

METHODOLOGICAL PRINCIPLES OF INSURANCE STRESS TESTING

LIQUIDITY COMPONENT

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Abbreviations

BCBS	Basel Committee for Banking Supervision
BE	best estimate
CIC	complementary identification code
CQS	credit quality step
EBA	European Banking Authority
EIOPA	European Insurance and Occupational Pensions Authority
ESRB	European Systemic Risk Board
GWP	gross written premium
HQLA	high-quality liquid assets
IAIS	International Association of Insurance Supervisors
EU	European Union
Nat-Cat	natural catastrophe
LCR	liquidity coverage ratio
NCA	national competent authority
QRT	quantitative reporting templates
SII	Solvency II
SCR	solvency capital requirement
ST	stress test
TA	total assets
UL/IL	unit-linked and index-linked

1 Introduction

1. Liquidity risk is fundamentally different from capital risk: due to the different triggering events and the different time horizon of materialization of risks, an insurer can be solvent but still experience a liquidity distress. The Solvency II (SII) regime is designed to ensure a sound capital position of (re)insurance undertakings but it does not include quantitative requirements and relative metrics with respect to the liquidity position. The absence of a commonly agreed approach to assess the liquidity sources and needs of (re)insurers, the subsequent absence of standardized metrics such as the Solvency Capital Requirement (SCR) for the capital position, and the lack of a specifically designed data collection makes a methodological discussion on the liquidity stress test (ST) more difficult. Against this background, the paper proposes a definition of 'liquidity position' for a (re)insurer together with specific metrics to measure it. The discussion that follows on the liquidity ST builds on these elements.
2. So far, the ST exercises conducted by EIOPA focused on the impact of adverse scenarios on the capital position of (re)insurers. The increasing consideration given to liquidity risk by the insurance industry and by the supervisors at EU and global level, highlighted the absence of a comprehensive conceptual approach to liquidity stress testing in the insurance industry. This contribution aims at initiating a process to fill this gap at the EU level. This conceptual framework also serves as a response to the developments of liquidity risk management and supervision introduced at global level where, the recently adopted International Association of Insurance Supervisors (IAIS) Holistic Framework for systemic risk¹ introduces new standards to cope with the liquidity exposures (ref to: IAIS Insurance Core Principles - ICPs and Common Framework - ComFrame).²
3. The main purpose of this chapter is to set out methodological principles that can be used to design ST exercises to assess the vulnerability of insurers to liquidity shocks. This first EIOPA proposal for a ST liquidity exercise is based on the current understanding and knowledge of liquidity risk in the insurance industry, hence it might evolve in the future to reflect also the experience gained in the assessment of such risk at EU and global level.
4. Given the novelty of the topic, section 1.1 provides some background on the liquidity risk in the insurance industry as well as a definition of liquidity risk for the sector. The following sections describe the building blocks of a liquidity ST exercise starting from the exposures of insurers to liquidity risk (section 1.3) and the potential metrics to measure them (section 2.1). Section 3 presents the proposed approach to the design of scenarios to be used in liquidity ST including narrative, shocks and their calibration. The chapter concludes with guidelines on the application of the shocks (section. 3.3) and with some examples on potential analysis and presentation of the results (section. 3.4).

¹ IAIS (2019) Holistic Framework for Systemic Risk in the Insurance Industry. Available at: <https://www.iaisweb.org/page/news/press-releases//file/87109/holistic-framework-for-systemic-risk>.

² IAIS (2019) Insurance Core Principles and ComFrame. Available at: <https://www.iaisweb.org/page/supervisory-material/insurance-core-principles-and-comframe>.

1.1 Definition of liquidity risk in insurance

5. Liquidity risk in insurance is defined by the SII Directive as “the risk that insurance and reinsurance undertakings are unable to realize investments and other assets in order to settle their financial obligations when they fall due”. It almost overlaps with the definition provided by the IAIS in its Glossary “The risk that an insurer is unable to realize its investments and other assets in a timely manner in order to meet its financial obligations, including collateral needs, as they fall due.”³ Both definitions imply that liquidity risk arises as a result of an imbalance between liquidity sources and needs, hence it affects assets, liabilities and their interplay.
6. Liquidity is a well-known and extensively debated characteristic of assets and several widely applied approaches, mainly based on “haircuts”⁴, are available for their classifications in prudential regimes including liquidity requirements to cover liquidity risk.⁵ For example, according to the Basel Committee for Banking Supervision (BCBS) framework, an asset to be considered of high quality and liquid shall be easily and immediately converted into cash at little or no loss of value, even during time of stress.
7. The situation changes when we look at the liability side of the balance sheet (BS) of an insurer where the largest items are the best estimates (BE). The BE is a typical insurance concept, computation of which depends on the characteristics of the in-force product portfolio. Currently there is no commonly accepted approach to their classification according to liquidity characteristics. The heterogeneity in products and in their features (e.g. guarantees, penalties) among jurisdictions provides additional complexity.
8. EIOPA, in its 2019 work on the asset and liability management in relation to the illiquidity of liabilities⁶, provided a definition of “illiquidity” for the liabilities of an insurer: “Insurance liabilities are considered illiquid over a given period when they allow the insurer to hold assets for this period with a very low risk of forced selling. This property depends on the timing and the predictability of the liability cash flows that in turn are influenced by product features such as surrender options”. EIOPA also provided a first classification of the liabilities based on a well identified subset of liquidity-relevant product’s features (e.g. fiscal and economic penalties).⁷
9. Due to the characteristics of the traditional life and non-life insurance business model, liquidity risk is generally not considered a major source of concern for insurers compared to other exposures.⁸ The inverted production cycle, where the cash inflows in form of collected premia precede outflows typically due to claims settlement, creates a stable source of funding for insurers. Against this,

³ IAIS (2019) Glossary. Available at: <https://www.iaisweb.org/page/supervisory-material/glossary/file/87192/iais-glossary>

⁴ The term haircut is used when referring to the difference between an asset's market value and the amount that can be used for specific analysis or under specific circumstances.

⁵ BCBS refers to the concept of high quality liquid asset (HQLA) in the Basel framework. Available at: https://www.bis.org/basel_framework/.

⁶ EIOPA (2019) Report on insurers’ asset and liability management in relation to the illiquidity of their liabilities. Available at: https://eiopa.europa.eu/Publications/Reports/EIOPA_Report_on_insurers_asset_and_liability_management_Dec2019.pdf

⁷ The criteria for the classification of assets and liabilities according to their liquidity characteristics are extensively discussed in Sections 2.2.1 and 2.2.2.

⁸ Ref. to EIOPA Risk and Financial Stability report – December 2019, Chapter 5 - Risk Assessment. Available at: <https://www.eiopa.europa.eu/content/eiopa-financial-stability-report-december-2019>.

in normal periods, a soundly managed insurer can mainly rely on inflows from premia to cover its outflows. However, the materialization of insurance specific events (e.g. policyholder behavior, relevant and concentrated increase in claims) might generate unforeseen cash outflows which need to be matched by other sources of liquidity (e.g. sales of assets). If this event is accompanied by a liquidity shock on the markets the impact on the insurer might be sudden and severe. That is why liquidity risk in insurance can be described as a low probability type of risk, but with a potentially high impact and therefore insurers need to have proper liquidity management in place, to fulfil both expected and unexpected funding needs in normal and distressed market periods. An overview of the potential sources of liquidity distress in the insurance industry is provided in section 1.3.

10. It is worth noting that liquidity risk may be both a microprudential concern, e.g. affect the individual insurers, and a macroprudential concern when the shock generates wide-spread reaction or action by a significant player in a particular market with potential spill-over to other markets.

1.2 Liquidity stress test framework

1.2.1 Objectives

11. The main objective of a ST exercise is to assess the resilience of financial institutions to severe but plausible scenarios and/or to assess the potential externalities generated by the individual or combined reactions of these institutions against the prescribed shocks. In this context, the aim is not to assess the capital but the liquidity position, namely the relation between liquidity sources and liquidity needs of an insurer over different time horizons against adverse circumstances.

12. In line with the discussion on the objective of a capital ST exercise⁹, also a liquidity ST exercise can have micro- or macroprudential objective as listed in Table 1-1.

Table 1-1 Microprudential objectives vs. macroprudential objectives

Microprudential objectives	Macroprudential objectives
<ul style="list-style-type: none"> • Measure the exposures of individual insurers to liquidity risks • Assess vulnerabilities and resilience of individual insurers to liquidity risks • Enhance risk management capabilities to assess and mitigate liquidity risks 	<ul style="list-style-type: none"> • Assess vulnerabilities and resilience of overall insurance sector and potential systemic liquidity risks • Assess potential spill-overs to other financial sectors and the real economy of liquidity risks

13. Given the novelty of applying the ST tool to the liquidity position of insurers, such an exercise can have additional overarching objectives like:

- foster specific discussions on the build-up of the liquidity risk in the insurance industry and on potential mitigation actions and policy implications;

⁹ A comprehensive discussion on the objective for a capital stress testing can be found in Chapter 2.2 of the 1st paper on the methodological principles of insurance stress testing available at: <https://www.eiopa.europa.eu/sites/default/files/publications/methodological-principles-insurance-stress-testing.pdf>.

- build an agreed approach to the measurement and assessment of the liquidity position of the insurers. This is particularly important considering that the SII framework includes liquidity risk only as a Pillar II requirement;
- have a sound understanding of the ways in which insurers' activities affect their liquidity risk profile under normal and stressed conditions.

1.2.2 Scope

14. When assessing liquidity risk via ST, the scope is one of the cornerstones of the exercise and it should be strictly related to its objective.

15. As for capital ST, the scope should be selected considering all the other elements of the exercise such as the objective(s). Hence, in absolute terms, there is no best option between groups and solos. Both solutions present advantages and disadvantages as shown in Table 1-2.

Table 1-2 Advantages and disadvantages in selecting solos vs. groups in liquidity stress testing

	Advantages	Disadvantages
Solo	<ul style="list-style-type: none"> • Target specific business lines • Country/jurisdiction analysis • Easy to compute the market coverage • Easier application of shocks • Easier validation of data • Easier to issue potential recommendations and recovery/resolutions actions for NCAs 	<ul style="list-style-type: none"> • Less informative from a financial stability perspective • Need some coordination work from both the insurance groups and the National Competent Authorities (NCAs) in case of participating solos from more than one European country that are part of the same group with the risk of duplicating work (validation activities performed at local level) • Potential limitation in evaluating the impact of reactive post-stress management actions (if they have to be decided at group level) • Doesn't consider the impact of the liquidity risk management pursued by the group • Meaningless if the liquidity is managed centrally
Groups	<ul style="list-style-type: none"> • Impact on the systemic groups (more informative from a financial stability prospective) • Easier to assess the impact of reactive post stress management actions if needed • Considers the impact of the liquidity risk management pursued by the group (including intra-group support and fungibility). • Account for different risk profile of holding entities with respect to operating entities 	<ul style="list-style-type: none"> • More complexity in the application and assessment of the scenarios with the consequence of the necessity to apply simplification and approximation that could have an impact on the comparability of the results • No country-based assessment • Harder to identify vulnerabilities of specific entities, especially when part of the group follows an accounting standard (like in the US) and uses D&A method for aggregation of the results • Harder to validate the data • The lack of common practices in the definition of group cash flows makes the validation of the results difficult • Currency issues enhanced in case of groups operating cross-border • Meaningless if the liquidity is not managed centrally

16. In case of groups, the general principle of “*assessing the risk where it is managed*” applies and advantages and disadvantages shall be considered in the light of the liquidity management practices implemented at group level. Specifically:
- if the liquidity is managed centrally by the parent company or by specific entities in the perimeter (e.g. cash pooling);
 - if the risk management framework adopted by the group foresees intra-group liquidity support under specific circumstances through binding intra-group agreements; or
 - if entities belonging to the groups are supposed to manage their liquidity independently without any pre-defined and binding intra-group support.
17. As a principle, in the context of a ST exercise, the intra-group subsidization has to be allowed in case:
- the liquidity is centrally managed at group level; and
 - the support among entities is foreseen and included in the risk management practices regularly adopted and enforced by the group (e.g. liquidity risk management plan, recovery plans, other policies adopted at group level by the board or other committees in line with the governance structure).
18. Any liquidity transfer should account for fungibility and transferability of sources across jurisdictions as well as the foreign exchange implications stemming from the potential different denomination of liquidity needs and sources.
19. Documentation on the liquidity management practices at group level shall, in principle, be shared with the national authorities during the pre-validation process (refer to the 1st methodological paper on insurance stress testing) and the potential liquidity transfer shall be highlighted in the templates for the data collection.
20. Alternatively, any intragroup support should be treated as a post-stress reactive management actions and considered according to the objective of the exercise.
21. Concluding, the selection of the scope should be defined in the design phase of each exercise finding the best balance between the granularity of the analysis and the liquidity management practices adopted at group level. This implies preference for analysis at solo level where liquidity is not shared and groups in case liquidity is centrally managed. In the latter case, information at solo level with a clear identification of the shared liquidity resources and / or intra-group liquidity transfers might be requested.

