%	1,668,435	18.3%
Luxembourg	3,906,027	26.4%	648,254	11.4%	3,257,773	35.8%
Netherlands	809,992	5.5%	773,431	13.6%	36,561	0.4%
United Kingdom	1,547,182	10.5%	394,628	6.9%	1,152,554	12.6%
Other	2,509,170	16.8%	717,431	12.4%	1,791,741	19.7%

When the data are looked at as a whole, there are structural differences between the investments of institutional investors in special funds and those of (retail) investors in retail funds. The vast majority of special funds are mixed securities funds (Figure 2), and,

³ UCITS is the abbreviation for "undertakings for collective investment in transferable securities". UCITS funds are collective investment undertakings that are permitted to invest in assets specified by the European UCITS Directive (Directive 2009/65/EC).

⁴ Alternative Investment Funds (AIFs) are any collective investment undertakings which are not UCITS funds. The basis for these is the AIFM Directive (2011/61/EU).

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accordingly, the bond portfolio is dominant (Figure 3). Retail funds, on the other hand, are predominantly equity funds.

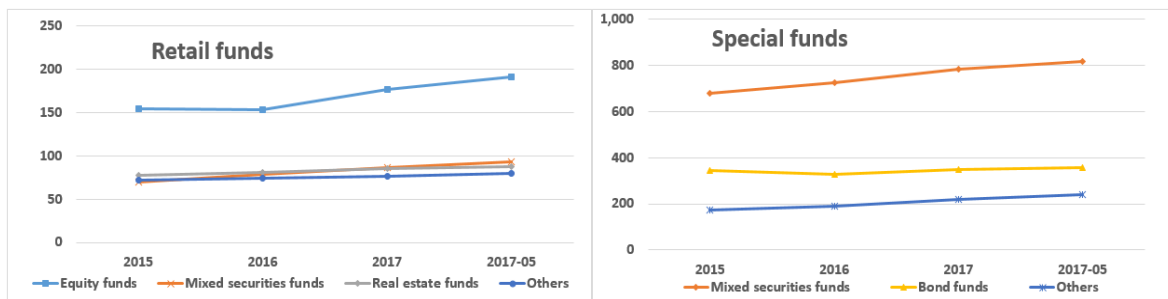


Figure 2: Assets under management by fund category for retail and special funds (in €bn)

This can also be seen in the following charts, which show assets under management in the three biggest asset classes for retail funds and for special funds.⁶ Overall, the proportion of high-liquidity assets is higher in retail funds than in special funds, as equity usually has a higher degree of liquidity. This cannot be used to draw conclusions about the investment strategies that the investors follow, however.

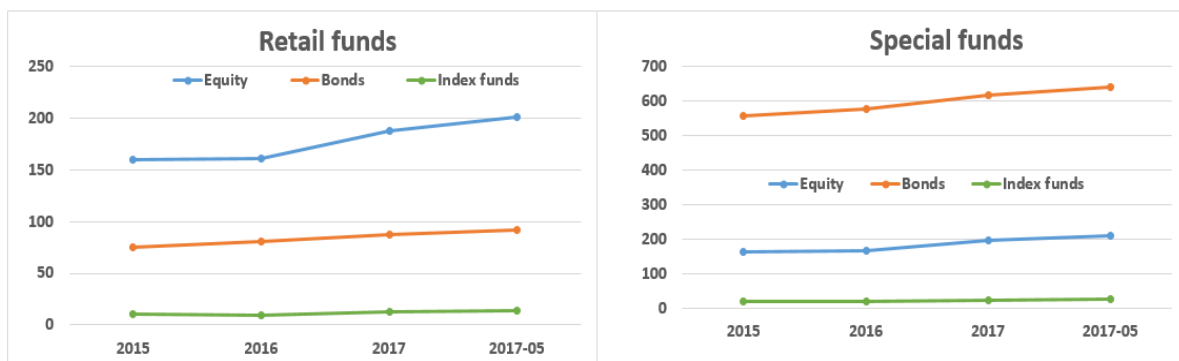


Figure 3: Assets under management by portfolio structure for retail and special funds (in €bn)

This also does not necessarily mean that German retail investors invest heavily in equity, as these charts only take into account funds established in Germany, and the majority of German retail investors also hold funds distributed from other EU countries in their portfolios.

Table 4: Distribution of retail funds (as at June 2017)

Distributed by / from	DE	LU	IE	AT	FR	LI	Others	Total
UCITS	1,420	6,198	2,145	495	445	193	355	11,251
Retail AIF	515	126	0	0	0	0	3	644

⁶ In special funds, the three biggest asset classes are bonds, equity and real estate funds. However, the volume of real estate funds is only marginally higher than that of index funds, and so this has been omitted in the chart to improve comparability.

For special funds, information is available regarding the institutional investor structure. This is shown in the chart below. Large groups of investors include insurers and institutions for occupational retirement provision, but also non-financial corporations. The discussions held as part of this project gave the impression that investors in special funds in principle follow more mid- to long-term investment strategies, while short-term investments are made in-house as part of liquidity management.

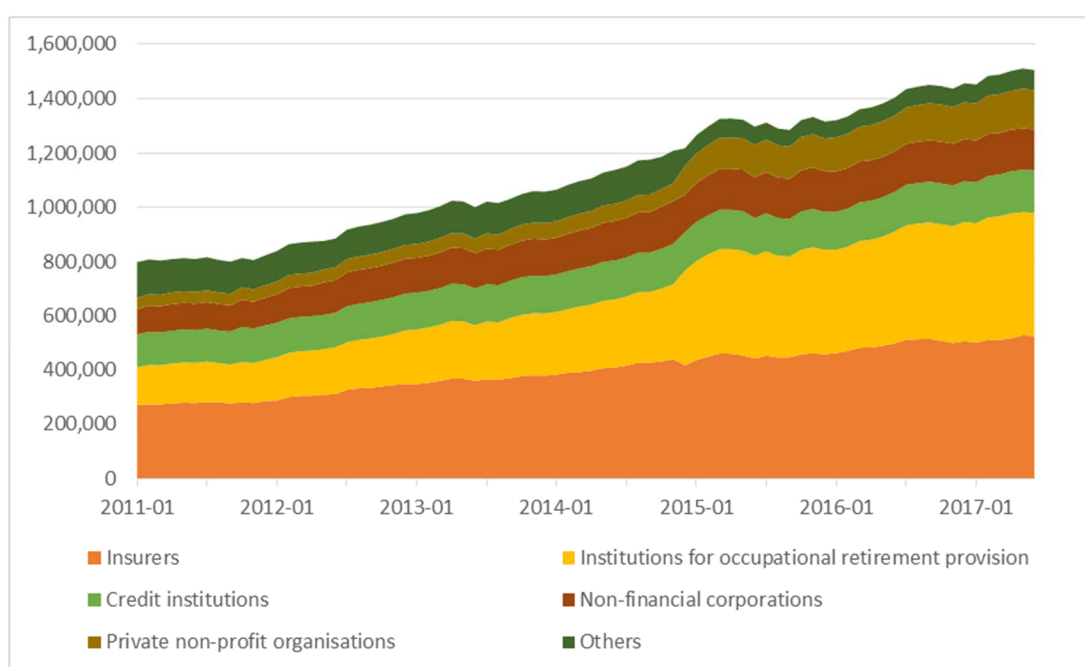


Figure 4: Investors in special funds (in €m)⁷

One feature that characterises the fund landscape in Germany within the European market is open-ended retail real estate funds. These are retail AIFs with particular rules for unit redemptions – not least for reasons of liquidity (see section 3.3). Despite crises in the segment, which also resulted in regulatory changes, this form of investment continues to enjoy considerable popularity and the volume thereof now stands at nearly €90bn.

