[LIQUIDITY RISKMANAGEMENT - MISMATCH GAPS]

This document outlines the various mismatch GAPs that can be used to monitor and manage the firm's liquidity risk. The calculation of the GAPs is based on the FSA's liquidity metric monitor, utilising the regulatory liquidity reports.

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1 Introduction

As part of the new liquidity guidelines[1], the FSA had published a Liquidity Metric Monitor (LMM)[2] that outlines a wide range of mismatch gaps that can be used to monitor liquidity risk. The gaps listed in the LMM are comprehensive in nature and can be used by firms to monitor and manage liquidity risk.

Inflow (assets) and Outflow (liabilities) mismatch "GAPs" across the various time-bands can be used to identify potential liquidity risks and to analyse the impact of maturity transformation on the firm's liquidity. The inflows (assets) and outflows (liabilities) are considered on a contractual basis and conservative behavioural and stress assumptions have been applied to arrive at the various mismatch GAPs.

The mismatch GAPs are analysed based on the time-bands listed in the table below:-

<=2 weeks	>2 weeks and <=1month	> 1 month and <=3 months	>3 months and <=6months	>6 months and <=1 year	>1 year and <=2 years	>2 years and <=5 years	>5 years

The summary of the GAPs considered in the LMM are listed below:-

1) **GAP1:** Wholesale Refinancing Gap (excluding lending to group and non-credit institutions)
2) **GAP2:** Wholesale Refinancing Gap after sale of highly liquid collateral (i.e., GAP 1 + sale of highly liquid collaterals)
3) **GAP3:** Wholesale Refinancing Gap after sale of high quality collateral (i.e., GAP 2 + sale of high quality collaterals)
4) **GAP4:** Overall Refinancing Gap including Group, Retail & Corporate Banking flows and Lower Quality Collateral (i.e., GAP3 + Group, Retail & Corporate Banking flows and Lower Quality Collateral)
5) **GAP5:** Overall Refinancing Gap plus withdrawable stress (i.e., GAP4 + callable stress)
6) **GAP6:** Overall Refinancing Gap plus withdrawable stress plus off-balance sheet stress (i.e., GAP5 + off-balance sheet stress)
7) **GAP7:** Impact of downgrade triggers (i.e., GAP6 + impact of 2 notches downgrade)

A trend analysis of the mismatch GAPs in conjunction with the firm's risk appetite can be a useful tool to monitor, track and manage liquidity risk. It can also serve as a guide to set internal limits and assist in liquidity pricing.

This document outlines as to how the LMM mismatch GAPs are calculated using the regulatory liquidity reports (FSA047/48).

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[1] PS09/16 – Strengthening liquidity standards
[2] Liquidity Metric Monitor (LMM)

2   How can mismatch GAP analysis assist in liquidity risk management?

Consider a simple example where the firm borrows £100 million from the wholesale market for a period of 3 months at 1.5%, with the assumption that it can access the wholesale market again to rollover these deposits on maturity. The firm then utilises most of these funds to provide loans to corporate and SME customers, with an average interest income of 7%, spread across the multiple time-bands as shown in the table below.

This scenario creates a maturity transformation, which enables the firm to make a better profit on the borrowing. If these deposits can be rolled over on maturity for up to 1 year, the firm will make a profit of £5.5 million (Interest earned = £7 million – Interest paid = £1.5 million). However, due to the maturity transformation, the firm is now also exposed to liquidity risk[3]. The liquidity risk is in terms of the firm not being able to pay its creditors because of its inability to rollover the wholesale deposits on maturity.

In case the funds are not rolled over, the firm might find it difficult to raise additional funds to meet its obligations. In this example, the firm will have to raise £50 million within a three month period.

(in £ millions)	<=2 weeks	<=2 wks and <=1 mth	>1 mth and <=3mths	>3mths and <=6mths	>6mths and <=1 yr	>1 yr and <=2 yrs	>2 yrs and <=5 yrs	>5 yrs	Total
Inflow (Wholesale and customer lending)	0	0	50	20	30	0	0	0	100
Outflow (Wholesale borrowing)	0	0	-100	0	0	0	0	0	-100
Net	0	0	-50	20	30	0	0	0	
Cumulative GAP (mismatch)	0	0	-50	-30	0	0	0	0	
%	0%	0%	-50%	-30%	0%	0%	0%	0%	

Firms will have to define internal limits to ensure that its mismatch GAPs are within manageable limits and is in line with its risk appetite. A failure to regularly monitor and manage mismatch GAPs can lead to liquidity problems, especially in case the firm borrows in the short-term wholesale market and lends long-term to customers (e.g., mortgages), similar to the problems faced by Northern Rock during the financial crisis in 2007/2008.