1.3 Sources of liquidity risk in insurance

22. The sources of liquidity risks for a (re)insurer depend on its full risk profile that comprises both BE and off-balance sheet exposures (e.g. derivative positions). The specificity of the asset holdings, of the in-force liability portfolios and the interactions therein as well as the potential exposures to margin calls make a company prone to liquidity related events as described in the following paragraphs. It is worth noting that the exposures which make undertakings prone to liquidity risk may also have capital implication; consequently, some of the events that might lead to liquidity distresses can also impact the capital position. It is therefore of utmost importance in a liquidity ST exercise to clearly identify the events and dissect their effects on capital and liquidity.

1.3.1 Exposure to insurable events

23. The exposures to insurable events may incorporate considerations of the nature, recurrence and severity of these events, including natural catastrophes, pandemics or legal matters that may happen within the considered time horizon. These could be considered as triggering events for liquidity stress scenarios. When claims are significantly higher than expected and sudden in nature, this may cause liquidity risk. In addition, uncertainty in the projection of cash flows leads to liquidity risk. The liquidity risk stems from the assets and the liabilities side.
24. Concerning the assets side, liquidity risk could originate from the fact that insurers might need to transform in a given (typically short) time frame their assets into cash to meet their debt obligations. As insurers hold assets with varying degrees of liquidity on their BS, it should be considered that in stressed market conditions it may be more difficult to monetize some of these investments than others. Factors such as market depth and access, the time requirement, haircuts and the likelihood of forced sale losses should be taken into account. For example, in stressed market conditions it might be challenging to sell some types of assets or these could be sold at a significant discount causing losses for the insurance company.
25. Concerning the liability-side, insurers might be confronted with, unexpected sudden increases in claims (e.g. pandemic¹⁰ for life insurers and cat events for the non-life). Another condition that could exacerbate the liquidity needs might be an unfavorable evolution of the legislation. Features that determine the likelihood of lapses are, for instance, lapse fees, maturity dates, guarantees and customer or product type. These characteristics vary from product to product and from insurer to insurer and determine the likelihood of mass lapse events, which may cause a sudden large funding need. Non-life insurers are exposed to cat events, including market turning events that might trigger a liquidity risk. Reinsurers might be exposed to the same risks as above and also to some other contractual terms that might increase the liquidity needs.

1.3.2 Policyholder behavior

26. The inverted cycle typical of the insurance business provides ample source of funding from current and future policyholder, hence the liquidity management of insurers is prone to policyholders' behavior with specific reference to underwriting trends and surrenders.
27. Premium inflow represents a relevant source of liquidity, hence any negative divergence from the expected level of written premia over time might generate strains in the liquidity position of insurers.
28. Policyholders can withdraw from specific insurance products at any time and insurers would have to provide the amount of cash equivalent to the surrender value. In case insurers do not hold sufficient high quality assets that can be

¹⁰ Pandemics are one-time shocks from the extreme, adverse tail of the probability distribution that are not adequately represented by extrapolation from more common events and for which it is usually difficult to specify a loss value, and thus an amount of capital to hold.

exchanged rapidly and without a haircut against cash, they could be forced to sell many of their assets at distressed prices.

29. Features that determine the likelihood of lapses¹¹ are, for instance, the type of product, lapse penalties (contractual and fiscal), maturity dates, guarantees and customer type. These characteristics depend on the product features and determine the likelihood of mass lapse events, which may cause a sudden large funding need.
30. Liquidity risk might further increase in case of contracts where the surrender value exceeds the value of the assets covering the obligations when the surrender option is exercised.
31. Possible triggers that may lead to a loss of confidence and policyholders surrendering their policies are, for instance, a prolonged economic crisis, a rating downgrade of the insurer, or reputational issues.

1.3.3 Off-balance sheet exposures

32. One example of liquidity risk that might arise from off-balance sheet activities is associated with holding derivative positions. Following the AIG collapse, insurers' involvement in derivatives has been considered as a potential risk to financial stability. The AIG involvement in the CDS market had however been unique, and insurers traditionally use derivatives for hedging.
33. While derivatives can help insurers mitigate some of the risks in their BS, they expose them to higher liquidity risk. Namely, following the financial crisis, it has been agreed globally to promote central clearing of derivatives. Both centrally cleared as well as bilateral derivatives trades require posting/exchanging of collateral, typically in the form of cash margins. Their purpose is to cover potential market movements and hence changes in the value of the derivative contracts.
34. For a more detailed discussion on derivatives as a potential source of liquidity risk to insurers as well as to a sensitivity analysis of EEA insurers on their interest rate swaps (IRS) please refer to the thematic article in the EIOPA Autumn 2019 Financial Stability Report¹².
35. Moreover, collateral needs could also emerge from reinsurance arrangements and/or any other obligations or guarantees provided to other parties. A triggering event for such a liquidity source could be an increase/decrease in interest rates.
36. Under normal circumstances repo markets will be able to secure the liquidity needs of insurers. However, banks' ability or willingness to provide liquidity can be limited, for instance around year end.

¹¹ Lapse should be understood in a holistic way, comprehensive of all the situations described in the Delegated Regulation on the level 2 text. Under this approach, lapses include all legal or contractual policyholder rights to fully or partly terminate, surrender, decrease, restrict or suspend insurance cover or permit the insurance policy to lapse all legal or contractual policyholder rights to fully establish, renew, increase, extend or resume the insurance or reinsurance cover

¹² De Jong et al (2019).

1.3.4 Balance sheet exposures

37. Financial markets developments can have a strong impact on an insurer's liquidity position and can affect both the assets and the liabilities. An adverse development might lead to a reduction in the market value of an insurer's assets or lead to decreased trading volume. Also, market developments and policyholder behavior can interact: when interest rates change rapidly, this might give an incentive to surrender thereby affecting the liabilities side. A triggering event for such a liquidity source could be fire sales of assets in an unfavorable market development.

1.3.5 Funding risk

38. This source of liquidity risk comes from the fact the insurers might experience a deterioration of their credit rating or a reduced access to the repo market and wholesale funding in general which might lead to the risk of shortening tenors or refusal to roll over or extend the maturity of funding. These events will lead to an increase in the funding costs of the insurer, a decrease in their capital and potential additional collateral requests.

39. Other sources of liquidity risk could be counterparty exposures. Concentration of counterparty exposures might apply to risk transfer operations where the exposures towards reinsurers might be concentrated. A potential failure or distress of a primary reinsurer has a direct impact on the reinsurance recoverables and reinsurance receivables cutting or limiting a liquidity source. Claim settlements delays of reinsurers can cause liquidity problems to the undertakings. In the case of accepted reinsurance, downgrading could require an undertaking to post additional collateral in favor of the cedant - introducing a new source of liquidity risk.

40. Non-traditional insurance business such as the provision of loans and mortgages is also prone to counterparty risk, hence any deterioration of the credit quality which is reflected in an increased probability of default might reduce the liquidity inflow.

1.3.6 Other

41. Another source of risk concerns the fungibility and availability of the liquid funds such as the ability to transfer liquidity across entities, in particular intra-group and/or cross-border transfers. Intra-group transactions, especially if happening among entities operating in different countries and under the jurisdictions of different local authorities might be limited by legal or fiscal motivations and impeded by supervisors based on capital grounds. Denomination of liquidity sources and liquidity needs in different currencies requires access to foreign exchange market which, under stress with impaired access to foreign exchange markets might reduce the fungibility of liquid funds.

42. In addition, the correlation and concentration of funding sources could lead to liquidity risk for insurers depending on how well diversified their sources of funding are. In this context the concept of concentration shall be intended more broadly than bilateral counterparty exposures. Concentration of liquidity sources shall be considered also at market, sector and geographical level.

2 How to measure liquidity risk

2.1 Approaches and Metrics

43. The use of a unified framework to assess and measure liquidity risk of insurers is a relatively new field for both undertakings and supervisors. Unlike Solvency II, there are currently no standardized indicators to measure and assess liquidity risk in a normal and/or stressed environment. Also, liquidity risk has many drivers and is entity specific which makes it difficult to be captured in one single indicator. This section outlines the approaches, including related indicators, which can be used to assess the current liquidity position of an insurer and the potential impact of a liquidity stress scenario.
44. A proper assessment of the liquidity position of an insurance undertaking should account for the full range of the liquidity sources and the liquidity needs in a holistic perspective. Sources and needs can be combined in absolute terms (e.g. *Sources – Needs*) or relative terms (e.g. $\frac{Sources}{Needs}$) depending on the objective of the analysis and the source of information. An isolated assessment of the sources or the needs provides further insights on exposures and vulnerabilities. Hence, it can be used to complement the holistic view by scrutinising specific aspects of the liquidity position of an undertaking.
45. The assessment of the liquidity position of an insurance undertaking can follow two main approaches- the BS approach and the cash flow approach. Each one has its benefits and shortcomings.
46. A **stock based approach** approximates the liquidity needs and sources stemming from the assets and liabilities positions of an undertaking at a reference date. Such an approach estimates the liquidity of the assets and liabilities by applying haircuts (or factors). The haircuts are based on the ease of liquidating an asset without penalties and redeeming a liability over a predefined time horizon. This approach allows an estimation of an undertaking's exposure to liquidity risk and, subsequently, an assessment of its vulnerability and ability to cope with potential liquidity shocks.
47. A **cash flow approach** is a flow-based approach that compares the projected or realised liquidity sources and needs of an undertaking over a predefined time horizon, to determine whether, and to what extent, the inflows are able to sustain the outflows over time.¹³
48. Overarching indicators encompassing sources and needs can be based on both stocks and flows based approaches. The latter perspective can be developed on a fully fledged cash flow analysis or a stylized set of relevant inflows and outflows of an undertaking. The two perspectives should not be considered mutually exclusive but rather complementing each other as they capture different aspects of sources and needs.
49. The stock perspective analyses the liquidity characteristics of the asset holdings and the portfolios of liabilities (see section 2.3). Depending on the level of liquidity of their assets, insurers can face situations wherein they are unable to meet obligations due to lack of sufficient liquid assets, especially in stressed periods when trading could be more difficult (it could require more time or

¹³ The relevant cash flows are not the risk neutral flows used in the valuation of the best estimate liabilities but rather the real world cash flows.

implying losses). On the other hand, insurers with more illiquid liabilities are less exposed to liquidity risk even in stressed periods provided that they have a proper asset-liability management practice in place.

50. The flow perspective covers the vast array of liquidity sources available for insurance undertakings to cover their liquidity needs, such as underwriting activities (e.g. written premia), investments (e.g. coupons, dividends) and funding activities (e.g. debt instrument issuance, wholesale funding). Liquidity needs can originate from traditional insurance activities (e.g. claims, surrenders), financial activities (e.g. margin calls, fees, collateral needs) and general operational expenses.
51. In developing its position to liquidity stress testing, EIOPA opts for a step-by-step approach starting from both a stock and a stylized flow based analysis, and ending with a fully-fledged cash flow analysis. This reduces the complexity of the assessment and relies extensively on the existing SII reporting, eventually minimizing the additional data requests to the undertakings. During the first step, the use of this liquidity indicator will allow both insurers and supervisors to gain a deeper understanding of liquidity risks faced by undertakings. The results of these analyses will be taken into account in the second step for the enhancement of the flow analysis towards a fully-fledged cash flow approach. The latter will, in any case, be subject to a cost-benefit assessment.
52. The current paper presents a stock based approach and a stylized flows approach. A fully fledged cash flow approach will be developed in a later stage, once a homogeneous and comparable approach in the calculation of the real-world cash flows is reached.

2.2 Indicators

53. The information gathered in the stock approach and the stylized flow approach can be summarized in a threefold set of indicators presented in Table 2-1. The first two sets capture the liquidity characteristics of asset allocation and liabilities, and the related flows. The sustainability indicators combine the stock and flow information to assess whether and to which extent any potential net outflows over defined time horizons can be covered by available liquid assets.