Table 5: Volumes in open-ended real estate funds (in €m)

	Jan 15	Jan 16	Jan 17	May 17
Retail funds	77,868	81,345	85,747	87,437
Special funds	56,007	66,753	78,275	82,031
Total	133,876	148,098	164,022	169,468

In the field of special funds, there has been an even more significant increase in interest for open-ended real estate funds. Unlike in the case of retail real estate funds, however,

⁷ Source: Deutsche Bundesbank, BaFin's own calculations

for special funds, as for other special funds too, there is the option of concluding individual redemption agreements between investors and asset management companies within the framework permitted by law.⁸

Exchange-traded funds (ETFs) are of minor significance from the perspective of Germany as a fund location. Comparing on a European level, the majority of ETFs are set up in Ireland or Luxembourg and then distributed in Germany. It therefore did not seem pertinent in the scope of the study to place a particular focus on liquidity management in German ETFs. In May 2017, the Central Bank of Ireland published a discussion paper on ETFs, and the results of this consultation are currently being evaluated.⁹ Among other things, the paper includes a separate section on ETFs and market liquidity.

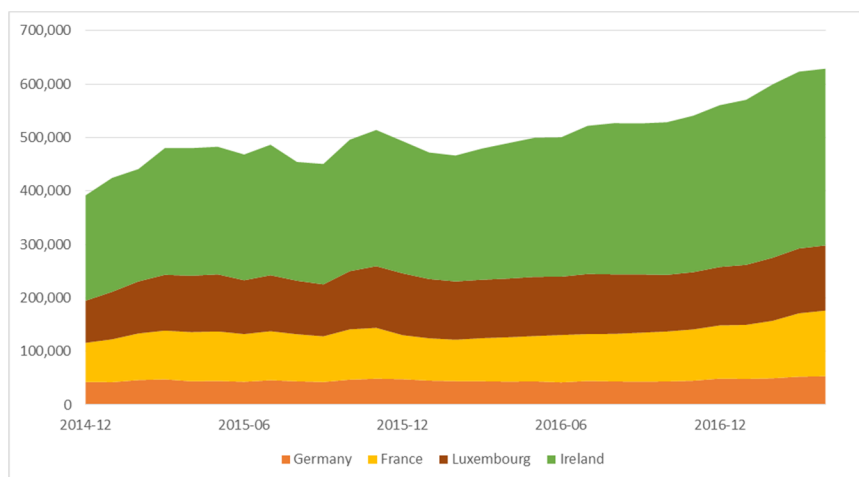


Figure 5: Fund volumes of ETFs for selected Eurozone countries (in €m)¹⁰

Money market funds are also only of limited significance in Germany, which is why this study does not look into this category of funds in greater detail. According to statistics from the Deutsche Bundesbank, there are currently 12 such funds in Germany, with a total volume of €2.7bn. This means that the market share within Europe is just 0.2 percent.

⁸ On the basis of the reference in section 284 (1) of the German Investment Code (*Kapitalanlagegesetzbuch* – KAGB) regarding the application of sections 192 to 211 and 218 to 260 of the KAGB, the special rules that apply to open-ended retail real estate funds for the issuance and redemption of units pursuant to section 255 of the KAGB are in general also applicable without restriction to special funds with a focus on real estate investment. Section 284 (2) of the KAGB, however, specifies conditions under which this can be deviated from, and in practice these conditions are often used.

⁹ Central Bank of Ireland, Discussion Paper 6, Exchange Traded Funds, 15 May 2017. The responses to the consultation can be found on www.centralbank.ie.

¹⁰ Source: ECB, BaFin's own calculations

3 Liquidity risks in investment funds

3.1 Definition of liquidity risk

An investment fund is liquid while it can ensure that investors' redemption requests and other payment obligations can be met. Liquidity management for asset management companies therefore involves ensuring that the – usually short-notice – obligations of a fund can be met at any time, even if the funds mainly invest in long-term and in part potentially illiquid assets.¹¹

Banks	Capital market	Investment funds
<p>Insolvency risk: Bank is unable to satisfy its current and future payment obligations in full and on time</p> <p>Refinancing risk: Bank is only able to borrow funds for refinancing at higher market rates</p> <p>Market liquidity risk: Bank is only able to liquidate assets on the market at a discount due to extraordinary circumstances</p>	<p>Market liquidity risk: Market participant is not able to buy or sell a financial instrument in the desired quantity at the desired price and time without significantly influencing the price</p> <p>Risks of transactions involving complex products: unexpected, short-notice demands on liquidity, e.g. arising from irrevocable loan commitments, guarantees, liquidity facilities for securitisation special purpose entities and margin calls on futures exchanges</p>	<p>Mismatch between liquidity of the fund (market liquidity risk, among others) and payment obligations (in particular redemption requests)</p>

Figure 6: Liquidity risks in the financial sector

It is important to understand that the meaning of liquidity risk in investment funds is different from how liquidity risk is defined in other parts of the financial industry. Customers of banks, for example, expect their institutions to be able to return their deposits in full at any time, subject to the maturity date. Investment funds, on the other hand, invest their investors' money in assets. The fund assets are subject to a range of risks that influence yields and thus the redemption value of fund units. These risks are managed by the asset management companies in the investors' best interests, with their risk management being subject to legal and other regulatory requirements.

In terms of the law, in investment funds liquidity risk is defined under the German Regulation on the Rules of Conduct and Organisational Rules Pursuant to the Investment Code (*Verordnung zur Konkretisierung der Verhaltensregeln und Organisationsregeln*

¹¹ This characteristic of investment funds is also called "liquidity mismatch" in the international debate on the subject.

nach dem Kapitalanlagegesetzbuch - KAVerOV, section 5 (3)) as the risk that a position in the investment undertaking's portfolio cannot be sold, liquidated or closed at limited cost in an adequately short time frame and that the ability of the investment undertaking to meet the requirements of satisfying investors' redemption requests or any other payment obligations (margin calls etc.) is impaired as a result.

3.2 Risk management

The principle of liquidity management for investment funds is that the asset management company must bring the liquidity of the fund into line with its payment obligations. To achieve this, primarily the market liquidity risk on the asset side and the expected and actual payment obligations on the liabilities side need to be monitored.

Liquidity on the asset side	Expected payment obligations on the liabilities side
<ul style="list-style-type: none"> - Issuance of fund units to investors - Income from the fund assets - Borrowing - Sale of assets 	<ul style="list-style-type: none"> - Redemption of fund units by investors - Delivery and payment obligations of the fund arising from derivatives, securities loans and repurchase agreements - Loan payments, interest payments and repayments - Administrative costs - Purchase of assets

Figure 7: Factors influencing liquidity on the asset side and the liabilities side of an investment fund (simplified illustration)

Market liquidity risk on the asset side primarily arises from an inability to generate sufficient liquid funds to cover payment obligations at short notice and on time, in particular in the case of an unexpectedly high level of redemption requests. A challenge here is that there is not always a clear line between whether an asset is categorised as liquid or illiquid, and this categorisation varies over time. For example, assets that are initially categorised as liquid can become illiquid (or vice versa) depending on the market situation. For this reason, processes and procedures need to be established as part of liquidity risk management to identify liquidity risks at an early stage, assess their consequences and, if necessary, take measures to counter them.

The liquidity risk on the liabilities side of an investment fund primarily arises from the undertaking not, or not sufficiently, being able to deal with high outflows of funds, resulting from investors redeeming shares,¹² without impacting portfolio allocation. Here the challenge lies in predicting the redemption behaviour of investors. This can vary hugely due to the different types of investors, their investment horizons and their individual portfolio or tax situations. However, in certain market phases (in particular in

¹² Pursuant to section 98 (1) of the KAGB, investors can redeem their fund units in return for a payout at least twice per month. In practice, open-ended funds allow daily redemptions of units. Other legal provisions apply to redemptions of unit certificates of open-ended retail real estate funds (see section 255 in conjunction with section 346 (2) of the KAGB).

times of stress) their behaviour can be unexpectedly similar. Alongside this, the delivery and payment obligations of the fund arising from derivatives, securities loans and repurchase agreements are another important aspect.