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[3] Interest rate risk is not considered as it is assumed that the interest rates will remain the same throughout this period. Any counterparty risk and credit risk is also ignored.

3 How do the mismatch GAPs impact the firm's overall profit/yield?

The new regulatory rules require firms to hold a Liquid Asset Buffer (LAB) of high quality securities and central bank deposits[4] as an additional form of liquidity in case of an adverse situation. The highly liquid buffer stock provides a much lower return/yield compared to other lending possibilities. This is the additional cost that firms incur to maintain sufficient liquidity at all times and to comply with regulatory requirements. This opportunity cost has to be evaluated and priced correctly to ensure sustainable returns on investments.

The regulatory LAB requirement in its "simplest" form comprises three individual requirements:-

- Wholesale requirement – is the net peak cumulative wholesale deficit calculated on a daily basis over a three month period after applying certain rollover assumptions.
- Retail requirement – is 10% to 20% of the entire retail deposits/accounts.
- Off-balance sheet requirement – is a certain percentage (ranging from 5% to 100%) of the firm's off-balance sheet exposure/commitments.

The LAB required to meet the wholesale requirement is the one that heavily relies on the mismatch principle. The LAB required to meet the retail and off-balance sheet requirement is a certain percentage of the overall deposits or commitments and is not directly impacted by maturity transformation (i.e., mismatch GAP).

In the example on the previous page, the liquid asset buffer requirement could range from £50 million to £100 million. Let us evaluate the overall impact of the firm's yield/profit by assuming that the firm's wholesale buffer requirement is £50 million. The firm then raises Retail customer deposits (Type-A)[5] of £65 million to fund the wholesale buffer requirement. The overall LAB requirement is now £63 million (Wholesale buffer requirement of £50 million and Retail buffer requirement of £13 million[6]). Let us now analyse the impact on the firm's profit/returns due to the new buffer requirements, which were initially triggered because of the mismatch gap in the wholesale segment.

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[4] Sovereign and central bank securities that are assessed at credit quality step 1 (i.e., credit rating of AA- and above) and deposits with central banks.
[5] Type-A retail funding include deposits raised over the internet and/or customers who are very sensitive to interest rate changes
[6] The LAB requirement for Retail Type-A deposits is 20% of the deposits (i.e., 20% of £65 million)

Analysis without a liquid asset buffer requirement				
Liabilities	A	Wholesale borrowing	£100,000,000	
	B	*Interest expense (1 year) @1.5%*		-£1,500,000
	C	Retail deposits (1 year)	£65,000,000	
	D	*Interest expense (1 year) @1%*		-£650,000
Assets	E	Wholesale lending	£165,000,000	
	F	*Interest income (1 year) with average interest @7%*		£11,550,000
Overall profit	G	(B+D+F)		£9,400,000
Overall return (%)	H	(G/(A+C))		5.69%
Analysis with a liquid asset buffer requirement				
Liabilities	I	Wholesale borrowing	£100,000,000	
	J	*Interest expense (1 year) @1.5%*		-£1,500,000
	K	Retail deposits (1 year)	£65,000,000	
	L	*Interest expense (1 year) @1%*		-£650,000
Assets	M	Wholesale lending	£100,000,000	
	N	*Interest income (1 year) with average interest @7%*		£7,000,000
	O	Liquid asset buffer securities	£65,000,000	
	P	*Interest income (1 year) with average interest @0.5%*		£325,000
Overall profit	Q	(J+L+N+P)		£5,175,000
Overall return (%)	R	(Q/(I+K)		3.14%
Additional cost of holding the liquid asset buffer				
Loss in earning	S	(G-Q)		-£4,225,000
Reduction in return (%)	T	(H - R)		-2.55%

Due to the new buffer requirements, the overall return with similar funding structure and risks has fallen from 5.69% to 3.14%. In scenarios of this nature, management teams will have to ask some critical questions about the firm's business model, funding sources and lending practices. Please refer to the appendix (Section 7) as to how the various funding sources could impact the LAB requirement.