Table 2-1 Indicators

View	Indicator	Details
Stock	$Liquidity_{Stock} = \frac{Liquid\ Assets}{Liquid\ Liabilities}$	<ul style="list-style-type: none"> Provides a snapshot of the liquidity position based on the asset and liability portfolios The liquidity of assets can be estimated through the application of liquidity haircuts to the different asset classes (granularity of the classification can vary) The definition of liquid assets can be narrow or broader The liquidity of life liabilities can be assessed through their BE weighted by their "lapsability", or on the weighted surrender values associated to the life and health portfolios (this approach is not

		applicable to the non-life portfolios)
Flow	$Flow_t^{Net} = Inflows_t - Outflows_t$ $Flow\ ratio_t = \frac{Inflows_t}{Outflows_t}$	<ul style="list-style-type: none"> • Net flows should capture all the treasury movement of an insurance undertaking over a given time horizon • The indicator can be tailored to analyse a specific business or product portfolio to assess its sustainability from a liquidity perspective • Suitable for forward looking assessments on different time horizons • Depending on the granularity of data, the indicator could be computed separately for each component (traditional life business, unit/index-linked business, non-life business, investments, other)
Sustainability	$Sustainability_t = Flow_t^{Net} + Liquid\ assets_t$ $Sustainability_t = \frac{Liquid\ assets_t}{Flow_t^{Net}}$	<ul style="list-style-type: none"> • Sustainability can be evaluated via an absolute approach (sum of net-flows and available liquid assets) or via a relative approach (ratio of available liquid assets to net-flows) • Provides an overview of the sustainability of the cash flow position in case of net outflow position • Assesses whether, in case of net outflows, the undertakings hold a sufficient amount of liquid assets to cover the net outstanding amount at a given time • The liquid assets element can be further specified for example by limiting it to cash and cash equivalents or by enlarging the category to asset classes which require actions on the markets to be converted into available cash (e.g. fixed income assets)

54. The stock indicator reported in Table 2-1 is not suitable for the non-life business, where the liquidity of liabilities cannot be approximated through their "lapsability" and the concept of surrender value is not applicable.

55. To cover this gap, EIOPA is considering an alternative approach that estimates the liquidity needs stemming from the liabilities through the amount and the duration of the BE:

$$Liquid\ liability_t^p = t * BE^p / DurBE^p$$

Where t is the time horizon of the assessment and p indicates the portfolio of the liability whose granularity might be adjusted to match the objective of the analysis and the data availability.

2.2.1 Stock indicator

56. The numerator and denominator of the ratio are based on the weighting of assets and liabilities from a liquidity standpoint. Weights are commonly assigned to classes of assets and liabilities. Therefore, the exposures of an insurance undertaking need to be classified and assigned to buckets identified by common liquidity characteristics.
57. Table 2-2 displays potential ways for clustering the assets and liabilities. On the asset side, several widely applied methodologies can be borrowed from other financial service industries. The classification of the liability exposures, being insurance specific, shall be developed ad-hoc and potentially tailored to the different lines of business. Additionally, it is worth anticipating that the criteria presented in Section 2.3.2 are developed for the direct insurance business and, even if potentially applicable also to reinsurance portfolios, further work is needed to define more suitable classifications for the reinsurance business.
58. On the asset side, there are many classifications that can be used as a reference (refer to Annexes 4.1, 4.3, and 4.4). They are generally based on absolute criteria which are homogenous across the different EU jurisdictions. Such classification is yet to be produced for the liability side. Amongst different contract characteristics, surrender penalties or incentives are known to be the drivers of liquidity risk. EIOPA will further investigate the different risk drivers and provide estimations of their effect in an effort to harmonize risk analysis with respect to liquidity. A proposal is elaborated in Section 2.3.2.

Table 2-2 Stock indicator: Bucketing approaches

Approach	Liquidity sources	Liquidity needs
Stock	Bucketing of assets according to liquidity characteristics (e.g. BCBS, ESRB, IAIS) ¹⁴	Bucketing of liabilities Life: - Product features - (Il)liquidity measure Non-Life: - Duration - Lines of business

2.2.2 Flow indicator

59. This indicator combines the relevant flow-based liquidity sources and needs estimated over one or more time horizons. Table 2-3 displays the in- and outflows included in the assessment. The list should be considered provisional and subject to further development.
60. The indicator can be specified for an insurance undertaking as a whole and for specific business lines (i.e. traditional life business, unit/index-linked business, non-life business, investments, other) to allow for a more detailed understanding of the sources of liquidity risk.

¹⁴ For details on the different classifications refer to section 4.

Table 2-3 Flow indicator: constituents

Approach	Liquidity sources (inflows)	Liquidity needs (outflows)
Flow	<ul style="list-style-type: none"> - Premiums - Coupons - Rents - Dividends - Sale of assets - Repo agreements - Intra-group inflows - Reinsurance inflows 	<ul style="list-style-type: none"> - Claims - Surrenders - Operational and technical expenses - Investment fees - Margin calls - Intra-group outflows - Taxes - Payment of dividends - Purchase of assets - Reinsurance outflows

2.2.3 Sustainability of the liquidity position

61. The analysis of the sustainability of the liquidity position combines the flow perspective and the stock perspective. Considering the availability of immediately or highly liquid assets to cover any cash flow shortage, allows getting a wider picture of the liquidity position of an insurer and a more thorough assessment of its vulnerability to liquidity risk (ref. to Table 2-4).
62. The indicator may be based only on the immediately liquid assets (cash and deposits) or it may include also highly liquid assets (see section 2.3.1 for a precise classification) to cover the flow mismatch.

Table 2-4 Sustainability indicator: components

Approach	Liquidity sources	Liquidity needs
Combined	<ul style="list-style-type: none"> - Cash and equivalents - Bucketing of assets according to liquidity characteristics (e.g. HQLA) 	<ul style="list-style-type: none"> - Total net cash flows

2.2.4 Ancillary indicators

63. The overarching sources/needs based indicators can be complemented by indicators focused exclusively on the characteristics of either the liquidity sources or the liquidity needs, to gather additional information on the potential vulnerabilities and exposures to shocks. An example of these indicators is provided in Table 2-5.

Table 2-5 Ancillary metrics to measure liquidity

Base	Indicator	Details
Stock - Assets	$\text{Assets Liquidity} = \frac{\text{Liquid Assets}}{\text{Total Assets}}$	<ul style="list-style-type: none"> • Focus on the liquidity sources • Provides an overview of the asset allocation from a liquidity perspective • Based on a classification of the assets • Definition of liquid assets can be narrower or broader
Stock - Liabilities	$\text{Liabilities Liquidity} = \frac{\text{Liquid Liabilities}}{\text{Total Liabilities}}$	<ul style="list-style-type: none"> • Provides an overview of the liquidity needs stemming from the in-force portfolio of life and health liabilities • Based on the weighted (an overview of the approaches for classification of liabilities is proposed in Section 2.3.2)

		<p>surrender value¹⁵ of the life and health in-force liability portfolio (Numerator) and the total BE of the same portfolio (Denominator)</p> <ul style="list-style-type: none"> • Information is based on the Solvency II QRT S.12. which needs to be further split according to the liquidity of the liability portfolios • Based on a classification of the product portfolio by a liquidity perspective or on the duration of liabilities (an overview of the approaches for classification of liabilities is proposed in Section 2.3.2) • The liquidity of the life liabilities can be based on weights associated with the predictability of the future cash flows of the product portfolios (e.g. presence of features which allow policyholders to lapse their contracts)
Flow	<p style="text-align: center;"><i>Surrender Ratio (flow)</i></p> $= \frac{\text{Total amount of surrenders}}{\text{Premiums}}_{16}$	<ul style="list-style-type: none"> • Provides an overview of the liquidity sources and needs from a flow perspective • Based on SII data (S.05)

64. The indicators described in section 2.2 can be used to assess the liquidity position of an insurer both in a normal or a stressed situation. Analyzing the liquidity indicators in a normal situation allows the identification of insurers with a weaker liquidity position. Comparing the liquidity indicator before and after stress allows for an assessment of the impact of the liquidity stress scenario on the market and the identification of insurers that are more sensitive to liquidity risks.

2.3 Stock perspective

65. The stock perspective allows the identification and assessment of exposure and potential vulnerability of insurers. It can capture the relation between decreases in future liquidity sources and increases in future liquidity needs.

¹⁵ Surrender refers to any policyholder's action (e.g. request of lapse) that implies a cash disbursement for the company (e.g. payment of a surrender value). The surrender value reflects the amount, defined contractually, to be paid to the policyholder in case of early termination of the contract (i.e. before it becomes payable by maturity or occurrence of the insured event, such as death), net of charges and policy loans. It includes surrender values guaranteed and not guaranteed.

¹⁶ Surrender refers to any policyholder's action (e.g. request of lapse) that implies a cash disbursement for the company (e.g. payment of a surrender value). This amount represents the total amount of surrenders occurred during the period.

2.3.1 Sources

66. The assessment of the liquidity sources under a stock approach relies on bucketing of the assets according to their liquidity. Overall, the SII reporting (list of assets) contains enough information to assess the liquidity characteristics of most of the exposures on the asset side of the BS. Also, there is a general understanding of the characteristics that determine the liquidity of assets.
67. In principle, a liquid asset should be easily and immediately convertible into cash, either through repo or outright sale, at little or no loss in value¹⁷. Such assets generally have low credit and market risk; have easy, transparent and accurate valuations and have low correlation with risky assets. These assets typically also have active outright sale or repo markets at all times with evidence of market breadth and depth. Finally, assets should have a proven record as a reliable source of liquidity during stressed market conditions.
68. Additionally, to ensure their availability to meet the insurer's liquidity needs, assets should be unencumbered. Instruments issued by other financial institutions should generally not be considered liquid, except for deposits. This is due to the potential risk that their liquidity is correlated with developments in the financial markets and/or broader economy and may exacerbate stress at the insurer level.¹⁸ The different level of liquidity between securities issued by financial and non-financial corporations will be reflected into the calibration of the haircuts.¹⁹
69. These shared principles are used to generate classification/bucketing of assets with similar liquidity characteristics and to treat them via haircuts that reflect their liquidity over a given time horizon. As an example, cash is the most liquid exposure on the balance sheet. It is always available as a liquidity source (a factor 100% applies or a 0% haircut). Real estate exposures on the other hand are not liquid over a short time horizon. A factor 0% would apply, reflecting that this exposure can't be used as a source of liquidity. The time horizon is key to calibrate the haircuts as an exposure that is considered illiquid in the short term can become liquid over a longer time horizon.
70. Supervisors and standard setting bodies propose similar approaches for bucketing of the asset classes and calibration of the haircuts. Differences can be found in the granularity of the aggregation of the assets and in the severity of the haircuts (ref. to Annex **Error! Reference source not found.**).
71. The most appropriate approach to be applied at European level to the insurance industry would be in line with the following principles:
- Bucketing of the assets should be homogeneously applied by all undertakings operating in the European Union;

¹⁷IAIS (2019), Draft Application Paper on Liquidity Risk Management. Available at: <https://www.iaisweb.org/page/consultations/closed-consultations/2019/draft-application-paper-on-liquidity-risk-management>.

¹⁸ IAIS (2019), Draft Application Paper on Liquidity Risk Management. Available at: <https://www.iaisweb.org/page/consultations/closed-consultations/2019/draft-application-paper-on-liquidity-risk-management>.

¹⁹ In 2021, the IAIS is also planning to assess the treatment of instruments issued by financial institutions by a liquidity perspective. Ref. to IAIS (2020) Public Consultation Document on the Development of Liquidity Metrics: Phase 1 – Exposure Approach. Available at: <https://www.iaisweb.org/page/consultations>.

- The bucketing should be based on the information already produced and reported by undertakings in the regular Solvency II reporting;
- Given the lack of experience in the insurance industry, haircuts should be aligned with the widely recognised practices applied in other industries (e.g. Liquidity Coverage Ratio (LCR) approach used in banking).

72. Against this background, EIOPA considers the classification presented in Table 2-6 most appropriate. This is an adaptation of the LCR approach applied in the banking industry to the insurance reporting.