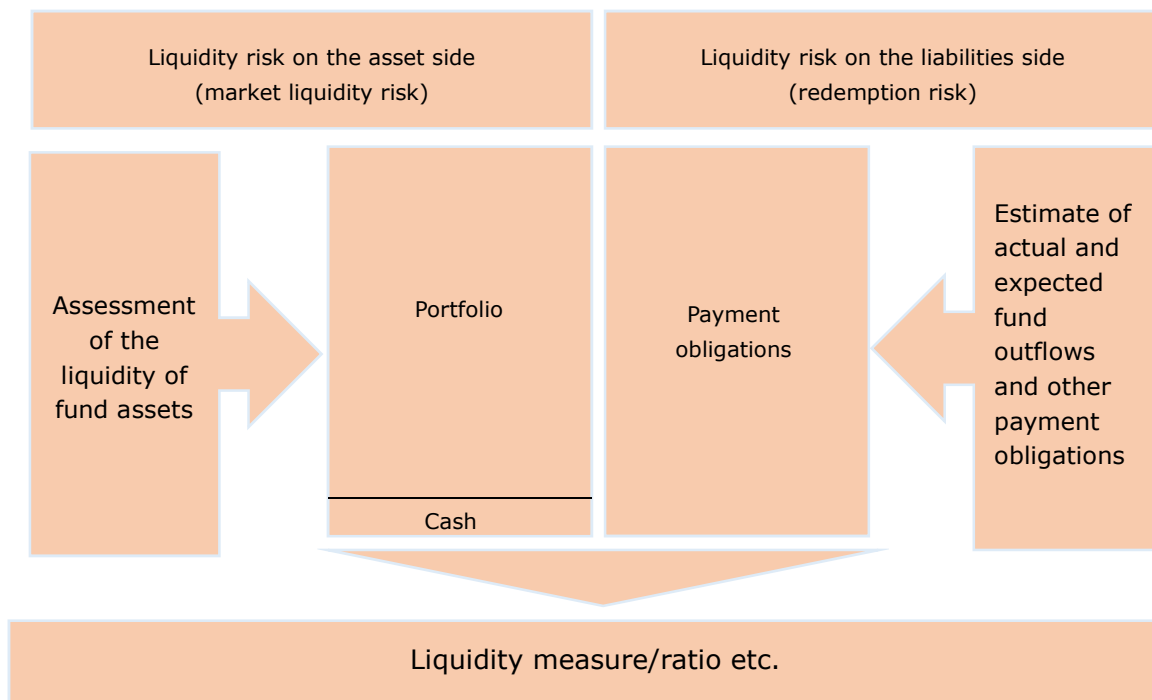


Figure 8: The principle of liquidity risk management

Comparing the two sides – liquidity on the asset side and expected payment obligations on the liabilities side – shows whether the liquidity profile of the investments of the fund at least matches, in principle, the underlying liabilities such as the actual and expected redemptions, as well as other payment obligations (section 30 (1) sentence 2 and section 30 (3) of the KAGB; Article 46 of the AIFMD Level 2 Regulation;¹³ Article 49(2) of the AIFMD Level 2 Regulation; Minimum Requirements for Risk Management for Asset Management Companies (*Mindestanforderungen an das Risikomanagement für Kapitalverwaltungsgesellschaften – KAMaRisk*) 4.6 item 2). This relationship can be visualised using liquidity measures (Article 48(1) of the AIFMD Level 2 Regulation).

3.3 Current regulation of liquidity risks in Germany

In Germany, all asset management companies are required to have an appropriate liquidity management system in place for every collective investment undertaking that

¹³ Commission Delegated Regulation (EU) No 231/2013 of 19 December 2012 supplementing Directive 2011/61/EU of the European Parliament and of the Council with regard to exemptions, general operating conditions, depositaries, leverage, transparency and supervision.

they manage.¹⁴ The risk and liquidity management of UCITS funds and AIFs are essentially subject to the same requirements.

The requirements for risk management in general and liquidity management and the associated stress tests are governed by the KAGB (sections 28, 29 and 30), the AIFMD Level 2 Regulation (Articles 38 to 49), the Regulation on the Rules of Conduct and Organisational Rules Pursuant to the Investment Code (KAVerOV) (sections 4 to 6) and the KAMaRisk (in particular parts 4.3 and 4.8).¹⁵ Pursuant to section 6 of the KAVerOV, the provisions from the AIFMD Level 2 Regulation (Articles 38 to 49) that apply to AIFs are to be applied correspondingly to UCITS.

The specific requirements for liquidity risk management can be found in Article 47 of the AIFMD Level 2 Regulation. According to these requirements, the asset management company is required, at least, to ensure that a fund maintains at all times a level of liquidity appropriate to its obligations, based on an assessment of the relative liquidity of the fund's assets in the market, taking account of the time required for liquidation and the price or value at which those assets can be liquidated, and their sensitivity to other market risks or factors. Furthermore, the asset management company is also required to monitor the liquidity profile of the fund, having regard to both the individual assets which may have a material impact on the fund's liquidity and to the material liabilities (including contingent liabilities and commitments). For these purposes the asset management company takes into account the profile of the investor base, including the type of investors, the relative size of investments and the relevant redemption terms. Furthermore, the asset management company also needs to have appropriate procedures in place for measuring liquidity in order to assess the risks of investments made previously and of intended investments which could have a material impact on the liquidity profile of the fund in order to obtain, in this way, knowledge and understanding of the liquidity of the relevant assets in normal and exceptional liquidity conditions. The asset management company documents its liquidity management policies and procedures, reviews them on at least an annual basis and updates them for any changes or new arrangements. In addition, it includes appropriate escalation measures in its liquidity management system and procedures to address anticipated or actual liquidity shortages or other distressed situations of the fund. Furthermore, pursuant to Article 49 of the AIFMD Level 2 Regulation, the asset management company is to ensure that the investment strategy, the liquidity profile and the redemption policy of the investment fund are aligned.

Pursuant to Article 48 (1), where appropriate, the asset management company, considering the nature, scale and complexity of each AIF it manages, is to implement and maintain adequate limits for the liquidity and illiquidity of the AIF consistent with its

¹⁴ An exception to this are closed-ended funds for which no leverage is being used.

¹⁵ The relevant requirements in the KAMaRisk for this are to be adhered to for collective investment management by all asset management companies within the meaning of section 17 of the KAGB, including asset management companies subject to registration pursuant to section 2 (4) and (5) of the KAGB, if and to the extent that such companies grant loans pursuant to section 285 of the KAGB.

underlying obligations and redemption policy. In this case, compliance with these limits is to be monitored and where limits are exceeded or likely to be exceeded, the required (or necessary) course of action is to be determined. In determining appropriate action, AIFMs shall consider the adequacy of the liquidity management policies and procedures, the appropriateness of the liquidity profile of the AIF's assets and the effect of atypical levels of redemption requests. In addition, Recital 61 of the AIFMD Level 2 Regulation states that the use of minimum limits regarding the liquidity or illiquidity of the fund can provide an effective monitoring tool for certain types of AIFM; however, exceeding a limit does not of itself have to require action by the asset management company as this depends on the facts and circumstances and the tolerances set by the company. Limits could be used in practice in relation to monitoring average daily redemption versus fund liquidity in terms of days over the same period. That could also be used to monitor investor concentration to support stress testing scenarios.

There are other, detailed provisions for liquidity management in real estate common funds (open-ended real estate retail funds). Pursuant to section 253 (1) sentence 2 of the KAGB, open-ended real estate funds must have available for redemptions a sum in liquid assets that is sufficient according to the liquidity management calculations, and is at least 5% of the fund assets. To manage the liquidity requirements, they may engage in short-term borrowing, provided such borrowing does not exceed 10% of the fund's assets, is subject to market conditions, and is provided for in the fund rules (section 254 (1) sentence 2 in conjunction with section 199 of the KAGB). For investors that acquired units in a real estate common fund after 21 July 2013, a minimum holding period of 24 months and a notice period for redemptions of 12 months apply for unit redemptions pursuant to section 255 (3) and (4) in conjunction with section 346 (2) sentence 1 of the KAGB. This minimum holding period and notice period do not apply to redemptions of units in real estate common funds already held by an investor on 21 July 2013, as long as the unit redemptions do not exceed 30,000 euro in half a calendar year for one investor (cf. section 346 (1) of the KAGB). The existing provisions, under which unit redemptions not exceeding 30,000 euro in half a calendar year were possible without restriction, was cancelled after 21 July 2013 (in accordance with the legal substantiation to the law, cf. Bundestag printed paper 17/12294, page 270). This was because experience with wound-down large open-ended real estate funds had shown that even this provision would not have been able to prevent a suspension and winding down because a high proportion of investors were invested below the 30,000 euro threshold. Similarly, surveys of the industry and of custodians showed that open-ended real estate funds were primarily bought into by retail clients with smaller investment volumes. Approximately 80 percent of investors had a corresponding securities account balance of up to 30,000 euros. In order to allow the AIF management company to better manage liquidity, the existing possibility for investors to redeem 30,000 euros in half a calendar year was cancelled and essentially one redemption date per year was provided for. Pursuant to section 255 (4) of the KAGB, an irrevocable notice of redemption with a notice period of 12 months must be given even for small amounts.