Please note that this simple illustration is only provided to demonstrate the impact of running a large mismatch GAP under the new liquidity rules. The Treasury and management team should also consider aspects like interest rate risk, credit risk, counterparty risk, reputational risk, business risk and FX risk to get a holistic view of the actual cost of liquidity.

4 Mismatch GAP analysis as outlined in the LMM

GAP1: Wholesale Refinancing Gap (adjusted for shorts)

GAP1 is calculated by considering wholesale inflows and outflows from sophisticated users of finance (excluding any lending to group and non-credit institutions). This identifies the wholesale mismatch that might require refinancing from the wholesale markets.

For example, a disproportionate "GAP1 mismatch" can occur when the firm borrows short-term from the wholesale markets and provides long term mortgages to retail customers. There is a risk that the firm might not be able to refinance the short-term borrowing in a market-wide stress scenario (similar to the problem Northern Rock faced in 2007/8).

	Brief description	Rows	FSA047/48 row description
Inflow	Central bank and Money Market Liquidity Funds	18	Designated money market funds
		19	Liquid asset buffer-eligible central bank reserves and deposits
	Unsecured lending to credit institutions (excluding group)	21	Lending to UK credit institutions
		22	Lending to non-UK credit institutions
	Securities	23	Own account security cash flows
Outflow	Unsecured funding (excluding group)	40	Primary issuances - senior securities
		42	Primary issuances - structured notes
		43	Covered bonds
		45	UK credit institutions
		46	Non-UK credit institutions
		47	Governments, central banks and supranationals
		48	Non-credit institution financials
		49	Non-financial large enterprises - Type A
	Dated Capital	41	Primary issuances - dated subordinated securities
	Group outflows	44	Group entities
	Asset Backed issuance	51	SSPE liability cash flows
	Conditional G.I.C.'s	50	Conditional liabilities pre-trigger contractual profile
	Adjustment for physical shorts (in case of short position ONLY)	6-17	Security, transferable whole-loan and commodity flows
Inflow/ Outflow	Net FX Flow	57	Principal FX cash flows (including currency swaps)
	Net Repo contractual & open	25-30	Reverse repos
		34-39	Repo

GAP2: Wholesale Refinancing Gap after sale of highly liquid collateral

GAP2 is built on GAP1 and is calculated by including the sale of highly liquid collaterals (i.e., securities with a credit rating of AA- and above), after taking a haircut.

GAP2 provides an indication of additional resilience provided by holding a stock of high quality liquid securities.

	Brief description	Rows	FSA047/48 row description	Haircut[7]
GAP1	GAP1 is calculated as provided in the section above			
PLUS				
Inflow	Highly liquid collaterals	6	Liquid asset buffer-eligible securities	2.5%
		7	Other high quality central bank, supranational and central government debt	5%
		8	US GSE/GSA securities	5%
Outflow	Remove Collateral Required for RTGS	4	Prior period's peak intra-day collateral used for UK settlement and clearing systems	
		5	Prior period's peak intra-day collateral used for settlement and clearing systems outside the UK	

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[7] The haircut is on the clean market value of the securities

GAP3: Wholesale Refinancing Gap after sale of high quality collateral

GAP3 provides the wholesale refinancing mismatch GAP across the various maturity time-bands after the sale of high quality collaterals (i.e., securities with a credit rating of A- and above and equities listed on major indices). GAP3 is built on GAP2 and is calculated by including the sale of high quality collaterals, after taking a haircut.

GAP3 provides an indication of additional resilience provided by holding a stock of high quality securities and listed equities.

	Brief description	Rows	FSA047/48 row description	Haircut[8]
GAP2	GAP2 is calculated as provided in the section above			
PLUS				
Inflow	High quality collaterals	10	High quality asset-backed securities	25%
		11	High quality covered bonds	25%
		13	High quality corporate bonds (UK credit institutions)	25%
		14	High quality corporate bonds (non-UK credit institutions)	25%
		15	High quality corporate bonds (excluding credit institutions)	25%
		16	Equities included in major indices	10%

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[8] The haircut is on the clean market value of the securities and equities

GAP4: Overall Refinancing Gap (including Group, Retail & Corporate Banking flows and Lower Quality Collateral)

GAP4 provides the overall refinancing mismatch gap including Group, Retail & Corporate Banking flows and Lower Quality Collateral across the various maturity time-bands.