Table 2-6 Asset bucketing

S.1	Cash & Bank Deposits & Bank Commercial Paper/Certificates of Deposits)
S.2	Government-Related Securities (Central governments & affiliates)
S.2.1	issued/guaranteed by EU member states (all CQSs) and issued by highly rated non-EU countries (CQS0/1)
S.2.2	Issued or guaranteed by highly rated non-EU countries (CQS2/3)
S.3	Exposures to ECB, Central banks, multilateral development banks & international organisations
S.3.1	issued or guaranteed by ECB, EU central banks, supranational institutions (BIS, IMF, EC,..) or Multilateral Development Banks
S.3.2	issued or guaranteed by central banks of non-EU countries (CQS0/1)
S.4	High Quality Covered bonds
S.4.1	Extremely high quality covered bonds - CQS0/1
S.4.2	High quality covered bonds - CQS2
S.5	Corporate bonds not issued by a financial institution or its affiliate
S.5.1	Corporate debt securities (CQS0/1)
S.5.2	Corporate debt securities (CQS2/3)
S.6	Corporate bonds issued by a financial institution or its affiliate
S.6.1	Corporate debt securities (CQS0/1)
S.6.2	Corporate debt securities (CQS2/3)
S.7	Listed Equity not issued by a financial institution or its affiliate
S.8	Listed Equity issued by a financial institution or its affiliate
S.9	Collateralised securities (CQS0/1)
S.10	Collective Investment Undertakings
S.11	Off-balance sheet or contingent financial liabilities to third parties

73. Credit worthiness aggregation and geographical aggregation can be further refined to better reflect the average asset allocation of European undertakings.

74. Within each category (if relevant), additional breakdowns might be requested. This can include, without any aim of completeness, the currency denomination, ring fenced funds, collateralization.

75. The table can be populated by undertakings relying on the set of information already provided in the regular reporting (mainly Solvency II S.06 template) as shown in Annex 4.5.

2.3.2 Needs

76. In the stock perspective, the liquidity needs have to be identified on the liability side of the BS. The most relevant part is the BE, which requires to be classified according to liquidity criteria.

77. In general, the classification of a portfolio of insurance liabilities is not a trivial task and it becomes even more difficult in case the criteria is liquidity, for which no commonly agreed definition exists. The assessment of the liquidity characteristics of the liabilities is a relatively new area of interest. So far, there is no common understanding or generally accepted methodology that can be used to assess the liquidity of liabilities. One reason for this lack of common

understanding is the vast variety of different insurance products throughout Europe, each potentially subject to specific national fiscal regimes.

78. The SII reporting contains some information that can be used to assess the liquidity position of insurers. However, the primary objective of the SII quantitative reporting templates is to assess the solvency position of insurers and thus, they include insufficient information for a comprehensive assessment of liquidity risk. Especially, the data available to assess the liquidity needs of exposures is limited. In order to make a proper assessment of the liquidity needs the dataset should become broader and more granular. Additional information on the surrender value of a policy and its probability is required when assessing the potential liquidity needs stemming from a (life) insurance contract. While the surrender value of the BE (split by lines of business) is available in SII reporting, the need for additional data will ultimately depend on the granularity and type of assessment or classification that will be performed.

79. This paper proposes two approaches to the bucketing of the liabilities:

- product features or liquidity characteristics of a liability that, in turn, reflect or approximate the liquidity of the liability or,
- a metric of the (il)liquidity of a liability which reflects its sensitivity to specific liquidity risks.

80. The first approach builds over the expected rational behavior of policyholders, whereas the second approach relies on the concept of illiquid liability as defined by EIOPA: "A liability is considered illiquid if its cash flow is predictable and stable against shocks"²⁰. Both methods aim at classifying (bucketing) the exposures according to their liquidity needs either by directly measuring the liquidity or by estimating it through an assessment of product features and liquidity characteristics.

2.3.2.1 Product features-based method

81. The product features-based method focusses on the classification of life insurance liabilities and can be based on the product features or liquidity characteristics of a liability that, in turn, reflect or approximate the liquidity of the liability. Similar to the bucketing of liquid assets, a factor-based approach can be used to approximate the liquidity needs stemming from the balance sheet exposures over a given time horizon. Exposures with a similar liquidity profile will be grouped into similar liquidity buckets (ranging from illiquid liabilities to very liquid liabilities) and receive a similar factor or haircut.

82. In its first Stress Test Methodological Paper, EIOPA sets forth two possible approaches focusing on the classification of life insurance obligations²¹. These approaches could be further elaborated to cover potential liquidity needs stemming from non-life technical provisions and other non-insurance obligations (e.g. short-term funding, off-balance commitments, derivatives, etc.).

Product type classification of liquid liabilities

²⁰ EIOPA(2019) Report on insurers' asset and liability management in relation to the illiquidity of their liabilities. Available at: https://eiopa.europa.eu/Publications/Reports/EIOPA_Report_on_insurers_asset_and_liability_management_Dec2019.pdf.

²¹ EIOPA (2020) Methodological Principles of Insurance Stress Testing. Available at: <https://www.eiopa.europa.eu/sites/default/files/publications/methodological-principles-insurance-stress-testing.pdf>.

83. This approach aims at defining a link between the sensitivity of lapse rates and a predefined range of product types. Regarding the choice of these product types, it should be noted that it could be difficult to provide an appropriate specification of potential lapse sensitivities for each and every existing insurance product of the European insurance sector that is both granular enough as well as feasible with regard to implementation. This approach links certain product characteristics to higher or lower lapse sensitivity. In general, various product-related criteria can be seen to have a substantial impact on lapse rates:

- Protection against biometric risks: A stronger focus on the protection against biometric risk usually leads to more stable lapse rates. With increasing age, the biometric protection becomes more and more valuable for policy holders and, in addition, it might get harder to get another contract.
- Savings components in traditional products: A stronger focus on the build-up of capital can lead to a stronger dependence of lapse rates on capital market movements as alternative investments become less or more attractive when compared to the expected return from the insurance product.
- Return characteristics of the insurance contract: If the return of an insurance contract is directly linked to the development of a capital market instrument or index (e.g. unit linked contracts), the dependence of lapse rates on capital market movements can be different from that for traditional with-profit products (which often aim to smooth returns over time). However, it should be noted that it might be difficult to derive a general rule on whether these types of contracts are definitively exposed to a higher or lower lapse sensitivity with regard to capital markets, as compared to traditional products.

84. The application of some of these criteria allows classification of different types of insurance products according to their sensitivity to lapses (see Table 2-7).

Table 2-7 Types of insurance products according to their sensitivity to lapses

Type of product	Characteristic	Sensitivity of lapse rate to capital market movements
Term insurance	Main goal is protection against biometric risk (no build-up of capital)	o
Endowments	Build-up of capital in combination with protection against mortality risk	**
Annuities in deferral phase	Build-up of capital in combination with protection against longevity risk	**
Annuities in pay out phase	De-saving process providing protection against longevity risk	If lapse in pay out phase is possible: * Otherwise: o
Pure unit linked contracts (without financial guarantees)	Build-up of capital where the return is directly linked to the return of a capital market product such as an index Combination with a protection against mortality or longevity risk possible	o (assuming correlation with the capital market movements). The presence of additional features shall be considered.
Unit linked contracts with financial guarantees	Build-up of capital where the return is linked to the return of a capital market product such as an index but with additional guarantees provided by the insurance company Combination with a protection against mortality or longevity risk possible	*
Disability	Main goal is protection against biometric risk (no build-up of capital)	o
Health	Main goal is protection against biometric risk (no build-up of capital)	o

o = low/no sensitivity, * = medium sensitivity, ** = high sensitivity

Source: EIOPA (2020) *Methodological Principles of Insurance Stress Testing*. Available at: <https://www.eiopa.europa.eu/sites/default/files/publications/methodological-principles-insurance-stress-testing.pdf>.

85. It is worth noting that products whose surrender value is equal to the market value of the underlying investment expose companies to lower liquidity risk. Products with a higher lapse sensitivity are considered as more liquid and will receive a lower haircut than products with a lower lapse sensitivity.

86. Despite the existence of national classifications to discriminate liquidity needs with respect to *a priori* characteristics, such a uniform grid is still under development at the European level. Sensitivity analyses based on those mentioned characteristics could be used to assess their effect.

Surrender based classification of liquid liabilities

87. An alternative approach to the classification of the life insurance portfolio by a product/lapse perspective relies on the existence and level of surrender penalties associated with a contract. Products with high surrender penalties could be assumed less likely to be lapsed, or better, lapse of these contracts would require more important changes in the economic and financial market conditions than for products offering lower penalties in case of lapse.

88. The application of this approach presents a major complexity in defining a homogeneous and agreed approach to the definition of surrender penalties as well as the calibration of the thresholds to define the cohorts in the two elements thereof. This complexity is, amongst other reasons, driven by the

large variety of different types of surrender penalties across the European insurance sector for which it seems very difficult to consistently define a relationship between their “level” and the likeliness of the associated insurance contracts being surrendered. Some surrender penalties imply deductions to the amount paid out to policyholders (the deduction being defined in terms of statutory reserves book values or in terms of market values), whilst other penalties induce various forms of tax disadvantages (which are often closely linked to the specific national legislative framework).

89. A viable penalty-based solution would be to classify the products according to the level of embedded contractual and fiscal penalties, assigning lower shocks to the ones with (high) contractual and fiscal penalties and higher shocks to the ones with no penalties, as presented in Table 2-8. The calibration of the thresholds for penalties is aligned with the IAIS Individual Insurer Monitoring data collection in the context of the Holistic Framework.

Table 2-8 Classification of products according to the embedded types of penalties

Liability bucket	Sensitivity to lapses
Surrender value equal to the BE/local statutory reserves	***
Surrender value between 100% (exclusively) and 80% of the BE/local statutory reserves	**
Surrender value lower than 80% of the BE/local statutory reserves	*
No surrender option	0

0 = low/no sensitivity, * = medium sensitivity, ** = high sensitivity, *** = very high sensitivity

90. When pursuing a penalty based classification the exposure towards UL/IL products and products that, in general, link the surrender value to the market value of the position should be carefully considered. Such products transfer market risks to the policyholders and, in absence of strict clauses on the timing of settlements or block in the redemption of external funds, might transfer also part of the liquidity risk.

91. In absence of a full freeze of the markets, a share of a fund can always be sold while accepting higher or lower haircuts to its value. In case the market loss deriving from this haircut is fully transferred to the policyholder, the part of liquidity risk borne by the undertaking is limited to the difference between the amount liquidated to the policyholder and the amount of the unit of the fund or the assets to be redeemed by the undertaking.

2.3.2.2 (II) liquidity metric method

92. Next to the product features classification of the liabilities to assess their liquidity, one can also envisage to classify the liabilities by making use of a measurement of the illiquidity of the liabilities. EIOPA developed a measurement of the (il)liquidity of insurance liabilities as part of a dedicated report²². The general concept of illiquidity could be considered as follows: the more stable and predictable the cash flows are, the more illiquid the liabilities. If cash flows are fixed irrespectively of the scenario, they are considered as fully illiquid because they are perfectly predictable and stable.

²² EIOPA (2019) Report on insurers’ asset and liability management in relation to the illiquidity of their liabilities. Available at: https://www.eiopa.europa.eu/sites/default/files/publications/reports/eiopa_report_on_insurers_asset_and_liability_management_dec2019.pdf?source=search

93. The measurement of illiquidity is based on the variation between the BE cash flows and the cash flows after the application of the relevant SCR stress scenario. This approach is applicable for both life and non-life obligations, but the relevant stresses differ between the two. For life obligations, mortality, mass lapse and the relative lapse up scenarios are considered. For non-life obligations, mass lapse, reserve risk and catastrophe risks are considered. These liability cash flows before and after stresses can define the share of liabilities that are predictable and serve as the basis for the measurement of the illiquidity of the liabilities.

Table 2-9 Advantages and disadvantages between the product features-based method and the (il)liquidity metric method

Approach	Advantages	Disadvantages
Product features-based method	<ul style="list-style-type: none"> Relatively easy method 	<ul style="list-style-type: none"> Approach is currently limited to Life technical provisions only²³ Hardly implementable by reinsurance undertakings
(Il)liquidity metric method	<ul style="list-style-type: none"> More granular and precise method allowing for a better classification Broader scope as it can be applied to all insurance liabilities 	<ul style="list-style-type: none"> More complex method based on best-estimate and stressed cash flows The SCR stress scenarios might not adequately capture liquidity risk The method might not be suitable for all types of products (e.g. unit-linked business)

94. The haircuts for both sources' and needs' must be calibrated according to the time horizon of the analysis. In case of annual time horizons, the LCR approach might serve as a source of inspiration for the liquidity sources, whereas on the liquidity needs the application of expert judgement might be required due to the lack of historical observations.