With regard to share redemptions, section 98 of the KAGB provides that every investor in an open-ended domestic fund can redeem their shares at least twice per month. Particulars are to be laid down in the fund rules. In practice, in the majority of UCITS funds redemption on any valuation date is provided for. For special funds, it may be agreed that redemptions may be made on particular redemption dates only (section 98 (1) sentence 2 of the KAGB).

If the investors' unit redemptions in a fund cannot be met by cash or short-term borrowing, the fund has to sell investments or, in a distressed situation, employ extraordinary liquidity management tools.

3.4 Regulatory requirements for liquidity stress tests

The regulations regarding liquidity stress tests are to be understood in the context of the general regulations regarding liquidity management. The following points, in particular, should be noted:

- Pursuant to the provisions of the KAGB, the asset management company is to regularly conduct stress tests in order to be able to assess the liquidity risks in a fund and, in doing so, use both normal and exceptional liquidity conditions (section 30 (2) of the KAGB).
- Pursuant to Article 45(3)(c) of the AIFMD Level 2 Regulation, the asset management company is to conduct periodic stress tests for each collective investment undertaking to identify risks arising from potential changes in market conditions that might adversely impact the fund. In the KAMaRisk, liquidity stress tests are given particular emphasis in this regard. Open-ended real estate funds also receive a particular mention; in their case, stress tests appropriate to their risks are to be conducted at least quarterly (KAMaRisk 4.8 item 6).

Regarding the format of the liquidity stress tests for UCITS and AIFs, the KAMaRisk refers directly to Article 48 of the AIFMD Level 2 Regulation. According to the Regulation, liquidity stress tests

- are to be conducted on the basis of reliable and up-to-date information in quantitative terms or, where this is not appropriate, in qualitative terms;
- where appropriate, simulate a shortage of liquidity of the assets in the fund and atypical redemption requests;
- cover market risks and any resulting impact (including on margin calls, collateral requirements or credit lines);
- account for valuation sensitivities under stressed conditions;
- are conducted at a frequency which is appropriate to the nature of the fund, taking into account the investment strategy, liquidity profile, type of investor and redemption policy of the fund, and at least once a year.
- The asset management company acts in the best interest of investors in relation to the outcome of any stress tests.

- The asset management company should analyse the period of time required to meet redemption requests in the stress scenarios simulated (Recital 62 of the AIFMD Level 2 Regulation).

The regulatory framework also leaves the asset management companies room for proportionality in the area of stress tests, in the form of opening clauses ("*Öffnungsklauseln*") which allow for a simplified implementation for smaller asset management companies in particular. Pursuant to the KAMaRisk, stress tests are to be conducted in principle for all types of material risk. However, they should be appropriate to the level of risk, i.e. the effort required is to match the respective risk situation. Stress tests for very low-risk collective investment undertakings can be correspondingly simple and low-effort, and in some cases they can be omitted altogether if it is not appropriate to conduct them. However, if the composition of the collective investment undertaking's assets has a complex risk profile, the stress tests need to reflect this complexity (KAMaRisk 4.8 item 6).

The results of stress tests are to be reported to BaFin in the framework of the AIFMD reporting and are passed on to ESMA.

3.5 Organisational requirements for stress tests

These requirements relate to how risk control is incorporated into the ongoing process of fund management, the regular risk reporting to senior management in writing and the establishment of (contingency) measures (processes, tools) as a result of the risk analyses.

The organisational and procedural requirements primarily relate to the risk management as a whole, and thus also apply to stress tests. The KAMaRisk emphasises the importance of a functional separation between risk management and the operational units, up to and including the senior management level. It also makes clear the point that the risk control function is not exclusively responsible for the ongoing assessment and monitoring of the risks and, accordingly, is not a downstream organisational unit. Rather, it is to be involved from even before the fund management unit commences investment activity and plays a key role in determining the risk profile and the basic investment strategy of a fund. The risk control function is also to be involved prior to any investment decisions that would have a material effect on the risk profile of the fund (KAMaRisk 4.5).

The requirements regarding risk reporting also do not relate specifically to stress tests; however, the results of stress tests are included in them. The senior management must receive on a frequent basis, and at least annually, written reports on matters of risk management (Article 60(4) of the AIFMD Level 2 Regulation). The reporting relates to all actual or foreseeable breaches of any risk limits set, so as to ensure that prompt and appropriate action can be taken. The risk reporting has to be done in a comprehensible and meaningful way. Along with a risk description it should also contain an assessment of

the risk situation. Suggested actions are also to be included in the risk report where required (KAMaRisk 4.3 item 12).

With regard to the stress tests specifically, the Level 2 Regulation states the following: where stress tests and scenario analysis reveal particular vulnerability to a given set of circumstances, the asset management company should take prompt steps and corrective actions (Recital 56). Liquidity management systems and procedures can allow asset management companies to apply the tools and arrangements necessary to cope with illiquid assets and related valuation problems in order to respond to redemption requests (Recital 59).

3.6 Responsibility of senior management

All members of the senior management are responsible – irrespective of their internal competencies – for ensuring that the company has a proper business organisation and that this organisation is developed further. Among other things, this includes the senior management approving and reviewing on a periodic basis the risk management policy and the arrangements, processes and techniques for implementing that policy, including the risk limit system for each collective investment undertaking it manages. Moreover, the senior management is to ensure and verify on a periodic basis that the risk limits of each collective investment undertaking managed are properly and effectively implemented and complied with. The senior management is only capable of meeting this responsibility if it is able to assess the risks and take the necessary measures to mitigate them (KAMaRisk part 3).

In order to ensure its effectiveness, the risk management policy should be reviewed at least annually by the senior management (Recital 52 of the AIFMD Level 2 Regulation).

4 Monitoring liquidity risk in practice

4.1 Liquidity risk on the asset side

Liquidity risk on the asset side occurs when it is not possible for sufficient cash to be generated to cover payment obligations at short notice and on time.

The very first step asset management companies take is to mitigate this risk through limits established in the contract terms and the investment guidelines and select in advance which securities the fund manager is potentially permitted to invest in. This guarantees that investments are only made in securities that meet certain minimum criteria with regard to liquidity. In particular, the asset management companies base their decision on a financial instrument's credit rating and set internal rules regarding the minimum rating required for an investment to be made. As a rule, the rating scores given by rating agencies are used for this. Other such criteria are, for example, the remaining maturity on bonds, restrictions to certain currencies, sovereign bonds, listed securities etc.

Before a new type of instrument is approved for trading, individual companies carry out a comprehensive risk analysis as part of the new product process.

In the second step, asset management companies create liquidity categories using reference data, market data and expert knowledge. To this end, the assets are divided into liquid and illiquid products. Certain companies also use a third category which comprises assets that cannot be categorised definitively as liquid or illiquid.

The investment companies consider liquid assets to mean assets that can be sold at any time within one day or a few days without a discount. An illiquid asset, on the other hand, can only be sold on the market at short notice at a considerable discount, if at all. The third category used by some companies was interpreted in different ways. Some used it for assets that could not be unequivocally assigned to a liquidity category. Or where the asset was in a transitional phase between liquid and illiquid, or vice versa, at the time of the assessment. Other companies put assets into this category if they were in principle classified as liquid but displayed illiquidity under stressed market conditions. In some cases, the assets which had been classified into the three categories were supplemented with information regarding qualitative and quantitative influencing factors based on market information and expert knowledge.