Please note that GAP4 excludes callable/withdrawable deposits (e.g., current accounts) and callable/withdrawable lending to retail and non-credit institutions (e.g., overdrafts)).

	Brief description	Rows	FSA047/48 row description	Excl. Non-defined maturity?[9]	Haircut [10]
GAP3	GAP3 is calculated as provided in the section above				
PLUS					
Inflow	Group Inflows	20	Lending to group entities	N	
	Non-credit lending	31	Non-retail lending exposures	Y	
		32	Retail lending exposures	Y	
	SSPE flows	33	SSPE asset cash flows	Y	
Outflow	Term funding	52	Non-financial large enterprises - Type B	Y	
		53	SME deposits	Y	
		54	Retail deposits - Type A	Y	
		55	Retail deposits - Type B	Y	
	Securities and commodities	9	Own-name securities and transferable whole-loans		25%
		12	Securities issued by group entities		100%
		17	Other securities and commodities		75%

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[9] Exclude non-defined maturity? – If this indicator is 'Y', callable/no-defined maturity items are not included in calculating this GAP. Example; Customer 'Current accounts' have no defined maturity and will not be included in the GAP4 calculation.

[10] The haircut is on the clean market value of the securities and equities

GAP5: Overall Refinancing Gap plus withdrawable stress

In a stress scenario, the firm could face higher withdrawals on customer callable/withdrawable deposits (e.g., current accounts). GAP5 provides the overall refinancing mismatch gap including "stress assumptions" applied to callable/withdrawable deposits (e.g., current accounts) and open lending inflows (e.g., overdrafts).

	Brief description	Rows	FSA047/48 row description	Outflow of callable deposits and inflow of non-defined maturity lending	
GAP4	GAP4 is calculated as provided in the section above				
PLUS				Inflow % (2 weeks)	Inflow % (> 5 years)
Inflow	Open lending inflows	31	Non-retail lending exposures	0%	100%
		32	Retail lending exposures	0%	100%
		33	SSPE asset cash flows	0%	100%
				Outflow % (2 weeks)	Outflow % (> 5 years)
Outflow	Callable retail liabilities	54	Retail deposits - Type A	20%	80%
		55	Retail deposits - Type B	20%	80%
	Callable corporate outflow	52	Non-financial large enterprises - Type B	30%	70%
		53	SME deposits	20%	80%
	Free Cash	56	Client / brokerage free cash	75%	25%
	Client collateral withdrawn (i.e.,Total Client Marketable Assets less margin)	78-89	All Client Securities/whole-loans held under rehypothecation rights (including all derivative margin collateral received) after haircut[11] **Less** Net Margin received (Collateral)	75%	25%

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[11]The haircut for the securities is the same as that used in GAP 2, 3 and 4.

GAP6: Overall Refinancing Gap plus withdrawable stress and off-balance sheet stress

In a stress scenario, the firm could face higher drawdown on off-balance sheet facilities/commitments. GAP6 builds on GAP5 and considers the mismatch gap including "stress assumptions" applied to off-balance sheet items.

	Brief description	Rows	FSA047/48 row description				
GAP5	GAP5 is calculated as provided in the section above						
PLUS				Inflow % (2 wks)			
Inflow	Off Balance Sheet Received	58	Committed facilities received	100%			
				Outflow % (<= 2 wks)	Outflow % (< = 3mths)	Outflow % (<= 6mths)	Outflow % (<= 12mths)
Outflow	Off Balance Sheet Provided	60	Secured facilities provided - other securities	25%			
		61	Unsecured facilities provided - credit institutions	100%			
		63	Unsecured stand-by facilities provided - entities other than credit institutions and connected SSPE's	50%		20%	
		64	Unsecured facilities provided by connected SSPE's - third parties	10%			
		65	Unsecured facilities provided - entities other than credit institutions	10%			
		66	Overdraft and credit card facilities provided	2.5%	7.5%	15%	30%
		67	Pipeline lending commitments	75%			
		69	Other legally binding commitments provided	10%			

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GAP7: Impact of Downgrade Triggers (2 notches long term)

GAP7 evaluates the mismatch gap in case of a downgrade by 2 notches. This will only impact firms that have Asset put backs and G.I.C.'s[12] .