2.4 Flow perspective

95. The flow perspective, by approximating the treasury cash flows, allows the assessment of the balance between regular inflows (liquidity sources) and outflows (liquidity needs) of an insurance undertaking over a given time horizon.

96. To that aim, premia, claims and other items shall be reported following an accounting perspective, namely reporting for each period of analysis the actual or projected treasury movement, e.g. cashed premia and paid claims.

97. Time-wise, the flow analysis might be applied to different time horizons, either backward looking (actual figures) or, under specific assumptions, forward looking (projections).

98. In normal circumstances, total inflows should be higher than or equal to expected outflows. Therefore, in tranquil periods, liquidity risk can arise only for those maturities where there is no perfect cash flows matching. This is particularly relevant for life insurers whose liability cash flows are most difficult to predict and spread over a longer time horizon. To this aim, a full cash flow analysis, comparing baseline and stressed cash flow patterns over time would

²³ For the non-life products an approach based on the concept of unearned premium can be explored.

allow a better assessment of liquidity risk. This would also allow estimating the survival period of each undertaking in the prescribed stressed scenario. Still, the computation, validation and analysis of full cash flows require extensive work and cooperation among EIOPA, NCAs and the industry.

99. The stylized approach proposed here considers only the sum of the flow for each relevant component on specific time horizons and assesses the total in- and outflows thereof, instead of looking at the whole cash flow patterns over the prescribed time horizon.
100. Projections may be referred both at the baseline and the stressed situations. Baseline projections might be based on the business plans of undertakings and/or on the actuarial projections for the calculation of technical provisions, while stressed projections would be based on the baseline projection taking into account the impact of the shocks.
101. The concept of baseline and shocked stylized flows can be applied also to backward looking time horizons, with the report of the registered flows (i.e. actual flows) being the baseline situation and the estimation of the impact of the shocks on the registered flows being the stressed situation.
102. The cash flow approach offers a different view compared to the stock approach. It allows for a more granular assessment of the liquidity position of an insurer because of the projections of both the future cash in- and outflows. The cash flow approach can cover all potential liquidity needs (both stemming from insurance and non-insurance obligations). However, the stylized cash flow approach implies a greater reliance on data from insurers and additional design and validation effort:
- specification of the request: which cash flows should be considered; definition of the templates; scope of the request (it may be not straightforward to define all the flows at group level), granularity of the request (ideally, liquidity should be assessed by currency and by portfolios);
 - production of the information: the information requested should be internally available for asset and liability management purposes, however there is no dedicated standard reporting in place and data are usually available at different offices (treasury, investment, actuarial);
 - validation of the information provided;
 - analysis and interpretation of the information collected.

2.4.1 Sources

103. The sources are represented by all the relevant inflows of an undertaking stemming from its underwriting activities, financial activities and service providing activities over a specified time horizon.
104. The inflows can be split according to business lines and activities with different levels of granularity in order to assess whether and to what extent a business is self-sustaining from a liquidity perspective. Table 2-10 provides, in its item labelled "inflow", an indicative overview of the information to be collected on the inflows and its level of granularity.
105. In case the analysis is based on projections, the information should reflect undertaking's inflows according to their best prudent assumptions based on an

as-is scenario. This assumption implies considering, in the baseline projection, unchanged expectations in the evolution of risks.

106. Cashed-in premiums shall be provided gross of reinsurance. In case of projections, the item shall include the expected cashed-in premium based on the product portfolio available at the reference date, including the new-business based on those products.
107. Sales of assets should take into consideration all the financial sales activities of the undertaking taking place in the period of observation, including the regular financial inflows (e.g. dividends, coupons). In case of projections, items should include only "business as usual" transactions, e.g. *i*) transactions in line with the in-force investment plan (if any); *ii*) transactions in line with the investment mandate for UL/IL business (if any). No reactive management actions shall be included if not otherwise specified.
108. Section "Other" should encompass all the flows not elsewhere reported (e.g. operational income). Additionally, if the target undertaking is a solo entity, any kind of intragroup liquidity support (ref. to section 1.2.2) has to be reported.

2.4.2 Needs

109. The same type of approach and considerations should be applied to assess the needs. In this case, the focus is on the outflows as reported in Table 2-10 and labelled as "outflow".
110. Claims/Benefits (Claims for the non-life business) shall not include surrenders and shall be provided gross of reinsurance, which is to be reported separately. The items shall include only expected outflows and not changes in provisions (including changes in incurred but not reported – IBNR positions) for claims and expenses. The items shall also include other technical outflows such as the acquisition costs and the costs of claims.
111. In case of projections, purchase of assets shall be filled-in taking into consideration regular outflows. Items should include only "business as usual" transactions (e.g. included in the liquidity risk management plan or according to the investment strategy) if not otherwise specified.
112. Section "Other" should encompass all the flows not elsewhere reported (e.g. operational expenses). Additionally, should the target undertaking be a solo entity, any kind of intragroup liquidity outflows (ref. to section 1.2.2) has to be reported.

2.4.3 Net flow position

113. The sum of liquidity needs and liquidity sources is eventually combined to calculate the net liquidity position of the business lines and the insurance undertaking as a whole in a given time horizon. Table 2-10 reports an illustration of such an analysis under items labelled "Net position".

Table 2-10 Flow-based template

Traditional life business		
C.1.1	Premium (written)*	In-flow
C.1.2	Claims and other technical outflows (excluding surrender)*	Out-flow
C.1.3	Surrenders	Out-flow
C.1.4	Net Reinsurance inflows	In-flow
C.1.5	Net Reinsurance outflows	Out-flow
C.1	Net Cash Flows	Net Position
UL/IL		
C.2.1	Premium (written)*	In-flow
C.2.2	Claims and other technical outflows (excluding surrender)*	Out-flow
C.2.3	Surrenders	Out-flow
C.2.4	Net Reinsurance inflows	In-flow
C.2.5	Net Reinsurance outflows	Out-flow
C.2	Net Cash Flows	Net Position
Non-Life business		
C.3.1	Premium (written)*	In-flow
C.3.2	Claims and other technical outflows	Out-flow
C.3.3	Net Reinsurance inflows	In-flow
C.3.4	Net Reinsurance outflows	Out-flow
C.3	Net Cash Flows	Net Position
Investments		
C.4.1	Investment related income (e.g. coupons, dividends, fees)	In-flow
C.4.1 UL	Investment related income (e.g. coupons, dividends, fees) - Separate accounts	In-flow
C.4.2	Investment related expenses (e.g. service fees, coupons paid, dividends paid)	In-flow
C.4.2 UL	Investment related expenses (e.g. service fees) - Separate accounts	Out-flow
C.4.3	Maturing fixed income assets**	In-flow
C.4.3 UL	Maturing fixed income assets - Separate accounts	In-flow
C.4.4	Purchase of assets**	Out-flow
C.4.4 UL	Purchase of assets - Separate accounts	Out-flow
C.4.5	Sales of assets**	In-flow
C.4.5 UL	Sales of assets - Separate accounts	In-flow
C.4.6	Margin / collateral calls outflows	In-flow
C.4	Net cash flows	Net Position
Other		
C.5.1	Intragroup cash inflows for liquidity purposes	In-flow
C.5.2	Intragroup cash outflows for liquidity purposes	Out-flow
C.5.3	Other liquidity related flows (e.g. repo agreement)	Out-flow
C.5.4	Funding emissions and costs (e.g. bonds, equity, coupons, dividends, fees)	In-flow
C.5.5	Operational expenses (e.g. wages/salaries, rents, service providers)	Out-flow
C.5.6	Operational income (e.g. income from provision of services)	In-flow
C.5.7	Other expected net cash flows (inflows - outflows) not elsewhere reported	Out-flow
C.5	Net Cash Flows	Net Position
C.6	Net cashflow at the end of the preiod	Net Position

* Please provide the figures gross of reinsurance.

** Excluding securities for liquidity purposes to be reported in C.5.1 and C.5.2. Excluding securities for funding purposes to be reported in C.5.3.

114. A proxy of the data to be used in a stylized flow analysis can be retrieved from the Solvency II QRT. Details are provided in Annex 4.6.

2.5 Sustainability of the flow position

115. The stock and the flow perspective can be combined to offer an integrated view of the liquidity position of an insurance undertaking as proposed in the paper "Enhancing the macroprudential dimension of Solvency II" published by the ESRB²⁴. In its report, the ESRB develops a cash flow liquidity indicator which is based on the Basel III LCR. It relies on the concept of *Total net cash outflows*

²⁴ ESRB (2020), Enhancing the macroprudential dimension of Solvency II. Available at: <https://www.esrb.europa.eu/pub/pubbydate/2020/html/index.en.html>.

(difference between the expected cash outflows and inflows) to define the stressed liquidity needs over a certain time horizon. The liquidity sources are determined by the assets bucketing approach (e.g. HQLA).

$$\frac{\text{Stock of HQLA}}{\text{Total net cash outflows}}$$

116. The stock and the flow approaches presented by EIOPA can be combined in the *Sustainability* indicator by the simple sum of the net total cash flow at the end of the period calculated in the flow perspective and the available liquid assets calculated in the stock perspective.

$$\text{Sustainability}_t = \text{Flow}_t^{\text{Net}} + \text{Liquid assets}_t$$

117. To ensure consistency in the assessment of the flows and stocks, they should be computed over the same time horizon.

118. The stock component can be specified with different level of granularity. The simplest approach should consider the full amount of liquid assets held by an undertaking. However, assets can be clustered based on their liquidity in the given time horizon and the potentially negative flow checked against these clusters. The more refined approach allows assessing whether negative flows can be sustained relying only on cash and cash equivalents or actions on the markets such as sales of assets are needed.

119. The three approaches have advantages and disadvantages both from an operational and informative perspective. Operationally, the stock based approach can rely on the standard SII reporting for the assessment of the liquidity sources. However, the SII reporting contains only limited information to assess the liquidity needs of the exposures. This assessment would require a limited request of additional information (e.g. bucketing of BE or surrender volumes)²⁵. Additional information is also needed to assess the development over time of the liquidity sources and needs in case the flow approach is pursued.

120. Advantage and disadvantages of the three approaches are summarized in Table 2-11.

²⁵ This statement holds for the level of granularity of bucketing of liquidity sources and needs proposed in the rest of this paper. In case the granularity of the classification of the liquidity needs increases, additional information might be requested.

Table 2-11 Advantages and disadvantages of the stock based approach vs. cash flow approach

Approach	Advantages	Disadvantages
Stock	<ul style="list-style-type: none"> • Flexible method; the impact of different haircuts can be easily assessed • Better comparability of results • Builds on existing SII reporting 	<ul style="list-style-type: none"> • Less risk sensitive • Less suitable for non-life business and reinsurance undertakings • Loss of information on mismatch between asset and liabilities
Flow	<ul style="list-style-type: none"> • More granular and precise method approach than the stock approach • Considers both cash in- and outflows of the liabilities and gives information on mismatch between liquidity sources and needs • Covers all types of cash flows (life, non-life and non-insurance liabilities) • Can take into account the impact of derivatives 	<ul style="list-style-type: none"> • More burdensome for participants • Increased complexity of projecting multiple set of cash flows • More difficult to validate (high level of subjectivity in the baseline projections)
Combined	<ul style="list-style-type: none"> • Combines some of the advantages of the stock approach with all the advantages of the flow approach • Allows for an integrated view and assessment of the liquidity position • Already experienced in EIOPA/NSA analysis 	<ul style="list-style-type: none"> • More burdensome for participants • Increased complexity of projecting multiple set of cash flows • More difficult to validate (high level of subjectivity in the baseline projections)

3 How to shock the liquidity position

121. The section explores how to shock the liquidity position of an undertaking in a stand-alone liquidity stress test exercise. This implies that the market value of assets (e.g. prices) and liabilities (i.e. market valuation) is supposed to remain constant when moving from the assessment of the baseline position to the stressed position, or, in other words, no change in credit spreads is prescribed.
122. In case a stress test scenario aims at assessing the resilience of both the capital and liquidity position of an undertaking, the shocks might be prescribed as adverse developments in the values of assets and of liabilities. Shocks to values might already incorporate a liquidity component (e.g. an increased yield might reflect both an increase of credit risk and liquidity risk spreads), hence there might be no need of prescribing specific liquidity shocks (e.g. increased haircuts) to assets and liabilities.