The companies take different approaches to classifying the assets into such liquidity categories. For example, one company uses the observable trading volume and inclusion in indices to assess the liquidity of shares. Using expert assessments, internal limits have been set on how large the proportion of shares to be sold can be relative to the overall trading volume in order that the shares can be sold on the market without a discount. Furthermore, the asset management company stipulated that shares that can be found in an index are automatically categorised as liquid.

Other investment companies allocated assets a blanket liquidity, or assigned them liquidity ratios based on credit rating, issuer, issue volume and guarantees. To achieve this, expert knowledge was used to estimate the length of time it would take to sell the assets. If it would be possible to sell an asset within a day, this equates to 100% liquidity. A time to liquidation of 10 days means 10% liquidity. For the liquidity of a bond, a percentage discount is also introduced when the company holds a high proportion of the issue volume. The investment company specified beforehand what was meant by a high proportion. The classification of the assets into liquid and illiquid is reviewed on a monthly basis. Companies that use an additional third category usually monitor this categorisation on a daily basis.

Once the assets have been divided into the liquidity categories, the third step involves modelling the sale of the assets. This is intended to filter out possible illiquid assets. Some companies calculate a liquidity ratio on the asset side on the basis of the percentage of liquid assets. The liquidity ratio here represents the proportion of the total assets that are liquid. Internal thresholds are set for the liquidity ratio and represented

by means of traffic light colours. If the thresholds are crossed below, this triggers an escalation process.

In a small number of asset management companies, the sale of assets is modelled per asset class on the basis of the current tradable volume. The tradable volume refers to the amount of an asset that could be traded on the basis of the current market price. This must not affect the market conditions of the other assets in the fund or catch the attention of the market. The possible tradable volume is produced by evaluating the assets. Internally defined discounts (for shares, for example) or rating-dependent discounts are used for this. For bonds, coefficients are determined based on the issuer, issue volume, home country and sector. Derivatives are evaluated using expert knowledge and empirical values from portfolio and risk management. The assumptions used for the calculations are reviewed on a monthly basis and at short notice as necessary.

When determining liquidity risk, **open-ended real estate funds** take into account the value of real estate, holdings, the liquidity portfolio, other assets and the difference between income and expenses.

Income includes income from real estate (rental income), income from holdings, income from the liquidity portfolio and other income. Expenses for open-ended real estate funds include operating costs, ground rent, terminable and whole-life annuities, interest costs, foreign taxes, fund management fees, depositary fees, experts' fees and other expenses.

Income	Expenses
Income from real estate	Operating costs
Income from holdings	Ground rent, temporary and whole-life annuities
Income from the liquidity portfolio	Interest costs
Other income	Foreign taxes
	Fund management fees
	Depositary fees
	Experts' fees
	Other expenses

Figure 9: Expenses and income in real estate funds

In order to be able to assess the liquidity of assets on the asset side, it is important that the asset management companies regularly check the liquidity of assets on the asset side and reassess their liquidity. In doing so, the company can establish an overview and is able to follow developments and changes in the liquidity status closely.

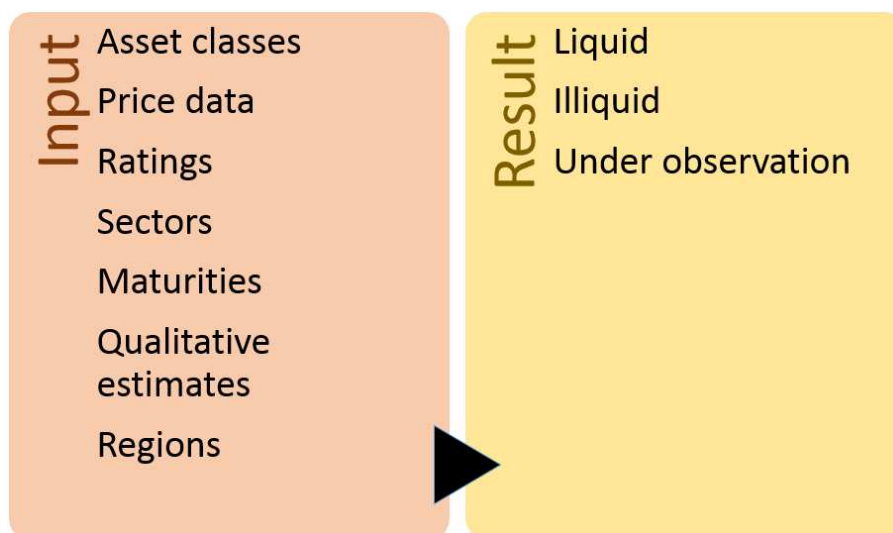


Figure 10: Liquidity risk on the asset side

4.2 Liquidity risk on the liabilities side

Liquidity risk on the liabilities side arises when it is not, or not sufficiently, possible to deal with high outflows of funds resulting from investors redeeming unit certificates without impacting portfolio allocation. The type and concentration of investors plays an important role here.

All of the asset management companies included in the study try to find out the investor structures and identify critical structures. To do this, they use information from their distribution partners, data from movements in any securities accounts held within the group and empirical values for redemptions. An investor structure is considered critical if a single investor holds a significant part of one fund or an institutional investor has significant holdings in a retail fund. The asset management companies analyse the investor structures on a monthly basis. This means that they are aware of possible redemptions of fund units early on.

At present, none of the asset management companies included in the study conduct a fund outflow analysis for special funds. Because of the investor structure of such funds and their investment behaviour, redemptions of unit certificates are much less common here. It is therefore not possible to assert any sufficiently valid deductions regarding future unit certificate redemptions by looking at the historical data regarding such redemptions. Efforts are made to obtain information about intended unit certificate redemptions as part of the communication with investors.

Some asset management companies launch funds for their parent company. In such cases, the focus is more on the monitoring of the economic situation of the parent

company and the associated continued existence of the business relationship than on a fund outflow analysis.

All companies conduct fund outflow analyses for their retail funds. Share redemptions in these funds are frequent and regular; some patterns of behaviour are observable, according to the companies' statements, and can be modelled in a statistically valid manner because of the high number of observations. The asset management companies forecast future share redemptions on the basis of historical trends. The forecasts obtained are later compared with actual outflows. In addition, extreme levels of fund outflows in the historical data are filtered out, analysed to find their causes, and then used to develop a prediction for rare but still plausible events. Some companies also use short-term trend models. These models monitor fund outflows in retail funds on a daily basis (and sometimes more frequently). If the one-day fund outflows cross above an internally specified threshold, the reasons causing the fund outflows are researched and measures are developed together with the project manager.

Fund outflows in **open-ended retail real estate funds** are also analysed, as high outflows can lead to the sale of real estate, and selling real estate takes a considerable amount of time. Upcoming new transactions and necessary expenses for building maintenance also require a high degree of liquidity. The starting point for liquidity planning is a rolling 12-month liquidity plan. This takes into account all material value drivers (projected events relevant for payments). A detailed monthly plan is derived from this 12-month liquidity plan.

The asset management companies forecast future share redemptions on the basis of historical trends. In addition, the companies gain an overview of upcoming liabilities. To achieve this, committed funds and share redemptions that are already known are categorised into period buckets in accordance with AIFMD reporting. In this way, a prediction can be made regarding the liabilities that the fund is likely to have in the upcoming days or months.

Table 6: Period buckets in accordance with AIFMD reporting

Period bucket	1	2	3	4	5	6	7
	1 day	2-7 days	8-30 days	31-90 days	91-180 days	181-365 days	>365 days

Analysing the investor structure, looking at the historical data and evaluating the predictions that can be derived from these are measures that should be a matter of course for all asset management companies in order to increase awareness of outflows of funds. For this to be possible, the companies need to have enough historical data available.