	Brief description	Rows	FSA047/48 row description		
GAP6	GAP6 is calculated as provided in the section above				
PLUS				1 notch	2 notches
Outflow	Derivatives margining and exposure	70	Asset put backs from third parties vehicles		
		71	Conditional liabilities		
		72	Over the counter (OTC) derivative triggers		
		73	Other contingent liabilities		

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[12] GICs – Guaranteed Investment Contracts

5   Wholesale survival days

In addition to the mismatch gaps, the LMM also defines three "Wholesale Survival days" indicators. The survival period is measured by evaluating the cumulative wholesale peak net cash outflow over a period of 3 months.

Wholesale survival days no collateral (GAP 1):- The number of days the bank has adequate cumulative wholesale inflows to cover the wholesale outflows (see GAP1 mismatch above for more details about GAP1).

Wholesale survival days using highly liquid collateral (GAP 2): The number of days the bank has adequate cumulative wholesale inflows to cover the wholesale outflows; after the sale of highly liquid collaterals (see GAP2 mismatch above for more details about GAP2).

Wholesale survival days using high quality collateral (GAP 3): The number of days the bank has adequate cumulative wholesale inflows to cover the wholesale outflows; after the sale of high quality collaterals (see GAP3 mismatch above for more details about GAP3).

6 Glossary of terms

FSA – Financial Services Authority

GIC – Guaranteed Investment Contract

LMM – Liquidity Metrics Monitor

SPE – Special Purpose Entity

SSPE – Securitisation Special Purpose Entity

Withdrawable funds – deposits placed by customers without any defined maturity (e.g., current accounts)

7 Appendix - Impact of funding source on Liquid Asset Buffer (LAB) requirement

The table below lists the most preferable funding sources in order of their stability and their impact on the firm's liquid asset buffer requirement.

Funding source	Description	Residual maturity	LAB Buffer requirement
Wholesale[13]	Long term wholesale funding[14]	> 3 months	0%
Wholesale	Wholesale funds lent to credit institutions with a matching maturity[15]	<= 3 months	0%
Retail	Deposits from Type-B customers	Any duration	10%
Retail	Deposits from Type-A customers	Any duration	20%
Wholesale	Funds lent to non-credit institutions[16]	<= 3 months	100%
Wholesale	Inflows and outflows that are not matched	< 3 months	22.5% to 100%[17]

In addition to the funding source, even lending provided to certain categories of wholesale market can impact the wholesale LAB requirement. For example, if the firm borrows £10 million from the Money Markets and lends to a non-credit institution (e.g., Non-financial large enterprise or Brokerage firm) or to a Group entity, the LAB requirement is £10 million.

Another aspect to consider is the off-balance sheet facilities or commitments provided. Adequate buffer has to be in place for these commitments/facilities. The LAB requirement for key off-balance sheet items is listed in the table below:-

Row	FSA047/48 row description	LAB buffer requirement
66	Overdraft and credit card facilities provided (retail customers)	5%
65	Unsecured facilities provided - entities other than credit institutions	10%
69	Other commitments and contingent facilities provided (e.g., Letters of Credit, Trade Finance guarantees)	10%
67	Pipeline lending commitments (retail customers)	75%
61	Unsecured facilities provided - credit institutions	100%

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[13] Wholesale entities: Credit Institutions, Non-credit financial institutions, Non-financial enterprises (Type-A/B) and SME
[14] Example: Dated subordinate debt
[15] Matching maturity : example:- funds raised for 60 days are lent for a duration of <=60 days
[16] Example: Funds raised in the money market for 80 days and lent for <=80 days to a property developer (non-retail lending exposure) or retail customer (retail lending exposure)
[17] Please refer to page 5 of the calculating the buffer requirements document for more details

8 Katalysys contact information

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Katalysys (www.katalysys.com) specialises in delivering solutions and consulting services to subsidiaries and branches of small and medium-sized banks operating in the UK. We have assisted our clients in building liquidity risk management framework, FSA liquidity reports, reconciliation of the liquidity reports to the balance sheet and liquidity metrics as per the new Financial Services Authority (FSA) guidelines (PS09/16).