3.1 The core concept

123. The liquidity position of an insurer shall be tested under adverse circumstances by measuring, according to specific metrics, the liquidity sources and needs over different time horizons and different scenarios.
124. The time horizon is a key element for identifying and calibrating shocks to liquidity sources and needs. For example, an increase in liquidity needs stemming from margin calls on the derivative position materializes in a short period of time and insurers would be required to fulfil the call within a few days, making this type of shock eligible for a short term scenario. The regulation on

the settlement of claims and redemptions is country specific, but, on average, insurers should settle policyholders' request for redemptions within 30 days. Therefore, it is reasonable to consider a shock to lapses only for scenarios based on at least 1 month or longer time horizons. Moreover, upon specific circumstances depicted in the narrative of an adverse scenario, it is fair to consider that the level of the lapses increases over time.

125. The time horizons are reflected in three self-contained scenarios whose shocks are defined and calibrated according to the materialization the events over time (refer to Table 3-1). These scenarios can be applied in isolation, however, if compatible with the framework of the exercise (e.g. instantaneous shocks, multi-period set-up), the shocks belonging to different time horizons can be combined.

3.2 Possible scenarios

126. This section elaborates on possible scenarios that could be applied for liquidity stress testing of insurers. As discussed above, life and non-life insurers are vulnerable to different sources of liquidity risk, given the different nature of the business. At the same time, the same sources of liquidity risk are likely to affect them in different ways. For these reasons, the key factor determining the possible scenarios is the time horizon over which the stress unfolds, that is, the time horizon for the event to fully develop and the issue to be settled. This report focuses on three possible scenarios extending over different time horizons:

- Short time horizon scenario (1 - 5 days);
- Medium time horizon scenario (30 - 90 days);
- Long time horizon scenario (6 -12 months).

127. Each sub-section is structured as follows: first, a general description of the chosen focus of the scenario is given, followed by an illustrative narrative and further details on possible shocks.

128. Concrete calibration of the shocks to be applied will be added at a later stage once a methodological approach has been defined. Similarly, further details regarding the possibility to activate intra-group support will be added later once the scope (solo vs groups) and the approach towards the treatment of management actions have been determined.

129. Table 3-1 provides an overview of the sources of liquidity risk, possible triggering events and shocks which can be used, alone or combined in the design of the adverse scenarios. It also provides an indication on the calibration of the shocks therein in terms of severity and expected impacts according to the three defined time horizons.

Table 3-1 Overview of sources of liquidity risk, possible triggering events, shocks, and relevance for the different time horizons

Source of risks	Triggering event	Shock	Short (1-5 days)	Medium (30-90 days)	Long (6-12 months)
Exposure to insurable events	Catastrophic events (e.g. natural catastrophes, pandemics)	Increase in frequency and magnitude of catastrophes	0	*	***
		Increase of collateral calls on risk pooling agreements (reinsurers)	***	**	0
	Sudden inflation spike (general or concentrated in specific sectors – e.g. medical costs, car spare parts)	Increase in cost of claims (potentially driven also by legal decisions)	0	*	**
Policyholder behaviour	Insurance run	Mass lapse event (surrenders)	0	**	***
	Loss of confidence	Reduction in new business (premium inflow)	0	*	**
		Non-renewal of existing contracts (premium inflow)	0	*/**	**/**
		Mass Lapse event (surrenders)	0	**/**	***
	Financial crisis	Reduction in new business (premium inflow)	0	**	***
		Non-renewal of existing contracts (premium inflow)	0	*/**	**/**
		Mass Lapse event (surrenders)	0	**/**	***
Off-balance sheet exposures	Increase/decrease in interest rates	Request of collateral (example: margin call on interest rate derivatives) due to changes in market value of assets	***	0	0
	Capital market shocks	Increase of margin/collateral calls	***	0	0
Balance sheet exposures	Fire sale	Haircuts to assets	***	**	*
	Capital market shocks	Haircut to assets	***	***	**
	Currency shocks	Foreign exchange mismatch	***	***	**
Funding risk	Deterioration of own credit rating	Increase in funding costs	***	***	**
		Shock to own equity	***	***	**
		Shock to risk premia of issued bonds	*	*	*
		Requests of collateral	***	0	0
	Disruption of the repo market	Reduced access to repo market	***	*	0

Counterparty exposure	Default of a primary reinsurer	Haircut to reinsurance receivables and reinsurance recoverables	o	**	***
	Deterioration of lending balance sheet positions (banking activities)	Increase in the probability of default of counterparties	o	**	***
Operational risk	Cyber attack	Liquidity needs coming from ransom ware or phishing attacks. Disruption in the premium collection process for some time	***	**	*

*o = low/no severity, * = low severity, ** = mid severity, *** = high severity.*

3.2.1 Short time horizon scenario

130. The short time horizon focuses on assessing the capacity of both life and non-life insurers to withstand the liquidity needs resulting from off-balance sheet exposures, in particular in the form of variation margin calls on their derivatives portfolios over 5 days.
131. In an exemplificative narrative, the scenario is assumed to be initiated by an abrupt reversal in global risk premia impacting both the swap rate curve and credit spreads. The required rate of return for holding fixed income assets would increase sharply (i.e. yield curves up).
132. Also, the financial market would experience a disruption in the repo market and in the overnight transactions making both intra-group and market-based transactions unfeasible.
133. Insurers use derivatives for hedging purposes, especially to hedge against interest rate risk. The value of their derivatives portfolios will change significantly and unexpectedly, mainly following an increase of the interest rates, and insurers will receive variation margin calls from central clearing counterparties (CCPs) via their clearing members payable within 24 hours in cash.
134. It is assumed that to meet the variation margin call, insurers would use a combination of the following options: post cash themselves, make use of collateral transformation services (incl. possibly a credit line) by their clearing member, access the repo market to convert assets into cash or sell (high quality) assets. In the latter case high haircuts are applied.
135. The shocks and their calibration can be selected from Table 3-1 focusing on the more relevant for the time horizon.

3.2.2 Medium time horizon scenario

136. The stresses in the medium time horizon scenario unfold between 30 and 90 days which is in practice the time horizon in a number of jurisdictions for the redemption of lapsable life insurance contracts.
137. The focus of this scenario would therefore be on assessing the capacity of insurers to withstand liquidity needs stemming from changes in policyholder

behavior (life insurers), funding risk (both life and non-life insurers) and exposure to insurable events.

138. The medium time horizon scenario is assumed to be initiated by two triggering events. Firstly, a wide-spread misselling scandal in the life insurance sector leading to a loss of consumer trust. A considerably higher share of life insurance contracts are being lapsed and a simultaneous reduction in the written premia is foreseen. Liquidity needs can also increase due to the spikes in claims inflation which might be general or concentrated in specific business lines according to the narrative. In order to meet the liquidity needs, insurers are selling assets; haircuts are to be applied. Secondly, the credit rating of several life and non-life insurers is downgraded and they experience an increase in funding costs and additional collateral requests. Furthermore, insurers' access to the repo market and intra-group transactions is impaired.
139. The shocks and their calibration can be selected from Table 3-1 focusing on the more relevant for the time horizon.

3.2.3 Long time horizon scenario

140. The long time horizon scenario covers period between 6 -12 months and analyses insurers' resilience to several sources of liquidity risk, namely their exposure to insurable events, changes in policyholder behavior and funding risk. It combines elements of the medium time horizon scenario and several additions.
141. Similarly to the medium time horizon scenario, a wide-spread misselling scandal in the life insurance sector leads to a loss of consumer trust. A considerably higher share of life insurance contracts is lapsed. In order to meet the liquidity needs, insurers sell assets and haircuts are to be applied. Secondly, the credit rating of several life and non-life insurers is downgraded and insurers experience an increase in funding costs and additional collateral requests. Furthermore, their access to the repo market is impaired. In addition, an extreme natural catastrophic event occurs. The claims pay-outs by non-life insurers considerably exceed the inflows. A final element of scenario is the default of large primary reinsurer.
142. The shocks and their calibration can be selected from Table 3-1 focusing on the more relevant for the time horizon.

3.3 Implementation of the scenarios

143. For the implementation of the scenarios, EIOPA would opt for a framework based on the instantaneous application of the shocks, namely, any prescribed shock, despite its significance in short, medium or long time horizon scenarios as described before, should be applied instantaneously. Even though shocks would have to be applied instantaneously, their calibration will follow the assumption on the severity made in chapter 3.2.
144. Consistent with the instantaneous nature of the shocks only the embedded management actions should be considered and reactive post-stress management actions should not be applied in the calculation of the post-stress liquidity position.

145. However, a macroprudential stress test exercise should assess the system-wide resilience to financial, economic and insurance shocks and the potential spillover to other markets generated or amplified by the insurance sector. To that aim such exercise should assess potential footprints to other parts of the financial system and the real economy stemming from common reactions of insurers to the stress scenarios. The collection and the aggregation at industry level of the impact stemming from the enforcement of the reactive management actions allows to infer potential footprint and spill-over effects to other markets/industries²⁶.
146. Therefore, depending on the objective of the exercise, guided reactive management actions could be allowed, provided that their appropriateness and plausibility is demonstrable and that they are not "ad-hoc" solutions but they are already foreseen in the undertakings' written policies/agreements. Documentation on the reactive management actions shall be shared and discussed with the national authorities during the pre-validation process (refer to the 1st methodological paper on insurance stress tests).
147. Reactive post-stress management actions need to be realistic and take into account the time needed to implement them and any expenses arising from them. Participants should be able to provide credible explanations on whether and how the post-stress management actions could actually be implemented under the adverse conditions of the stress scenario, also taking into account any potential secondary consequences (e.g. limitations to inter-company capital movement in the event of financial distress).
148. The applied management actions would have to be clearly documented and the impact of the prescribed shocks would have to be reported both with and without the application of reactive management actions (both qualitative and quantitative evaluation).
149. In order to infer potential spill-overs stemming from the actions taken by insurers against the prescribed liquidity shocks, the data collection can be complemented by a quali-quantitative questionnaire where companies are requested to provide information on the reactive management actions that would be triggered to cope with the liquidity shocks, with specific reference to:
- the disinvestment strategy:
 - type and amount of security sold;
 - sequence and timing of the sale of the securities;
 - channels (primary, secondary, intra-group).
 - nature and quantity of additional liquidity sources which could be used in case of a stress (e.g. credit lines with banks,...);
 - if the scope is solo-entities, the level of intra-group support (if any) post stress.
150. Moreover, information on the existence (plus short description) of a contingency funding plan and at which level it is set up (undertaking/group) could be asked.

²⁶ For a thorough treatment on the objective of a stress test exercise refer to section 2.2 of Methodological principles of insurance stress testing (EIOPA-BoS-19/568) available at: <https://www.eiopa.europa.eu/sites/default/files/publications/methodological-principles-insurance-stress-testing.pdf>.

151. In order to reduce the burden and complexity for the undertakings, the quali-quantitative questionnaire should be limited and focused.
152. When applying the shocks, companies shall not take into account potential mitigation effects stemming from local micro- or macroprudential regulatory regimes (e.g. temporary suspension of the redemption rights).
153. A stock based assessment of the balance sheet position can be potentially done via top-down relying on the regular Solvency II QRT submissions. Regular submissions shall be complemented by participants with information on the classification of liabilities.

3.3.1 Estimation of the baseline and post stress position

154. The estimations of the pre and post stress positions should be based on the approaches presented in section 2.1 and the indicators described in section 2.2, hence following the stock-based, stylized flow based and combined assessment.

Stock perspective

155. The shocks encompassed in the adverse scenario are reflected into the calibration of the weights²⁷ used to treat the assets (liquidity sources) and the liability portfolios (liquidity needs) classified according to the buckets defined in section 2.3.
156. The calibration of the weights should take into account the narrative of the scenario and the time horizon of the exercise starting from the baseline weights and moving towards more penalising factors.
157. Counterparty exposure, with particular reference to the reinsurance recoverables and reinsurance receivables should be reported without haircuts in the baseline scenario and with the application of the haircuts prescribed in the stressed scenario.

Flow perspective

158. Adverse scenarios are converted into shocks to the components of the stylized flows on both the source and need sides.
159. The post stress liquidity position would have to be assessed in line with the scenario by (re)computing:

the expected technical cash inflows as follow:

- For life and non-life business inflows has to be assessed taking into account the reduction of the written premia (both for the in-force business and for the new business);
- For life and non-life business reinsurance inflows shall take into account the prescribed application of haircuts; and

²⁷ Example on the baseline factors proposed by ESRB are available in Annex 4.1; examples on the baseline factors proposed by IAIS are available in Annex 4.3; examples on the baseline factors from other applications are available in Annex 4.4.

the expected technical cash-out as follow:

- For the life business the surrender cash outflows shall be computed taking into account the shocks to lapses. The same level of granularity of the baseline shall be preserved;
- For the non-life business the prescribed increase in the cost of claims shall be reflected in the estimation of the cash outflows stemming from claims settlement.