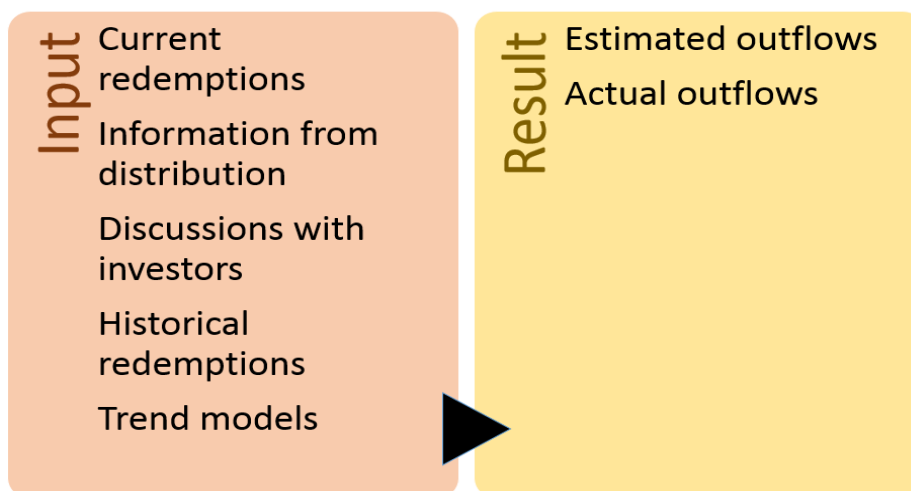


Figure 11: Liquidity risk on the liabilities side

4.3 Quantifying liquidity risk

Companies use measures to obtain a concise visualisation of liquidity risk. The asset management companies use various measures, for example liquidity and illiquidity ratios, liquidity measures and liquidity points systems.

The **liquidity ratio** is determined by calculating the relationship between liquid assets and the overall fund volume. It is monitored using internally specified limits. Measures are taken when these limits are exceeded.

The **illiquidity ratio** shows the potentially illiquid positions in the fund. The ratio is monitored using a two-stage limit process. The notification limit is the first threshold here, and when it is crossed the fund manager is notified. The trading limit is a further threshold, and when that is crossed further-reaching measures are necessary. The limits on the fund are set based on the respective fund structure and differentiate between different fund categories and their respective risk profiles.

A measure that finds broad application is the **liquidity measure**. This is determined by calculating the relationship between the sum of all liquid assets and the expected payment obligations. Once calculated, the measure is then transferred over into an internal limit system and illustrated using traffic light colours, such that a critical liquidity measure is represented by a red light, for example.

In the **liquidity points system**, the difference between liquid assets and expected payment obligations for each day is calculated for a one-year period. In order to assess the liquidity profile of a portfolio and be able to identify potential difficulties early on, a point score is calculated for each fund from the sum of the daily values. The liquidity points are then also transferred over into an internal limit system in order to identify possible liquidity shortages early on. Measures are triggered if the threshold is exceeded.

Some asset management companies allocate the available liquidity to time periods, which means that an indication of possible liquidity shortages in the individual time periods can be stated. The available liquidity is considered in relation to average fund outflows in the reporting month and this gives the number of days for which future outflows of funds can be covered using the available liquidity. This is based on the assumption that the average net redemptions from the previous month can be extrapolated into the future.

To determine overall liquidity risk in open-ended retail real estate funds, the fund's assets, committed funds and all unit certificate redemptions that are already known are assigned to the period buckets in accordance with AIFMD reporting. As well as the available liquidity, another output is a liquidity status for each block of time. A traffic light system is used to show shortfalls or excess coverage.

Comparing liquid assets with expected liabilities allows companies to estimate the liquidity of the fund. Internal thresholds reveal excess liquidity and liquidity shortfalls and mean that the appropriate countermeasures can be taken.

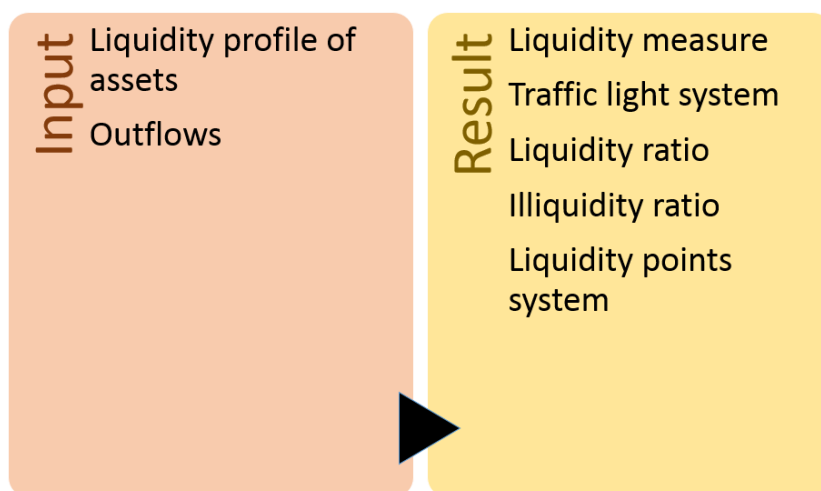


Figure 12: Quantifying liquidity risk

5 Liquidity stress testing in German investment funds

All of the asset management companies included in the study conduct stress tests on a regular basis, using both normal and exceptional liquidity conditions. However, the complexity of the methods chosen and the frequency with which the tests are conducted vary significantly between companies depending on the business model and the chosen modelling approach. This freedom of design is provided for explicitly by the KAMaRisk in part 4.8, item 6.

5.1 Stress testing on the asset side

Stress tests on the asset side involve simulating a worsened liquidity situation or a lack of liquidity in the fund assets which leads to it being more difficult to liquidate assets in comparison with normal (previous) market conditions. The result of the stress test is intended to show the effect that the stress scenarios simulated have on the liquidity situation in the fund.

– To this end, the liquidity of the investment fund must be assessed under normal and exceptional conditions. To do this, for each of the individual assets held in the fund, a liquidity status is assigned for one day, and often for additional time horizons, in each case under normal and exceptional conditions.

Most of the asset management companies studied use the period buckets as defined in the AIFMD for the categorisation (see Figure 11), but some use period buckets that they have defined themselves. One company intentionally only takes into account a liquidity horizon of one day for its stress tests, which it justifies on the basis that this is the only horizon that is relevant given that redemptions are possible within a single trading day.

Liquidity is often assigned using liquidity classes from highly liquid to illiquid, and the individual financial instruments are allocated to these classes. However, some companies assign individual financial instruments liquidity ratios directly.

Various methods are used to determine the liquidity of individual products under normal conditions:

- Deriving the liquidity from product specifics, for example in the case of overnight money (liquid) or shares in the major indices (liquid) or OTC derivatives (liquid or illiquid depending on structure).
- Using market data such as Bloomberg or Reuters, e.g. spreads for bonds or turnover for shares, to assess liquidity. Market data on liquidity are only available to a limited extent, however.
- Own assessment. Here, the liquidity of a financial instrument can also depend on the expertise of the investment company and its traders.

All three methods were used in the asset management companies included in the study. The limited availability of market data regarding liquidity and the small number of providers, and the high costs this entails, were criticised.

The liquidity of the individual financial instruments is used to determine the liquidity of the fund under normal conditions. This liquidity under normal conditions is then used to derive the liquidity under exceptional conditions. There are various ways of doing this depending on the fund composition and the available data:

- Deriving the liquidity from historical data using statistical methods of varying complexity
- Using specific historical events
- Constructing hypothetical stress scenarios with regard to the future using extrapolations from historical events or expert assessments, either ad hoc (e.g. for Brexit) or in order to quantify relevant risks
- Expert assessments

All of the asset management companies included in the study use historical data to derive their stress scenarios. Because the availability of the data is poor in parts, however, these are always supplemented with the companies' own assessments. In addition, all of the companies conduct ad hoc stress tests. None of the companies included in the study were found to use specific historical events in their stress tests.

The definition of the stress scenarios used is mostly based on asset classes, countries or sectors, or on characteristics, such as ratings. For example, in all of the funds of a company, all bonds with a BBB rating might be categorised as illiquid. Or all investment products connected to a specific country. This would model the effect of a market-wide stress factor on the individual funds. Another type of stress scenario is one that relates to the individual fund profile; this involves, for example, simulating the largest share exposure of the fund becoming illiquid. In some cases these scenarios are also calculated in combination with each other.

In principle the same tools are used to construct the scenarios in **open-ended real estate funds**. Real estate itself is always deemed illiquid because it is not possible to sell it quickly. In addition to the liquidity portfolio, the income from real estate, such as rental income and holdings, must also be modelled and included in the stress tests. Typical stress scenarios here might be, for example, losing the most significant tenants or a market downturn.