160. The liquidity needs stemming from margin calls on interest rate swaps derivatives could be assumed to be equal to zero in the baseline scenario. Under stressed scenario the liquidity need stemming from the net interest rate swaps position would have to be estimated based on the prescribed shocks to the risk free rate curve.

161. In principle the assessment of the liquidity sources and liquidity needs could be based on the present value of the cash in- and outflows over the prescribed time horizon discounted at the risk free rate curve²⁸. However, given the short time horizon (up to 6/12 months) and the current level of the risk free rate, a simple sum of the cash in- and outflows could be deemed as reasonable.

Sustainability of the liquidity position

162. The two perspectives are consolidated in the combined assessment without the application of further shocks. The liquidity needs derived from the potential negative net flow position under stressed scenario are checked against the available liquid assets under stressed scenario.

3.4 Analysis and presentation of the results

163. The EIOPA stress test exercises have never been characterised by a pass-fail nature, namely, any potential weakness emerged in the post-stress position of the participants never automatically triggered actions aimed at strengthening the financial position of the insurers. The information collected and produced under the stress test process were utilised in an aggregated way to infer potential vulnerabilities at EU level and to issue recommendations to NCA.

164. Any liquidity component proposed in future ST exercises will follow the same approach and the communication of the results will be carefully treated in order to avoid any misinterpretation or over-interpretation of the results.

165. The assessment of the liquidity position cannot rely on standardized and acknowledged metrics both for the baseline and the adverse scenarios. The main consequence of this gap is the lack of past and/or current reference values for the selected indicators which might reduce the significance of the conclusions inferred from the ST exercise.

166. Against this background the analysis will be, at least for the first ST exercise, mainly based on the relative changes of the selected indicators, namely calculating the indicators under baseline scenario, under adverse scenarios and analyzing their changes and their drivers. In case the exercise encompasses a macroprudential dimension, the indicators might be produced with and without the application of reactive management actions.

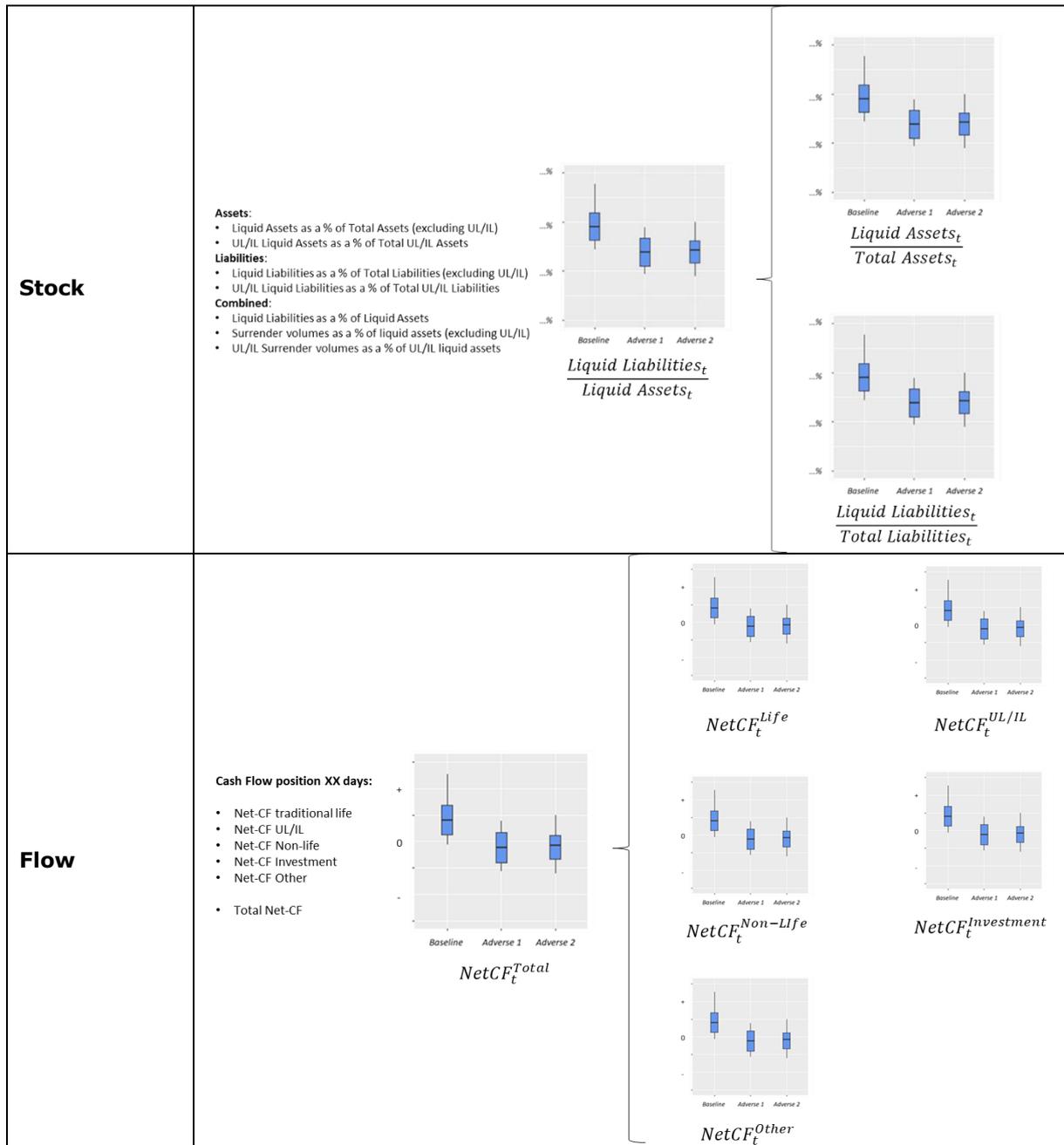
²⁸ The Long Term Guarantees package should not be considered in the liquidity assessment, hence the risk free rate curve should not include the Volatility Adjustment.

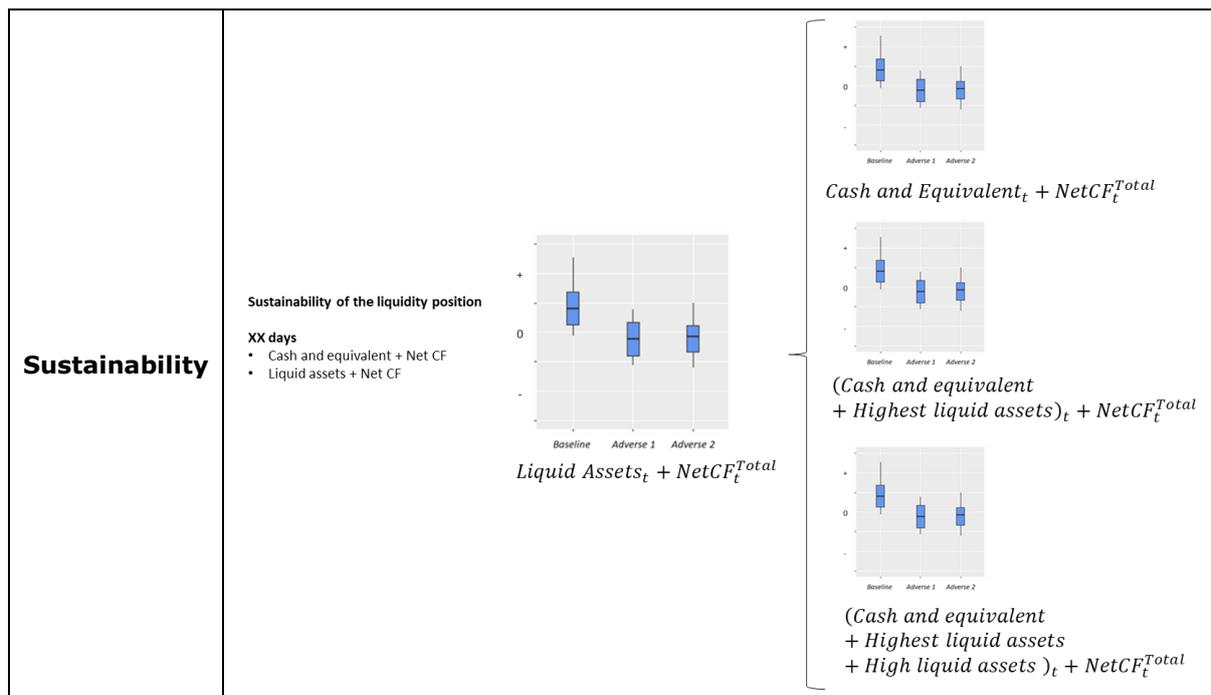
167. The vulnerabilities of insurers will be assessed according to the set of indicators presented in section 2.2 (stocks, flows, sustainability of flows) which might be complemented by further analyses on the constituents of needs and sources both in the stock and flow dimension.

168. Pre- and post-stress indicators will be presented in an aggregate way (e.g. cumulated values or distributions). Any individual results will be presented only upon agreement of the participating insurer.

169. An incomplete overview of the analysis is presented in Figure 3-1.

Figure 3-1 Exemplification of a potential vulnerability analysis





170. An assessment of the potential spill-over effects stemming from the insurance industry can be done by aggregating the reported changes in the asset allocation (disinvestments / investments) based on the qualitative and quantitative questionnaire. The amount and the sequence of sales of the securities might allow to infer potential qualitative footprints on other financial markets.

Leveraging on National experience – an alternative approach

The French Prudential Regulation Authority (ACPR) developed and used, mainly in banking regulation, an alternative approach. The framework, which diverges in several aspects from what is presented in this chapter, tackles the assessment of the liquidity position under stressed situation by a reverse perspective. After the identification of the relevant liquidity risk drivers, the approach aims at answering for each of them the following question: “Which severity of a given shock to a liquidity risk driver is necessary to breach a pre-defined threshold of the chosen liquidity metric?”

Operationally, the approach requires proceeding in three steps. First, define and calibrate a liquidity metric identifying the thresholds that signal a situation of liquidity distress. Second, define a set of single shocks²⁹. On the asset side, a single shock could target haircuts to assets, or changes in business volume, collateral requirements/margin calls, or other management actions³⁰ (e.g. assumptions on short-term financing, recapitalization of subsidiary/participations, changes of structure and Intra-Group-Transactions, asset defaults, etc.). On the liability side, shocks could materialize as policyholder lapses, large unexpected claims pay-outs, or changes in regulation. Third, present the outcome including graphical presentation for each company’s vulnerabilities.

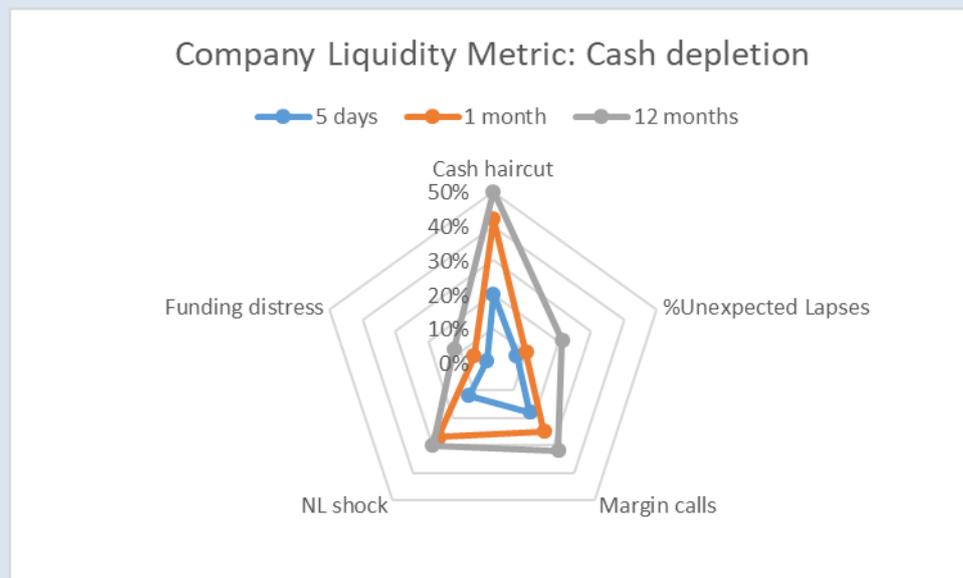
²⁹ For a definition of “single risk factor” please refer to Chapter 4 of the Methodological principles of insurance stress testing. Available at: <https://www.eiopa.europa.eu/sites/default/files/publications/methodological-principles-insurance-stress-testing.pdf>.