The companies included in the study that manage real estate funds primarily use historical data to derive their stress scenarios, but also make use of other methods (hypothetical stress tests, expert assessments).

Like the structure of the stress tests, the number of stress scenarios used varied considerably between the asset management companies included in the study. Half of the companies only calculate the two scenarios required by law (normal and stressed), while other companies calculate four or even more, or stress-test product classes individually and are then able to combine these to create a number of complete scenarios.

In the companies included in the study no correlation can be found between the size of the asset management company and the number of stress tests used.

There is no universally correct approach to liquidity stress tests. The appropriate type and number of stress tests depends on the size and the business model of the asset management company.

The most sensible methods to use also depend on the type of fund (retail or special fund) and its composition. If there are no meaningful market data available, a qualitative approach would seem to be more expedient than a quantitative one.

5.2 Stress tests for the liabilities side

Stress tests on the liabilities side involve simulating increased redemptions on the part of investors, leading to increased fund outflows. The result of the stress tests here should show in a factual manner whether the fund can cope with this situation without resorting to contingency measures.

To this end, fund outflows need to be modelled under normal and stressed conditions. The institutions included in the study use two methods for this:

- Determining the fund outflows based on historical data and using statistical methods (extreme value theory or VaR modelling)
- Establishing general values based on own assessment

In general, the historical data needs to go back sufficiently far in order for the values derived to be somewhat statistically valid, e.g. 30 data points for the extreme value theory, according to one institution. Otherwise, only an expert assessment is possible. This means that in special funds that are tailor-made for a few investors and where there are usually far fewer redemptions, fund outflows can only be estimated.

All of the asset management companies included in the study emphasised that in special funds the investor behaviour was completely different from investor behaviour in retail funds. They explained that in special funds outflows were rare and usually known about a week in advance so that they could be effected without having an impact on the market. The companies pointed out in particular that in practice unit redemptions and the associated required liquidation of fund assets generally occurred by agreement between investors and the asset management company. As a rule, it was in the investors' own interests to cooperate closely with the asset management company in order to keep down both transaction and liquidity costs. When assets had to be sold more quickly and with less preparation, this increased costs and was thus detrimental to returns.

Stress tests for fund outflows in special funds are therefore not very meaningful and the companies either conduct them pro forma or not at all. For retail funds, on the other hand, stress tests are carried out throughout. As on the asset side, the companies usually work with a number of time horizons (e.g. 1-day fund outflows of $x\%$ and 10-day fund outflows of $y\%$). Fund-specific historical values for fund outflows are usually used if available. Otherwise values from comparable funds or expert assessments are used. If

there is more precise information available regarding the investor structure (in particular for institutional investors in retail funds, or for other concentrations of investors), in some cases scenarios are simulated in which the biggest investors redeem their units.

Stress tests for fund outflows are also conducted in **open-ended real estate funds**. However, other payment obligations such as interest or credit payments or maintenance costs also need to be taken into account in addition to this. Typical stress scenarios here might be, for example, losing the most significant tenants or a market downturn.

5.3 Amalgamating the asset side and the liabilities side

Once the stress tests for the asset side and the liabilities side have been calculated, they are amalgamated. This is done either by a simple comparison or by defining a liquidity measure (see section 4.3).

There is sufficient liquidity in the fund if the liquidity on the asset side is greater than on the liabilities side, or if the measure is within a corresponding range. Many companies work with a traffic light system in order to identify critical funds quickly.

The results of the stress tests are disseminated according to the established reporting and escalation processes.

The frequency of the stress tests in the asset management companies included in the study was between daily and quarterly. In addition, all of the companies conduct ad hoc stress tests, e.g. for exceptional events such as the Brexit referendum or the possible effects of elections.

The frequency of the stress tests is based on the general requirements for liquidity reporting; in accordance with these requirements, the regular stress tests are also conducted to the last day of the week, month or quarter. No clear correlation could be found between the size of the asset management company and the frequency of the stress tests in the companies included in the study.

Example

Two examples are given below to illustrate the principle of the procedure: one fund with shares ("OurFund1") and a second with bonds and credit linked notes ("OurFund2"). To determine the liquidity, the funds are divided into product classes, which are each assigned a liquidity score (proportion liquidatable in one day in %). This gives the normal scenario.

In the stress scenario, the liquidity of all products except for overnight money is assumed to be 40% lower. Fund outflows of 30% are assumed in the stress scenario; below this threshold, the fund is marked "red". Between 30% and 39% is marked "yellow" and from 40% the fund is considered liquid and is therefore "green".

The numbers and funds used are purely fictional, and the procedure here is also for illustration purposes only. In order to keep the examples intentionally simple, the fact that the composition of the fund changes due to fund outflows in the stress scenario is also not taken into account. In terms of the principles of the approach, a simple stress test of this nature is possible, but it must fit the business model and the procedure must be justified and validated.

OurFund1

	Share	Liquidity (normal)	Liquidity (stressed)
Overnight money	15%	100%	100%
Shares (DAX)	35%	75%	45%
Shares (second-tier)	50%	32%	19%
OurFund1		57%	40%

Figure 13: Stress test example OurFund1

The liquidity of the second-tier shares in the first fund worsened under stress from barely liquid to illiquid, and the liquidity of the fund dropped from 57% to 40%. However, even in the stress scenario the fund is still liquid.

OurFund2

	Share	Liquidity (normal)	Liquidity (stressed)
Overnight money	8%	100%	100%
Bonds (AAA)	17%	90%	54%
Bonds (BBB)	50%	32%	19%
Credit-linked notes	25%	0%	0%
OurFund2		39%	27%

Figure 14: Stress test example OurFund2

The second fund is in the yellow range even in the normal scenario, and under stressed conditions the securities worsen considerably and the fund becomes illiquid.

5.4 Validation and backtesting

All of the asset management companies included in the study stated that they conduct ad hoc validations of the assumptions and methods used for the stress tests. However, this is not a formalised process at all of the companies, which is evident from the fact that not all of the companies submitted a corresponding validation report.

As part of the validation, some of the companies also carry out backtesting, e.g. if a VaR model is used for the fund outflows.

However, the availability of historical data relating to liquidity risk is overall poor in comparison with that for market risk, which means that the use of such data plays a much smaller role for liquidity risk, and backtesting therefore cannot always be used as a validation tool.

The important thing is that the stress tests and assumptions used are actually regularly validated and the results documented. The approaches for validating the methods used should be appropriate; with expert opinions, for example, an expert review is sufficient.

6 Risk analyses and reporting

The results of the liquidity risk stress tests are an integral part of the liquidity risk analysis. In all of the companies included in the study, the results are categorised using a traffic light approach and produced in graphic form: green for sufficient liquidity and red if the liquidity is too low. At most companies there is also a yellow range for liquidity that is currently only just sufficient. The risk management unit defines appropriate thresholds to determine these ranges.

The following example of a stress test report for a securities fund is, as before, intentionally kept simple. It shows the liquidity of the fund under normal and stressed conditions and the proportions thereof that the individual product classes make up.

Name	Fund type	Assets	Liquidity in normal scenario					Funds	Total	Liquidity in stress scenario					Funds	Total
			Cash	Equity	Bonds	Derivatives				Cash	Equity	Bonds	Derivatives			
OurFund1	retail	45,65	15%	42%	0%	0%	0%	57%	15%	25%	0%	0%	0%	0%	40%	
OurFund2	retail	23,45	8%	0%	31%	0%	0%	39%	8%	0%	19%	0%	0%	27%		
OurFund3	retail	11,22	10%	20%	10%	5%	0%	45%	10%	14%	6%	1%	0%	31%		
OurFund4	special	67,89	8%	30%	2%	6%	6%	52%	8%	22%	0%	3%	3%	36%		

Figure 15: Stress test report example for a securities fund

In **real estate funds**, a liquidity measure is usually used for the stress tests. In the example below, first the liquidity under normal conditions is shown, and then the effects the different scenarios have on a liquidity measure ("liqui-rate") using a traffic light system:

Liquidity of assets								
	Total in €m	1 Day	2-8 Days	9-30 Days	31-90 Days	91-180 Days	181-365 Days	>365 Days
Assets	320.57							
Real estate	220.00					40.00	100.00	80.00
Cash at bank	50.20	20.20	25.00	5.00				0.00
Holdings	20.25				2.00		16.00	2.25
Other	30.12			10.00	5.00	2.00	7.23	5.89
Equity and liabilities	185.79							
Loans	60.00			5.00	5.00	5.00	5.00	40.00
Provisions	20.34			4.34		10.12		5.88
Committed funds	25.45				6.00		8.23	11.22
Fund outflows	80.00		10.00			10.00	10.00	50.00
Overall liquidity*	77.56							
Liqui-Rate*								
Normal	1.8							
Loss of top ten tenants	1.2							
Interest rate shock (+200bp)	1.3							
Market downturn	0.9							
Liquidity-/redemptions+	1							
FX: historical maximums	1.4							
* illustrated by a traffic light system								

Figure 16: Stress test report example for a real estate fund

Where funds are categorised in the yellow or red range in the stress tests, a more in-depth investigation is carried out and this may be escalated by the risk management unit. All of the companies included in the study emphasised the importance of speaking with the portfolio management unit in order to gain additional information from them about the liquidity of the fund and its investor structure before escalating the issue to the responsible bodies and the senior management. However, in some of the asset management companies, the escalation paths were not clearly defined.

In addition, the companies used and declared in the reports the following processes as ways of analysing risk:

- Examining the fund composition (liquid and illiquid instruments, sometimes in great detail)
- Analysing the fund outflows, especially single conspicuous outflows
- Analysing the investor structure, especially with respect to concentration risks in retail funds.

German asset management companies provide for both regular and ad hoc reporting in their own policies and have essentially implemented this as follows: reports on the liquidity situation in the funds are produced on a daily basis.¹⁶ In most cases, these are aimed at the risk management unit and the fund manager. In addition, reports are produced in aggregate form on a monthly basis and discussed in the respective risk committees. Members of these risk committees are usually also representatives of the senior management. Some companies also produce summary reports on a weekly basis. In addition to the reports for internal addressees, German asset management companies also produce quarterly reports on the risk situation and submit these to the national supervisor (BaFin).

When internally defined thresholds are exceeded, ad hoc reports are prepared in order to inform the risk committee and the fund management unit and decide on suitable countermeasures where necessary.

An internal requirement for regular reporting on the current liquidity situation is useful and important. The content of the reports should be adapted to the respective addressees.

Escalation levels should be clearly defined and the individual steps documented in writing. Even if the risk management unit and the portfolio management unit agree that no further steps need to be taken in the case of a critical fund, this is to be documented in writing giving the justification.

7 Supervisory assessment

A key finding in the work on this study is that there is no one-size-fits-all solution for liquidity risk management or, therefore, for stress testing. The business models of the individual asset management companies and the funds managed by them are key in determining the most sensible way of managing liquidity risk.

On the asset side, an in-depth analysis should be carried out in the key investment areas. For example, for an equity fund focusing on selected countries it is very useful to gain a good understanding of market practice in that location. However, such a deep analysis is not necessarily required for bonds used as collateral for derivative transactions. This means that higher demands are placed on asset management companies in the areas they focus on.

"Off-the-peg" liquidity risk management will probably not be sufficient in the core areas. Liquidity risks should be assessed on the basis of companies' own considerations and assessments at least for the assets that are the focus of the investments in each fund set up by the company. In particular, standard liquidity measures supplied by external data providers may only give an insufficient representation of the individual situation of the

¹⁶ Reports are usually produced on a quarterly basis in open-ended real estate funds.

asset management company and can only produce proper results when combined with the company's own empirical values. Each company also has to weigh up the costs associated with obtaining data for the liquidity risk management against the value of the knowledge obtained. Ultimately, a costly acquisition of large volumes of data says nothing on its own about the quality of liquidity management if the data are not used in a carefully targeted manner within the asset management company. It is therefore particularly important for the assessment of liquidity risks that the risk management structure suits the asset management company.

The liabilities side can also vary significantly. Some companies are part of a group financing structure, while others specialise in retail or special funds. The level of knowledge about the investors in a retail fund also differs to varying degrees depending on how the funds are distributed. It is higher if the company can access the securities account data and more difficult if the funds are distributed by third parties. Independently of this, however, liquidity management is particularly challenging for retail funds where the retail fund includes a large tranche for institutional investors. These investors generally react more quickly to market developments and performance trends than retail investors, and with much greater amounts and shares in a fund. It is therefore desirable for asset management companies to communicate closely with the institutional investors so that they can react in good time. This study highlighted a need for further clarification regarding the quantification of this matter. This is also true for the detailed redemption arrangements in special funds.

The additional recommendations made in the individual sections of the study are collated again below:

In order to be able to assess the liquidity of assets on the asset side, it is important that the asset management companies regularly check the liquidity of assets on the asset side and reassess their liquidity. In doing so, the company can establish an overview and is able to follow developments and changes in the liquidity status closely.

Analysing the investor structure, looking at the historical data and evaluating the predictions that can be derived from these are measures that should be a matter of course for all asset management companies in order to increase awareness of outflows of funds. For this to be possible, the companies need to have enough historical data available.

Comparing liquid assets with expected liabilities allows companies to estimate the liquidity of the fund. Internal thresholds reveal excess liquidity and liquidity shortfalls and mean that the appropriate countermeasures can be taken.

There is no universally correct approach to liquidity stress tests. The appropriate type and number of stress tests depends on the size and the business model of the asset management company. The most sensible methods to use also depend on the type of fund (retail or special fund) and its composition. If there are no meaningful market data

available, a qualitative approach would seem to be more expedient than a quantitative one.

The important thing is that the stress tests and assumptions used are actually regularly validated and the results documented. The approaches for validating the methods used should be appropriate; with expert opinions, for example, an expert review is sufficient.

An internal requirement for regular reporting on the current liquidity situation is useful and important. The content of the reports should be adapted to the respective addressees.

Escalation levels should be clearly defined and the individual steps documented in writing. Even if the risk management unit and the portfolio management unit agree that no further steps need to be taken in the case of a critical fund, this is to be documented in writing giving the justification.

Annex: Ongoing international projects

In January 2017, the FSB published Policy Recommendations to Address Structural Vulnerabilities from Asset Management Activities. Some of these recommendations relate to the liquidity mismatch that exists in investment funds between fund investments and redemption terms and conditions as a structural vulnerability in the financial system. From this, the FSB derives recommendations for dealing with this risk, including with regard to the liquidity stress tests to be conducted in the investment fund industry. Recommendation no. 6 in this paper states that supervisory authorities should require and/or provide guidance on stress testing at the level of individual open-ended funds to support liquidity risk management to mitigate financial stability risk. The requirements and/or guidance should address the need for stress testing and how it could be done. IOSCO is called on to update its existing guidance by the end of 2017.

IOSCO therefore issued two consultation papers in July 2017: "*Open-ended Fund Liquidity and Risk Management – Good Practices and Issues for Consideration*" and "*Consultation on CIS Liquidity Risk Management Recommendations*". The consultation period ended on 18 September 2017. The papers were published at the beginning of 2018.

In autumn 2016, the European Systemic Risk Board (ESRB) set up an expert group on "Investment Fund Liquidity and Leverage", which is also working on recommendations for investment funds, including with regard to reducing and avoiding liquidity mismatch as well as to stress testing. The schedule runs until 2018.

ESMA would like to foster supervisory convergence in Europe for stress testing in investment funds. ESMA considers this to be necessary firstly because of the hitherto different European requirements for UCITS and AIFs, and secondly because of the diversity of approaches and scenarios which can be observed on the market resulting from the responsibility for stress tests lying with the companies. ESMA therefore hopes to publish "*Supervisory convergence principles for fund-level stress tests by investment funds*" in the course of 2018 in order to promote good practice in the implementation and effective use of stress tests.

The FSB also drafted a recommendation for system-wide stress tests in the paper mentioned above. The considerations of the ESRB and ESMA regarding stress tests therefore run in parallel alongside those regarding stress tests at fund level towards stress tests and simulations for the entire investment fund sector and its links with the financial system. There is an ongoing discussion regarding the objective, possible design and restrictions of such a project.