³⁰ Management actions are decisions taken by company boards in discretion, in response to changing economic conditions.

As an illustration of this, let us consider the following analysis:

- Liquidity metric: level of cash (cash depletion);
- Five single shocks haircut to assets, funding distress, unexpected lapses, non-life shocks, margin calls.

The aim is to identify the level of each shock that leads to the breach of the threshold in the defined liquidity metric. On this basis, for each shock, the level that leads to the breach of the liquidity metric is plotted and all those points are connected to form a radar or spider net chart as displayed below.



This representation technique carries multiple advantages. At first, it allows to combine in one view the outcome of a set of single shocks keeping at the same time a clear segregation of the impacts. It is therefore particularly appealing for risk identification with regard to liquidity risk, since liquidity risk is highly insurer and scenario specific. It helps to understand the underlying risks and vulnerabilities in an insurer's business and products that may pose a threat to its liquidity position. Furthermore, it is a quick way to monitor and check the liquidity resilience of an insurance company: if the 0% shock is at the centre of the radar chart, then the bigger the area of the pentagon depicted, the more resilient a company is. In addition, this approach is a convenient way to strengthen the case of risk-scoring in the case of liquidity-risk-analysis.

Beside the advantage of identifying the impact of each shock, this exercise comes with disadvantages. Shocks are here considered independent from each other (the radar is the representation of 5 single-shock scenarios), whereas in reality, these drivers tend to act in a combined way and their impacts might be self-enforcing: an increase in lapses often occurs in a context of tight markets (which already affects securities' liquidity).

Other approaches with combination of risk drivers could be used to overcome this limitation. Also, EIOPA insists that this approach is an alternative one. It is mainly designed for internal use, such as sensitivity or scoring analysis, and could serve as a basis for top-down stress testing.

4 Annex

4.1 ESRB bucketing of liquid assets

Item		Haircut
Level 1 assets	Cash and cash equivalent Bonds and loans from: The European Central Bank EU Member States' central government and central banks denominated and funded in the domestic currency of that central government and the central bank Multilateral development banks referred to in paragraph 2 of Article 117 of Regulation (EU) No 275/2013 International organizations referred to in Article 118 of Regulation (EU) No 275/2013	0% 0%
Level 2A assets	Bonds and loans rated Credit Quality Step (CQS) 0 or 1, excluding those from financial institutions	15%
Level 2B assets	Covered bonds rated CQS 0 or 1, excluding those emitted by a bank which is part of the same group Qualifying RMBS Bonds and loans rated CQS 2 or 3, excluding those from financial institutions Qualifying common equity shares, excluding: Equities issued by a financial institution Equities qualifying for strategic participation Equities qualifying for the duration-based equity module Long-term equities	25% 50% 50% 50%

Source: ESRB (2020), *Enhancing the macroprudential dimension of Solvency II*. Available at: <https://www.esrb.europa.eu/pub/pubbydate/2020/html/index.en.html>.

4.2 IAIS bucketing of liquid assets

<u>Asset Class</u>	<u>Other Considerations</u>	<u>Liquidity Bucket</u>
Demand deposits	Sufficiently diversified	Primary
Securities issued or guaranteed by sovereign, supranational or other non-sovereign public sector entities backed by their full faith and credit	Used to back liabilities in the sovereign's jurisdiction	Primary
	Rated AA- / Aa3 or better	Primary
	Rated A- / A3 or better, but less than AA- / Aa3	Secondary
Securities issued by a Government Sponsored Enterprise senior to preferred equity	Rated AA- / Aa3 or better	Primary
	Rated A- / A3 or better, but less than AA- / Aa3	Secondary
Covered bonds	Rated AA- / Aa3 or better	Secondary
	Rated BBB+ / Baa1 or better, but less than AA- / Aa3	Tertiary
Vanilla corporate debt securities, including commercial paper	- Rated AA- / Aa3 or better; AND	Secondary
	- Not issued by a financial institution or its affiliates	
	- Rated BBB+ / Baa1 or better, but less than AA- / Aa3; AND	Tertiary
	- Not issued by a financial institution or its affiliates	
Other fixed income instruments issued by public sector entities	- Rated BBB+ / Baa1 or better	Tertiary
Common equity shares	- Publicly traded on a major exchange; AND - Not issued by a financial institution or its affiliates	Tertiary
Other assets	Demonstrated to have low credit risk and low market risk, is liquid and readily marketable and has a proven record as a reliable source of liquidity during stressed market conditions.	Primary / Secondary / Tertiary

Source: IAIS (2019), draft Application Paper on Liquidity Risk Management. Available at: <https://www.iaisweb.org/page/consultations/closed-consultations/2019/draft-application-paper-on-liquidity-risk-management>.

4.3 IAIS Indicator for Liquidity Risk - Asset Factors

Factors	Liquidity Sources
100%	Cash
100%	Sovereigns rated AA- and above
100%	Sovereigns in local currency
85%	Sovereigns rated A- and above
85%	GSE securities senior to preferred shares rated above A-
70%	Investment-grade covered bonds
70%	Investment-grade public sector entity debt
70%	Investment-grade corporate debt securities
50%	Common equity

Source: IAIS (2020), *Consultation paper on the Development of Liquidity Metrics: Phase 1 – Exposure Approach*. Available at: <https://www.iaisweb.org/page/consultations/current-consultations/development-of-liquidity-metrics-phase-1-exposure-approach//file/93103/pcd-on-development-of-liquidity-metrics-phase-1-exposure-approach-public>

4.4 Asset factors from other applications

	BCBS		S&P (US and Can. Life) ⁶		S&P (Global) ⁷	AM Best ⁸	
	LCR ⁹	NSFR ¹⁰	1 month	1 year		Short-Term	Long-Term
Cash	100%	100%	100%	100%	99% ¹¹	100%	100%
Highest Quality Sovereign Debt	100%	95%	100% ¹²	100% ¹²	90%	100% ¹⁴	100% ¹⁴
Sovereign Debt in Local Currency	100%	95%	96/98% ¹³	100% ¹³	90%	N/A ¹⁴	N/A ¹⁴
High Quality Sovereign Debt	85%	85%	96/98% ¹³	100% ¹³	90%	N/A ¹⁴	N/A ¹⁴
Highest Quality Covered Bonds	85%	85%	96/98% ¹⁵	100%	90%	60/75% ¹⁶	70/90% ¹⁶
Highest and High Quality GSE Securities	0/85/100% ¹⁷	0/85/100% ¹⁷	90% ¹⁸	90% ¹⁸	90%	90% ¹⁸	95% ¹⁸
Investment-Grade Corporate Bonds	50/85% ¹⁹	50/85% ¹⁹	96/98% ¹⁵	100%	90%	75%	90%
Investment-Grade Public Sector Entity Debt	85/100% ¹⁷	85/100% ¹⁷	90%	90%	90%	0% ²⁰	0% ²⁰
Liquid Common Equity	50%	50%	70%	85%	50%	70%	70%

⁶ Standard and Poor's Ratings Services, Life: Liquidity Model for U.S. and Canadian Life Insurers (2004). S&P recently superseded this criteria with more general criteria for rating insurers. Their newer criteria lacks details on the treatment of different asset classes.

⁷ Standard and Poor's Ratings Services, Insurers: Rating Methodology (2013). S&P recently superseded this criteria with more general criteria for rating insurers. Their newer criteria lack details on the treatment of different asset classes.

⁸ AM Best, AM Best's Stress Liquidity Ratio for US Life Insurers (2017).

⁹ BCBS, Basel III: The Liquidity Coverage Ratio and liquidity risk monitoring tools (2013), available at <https://www.bis.org/publ/bcbs238.pdf>.

¹⁰ BCBS, Basel III: the net stable funding ratio (2014), available at <https://www.bis.org/bcbs/publ/d295.pdf>.

¹¹ S&P assessed a 1% haircut on deposits with banks rated BBB- and higher. A 5% haircut was applied to banks rated BB or B.

¹² S&P's U.S. criteria includes a 100% factor for U.S. government securities. No general treatment of sovereign debt is specified.

¹³ S&P's criteria includes a list of developed countries and international financial centers. Bonds issued by corporations or governments not on this list would receive more punitive treatment.

¹⁴ Because the AM Best methodology is for the U.S., only factors applicable to U.S. Government Securities are specified. AM Best only prescribes factors for U.S. obligations.

¹⁵ S&P uses a 98% factor for public bonds rated A- and above. Other investment-grade public bonds receive a 96% factor.

¹⁶ AM Best does not include a covered bond asset class. Investment-grade corporate bonds not issued in private offerings or by affiliates receive a 75% factor in the short-term scenario and 90% in the long-term scenario. Other Loan-Backed and Structured Securities receive a factor of 60% in the short-term scenario and 70% in the long-term scenario.

Source: IAIS (2020), Consultation paper on the Development of Liquidity Metrics: Phase 1 – Exposure Approach. Available at: <https://www.iaisweb.org/page/consultations/current-consultations/development-of-liquidity-metrics-phase-1-exposure-approach//file/93103/pcd-on-development-of-liquidity-metrics-phase-1-exposure-approach-public>.

4.6 Stylised flow analysis data – Solvency II QRT references

Solvency II QRTs does not provide an accurate correspondence with the information to be collected in a stylised flows analysis, hence the QRT references shall be considered as an indication. In particular, any reference to the QRT cells of the S.0501 shall be considered only with respect to the claims and the expenses expected to be paid, therefore the cell "Claims and other technical outflows" shall not include changes in provision for claims or for expenses.

	SII references	QRT Template	Column/Row	Calculation	Description
Traditional life business					
C.1.1	Premium written (Gross)	S0501	[C0300/R1410] [C0230/C1410]	[C0300/R1410] - [C0230/R1410]	Total Gross written premium deducted by the UL/IL insurance gross written premium
C.1.2	Claims an expenses incurred	S0501	[C0300/R1610] [C0230/R1610]	[C0300/R2600] + [C0230/R1610] - [C0230/R2600]	Total Gross claims incurred + expense incurred deducted by the UL/IL insurance gross claims incurred and the UL/IL related expense incurred
C.1.3	N/A				
C.1.4	Reinsurance shares of premium and claims	S0501	[C0300/R1420] [C0300/R1620] [C0230/R1420] [C0230/R1620]	[(C0300/R1620) - (C0230/R1620)] - [(C0300/R1420) - (C0230/R1420)]	Total reinsurance share of claims incurred deducted by UL/IL business - Total reinsurance share of premiums written deducted by UL/IL insurance
C.1	Net Cash Flows				
UL/IL					
C.2.1	Premium written (Gross)	S0501	[C0230/R1410]	[C0230/R1410]	UL/IL insurance gross written premium
C.2.2	Claims and other technical outflows (excluding surrender)*	S0501	[C0230/R1610] [C0230/R2600]	[C0230/R1610] + [C0230/R2600]	UL/IL insurance gross claims incurred and the UL/IL related expense incurred
C.2.3	N/A				
C.2.4	Net Reinsurance flows (receivables - payable)	S0501	[C0230/R1420] [C0230/R1620]	[C0230/R1620] - [C0230/R1420]	Total reinsurance share of claims of IL/IL business - Total reinsurance share of premiums written of UL/IL insurance
C.2	Net Cash Flows				
Non-Life business					
C.3.1	Premium written (Gross)	S0501	[C0200/R0110] [C0200/R0120] [C0200/R0130]	[C0200/R0110] + [C0200/R0120] + [C0200/R0130]	Sum of premium Written - Gross direct business, gross proportional reinsurance accepted, gross non-proportional reinsurance
C.3.2	Claims and other technical outflows	S0501	[C0200/R0310] [C0200/R0320] [C0200/R0330] [C0200/R1300]	[C0200/R0310] + [C0200/R0320] + [C0200/R0330] + [C0200/R1300]	Sum of claims incurred - Gross direct business, gross proportional reinsurance accepted, gross non-proportional reinsurance + Total expenses
C.3.3	Net Reinsurance flows (receivables - payable)	S0501	[C0200/R0140] [C0200/R0340]	[C0200/R0340] - [C0200/R0140]	Difference between the reinsurance share of claims incurred and the reinsurance share of premium written
C.3	Net Cash Flows				

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