



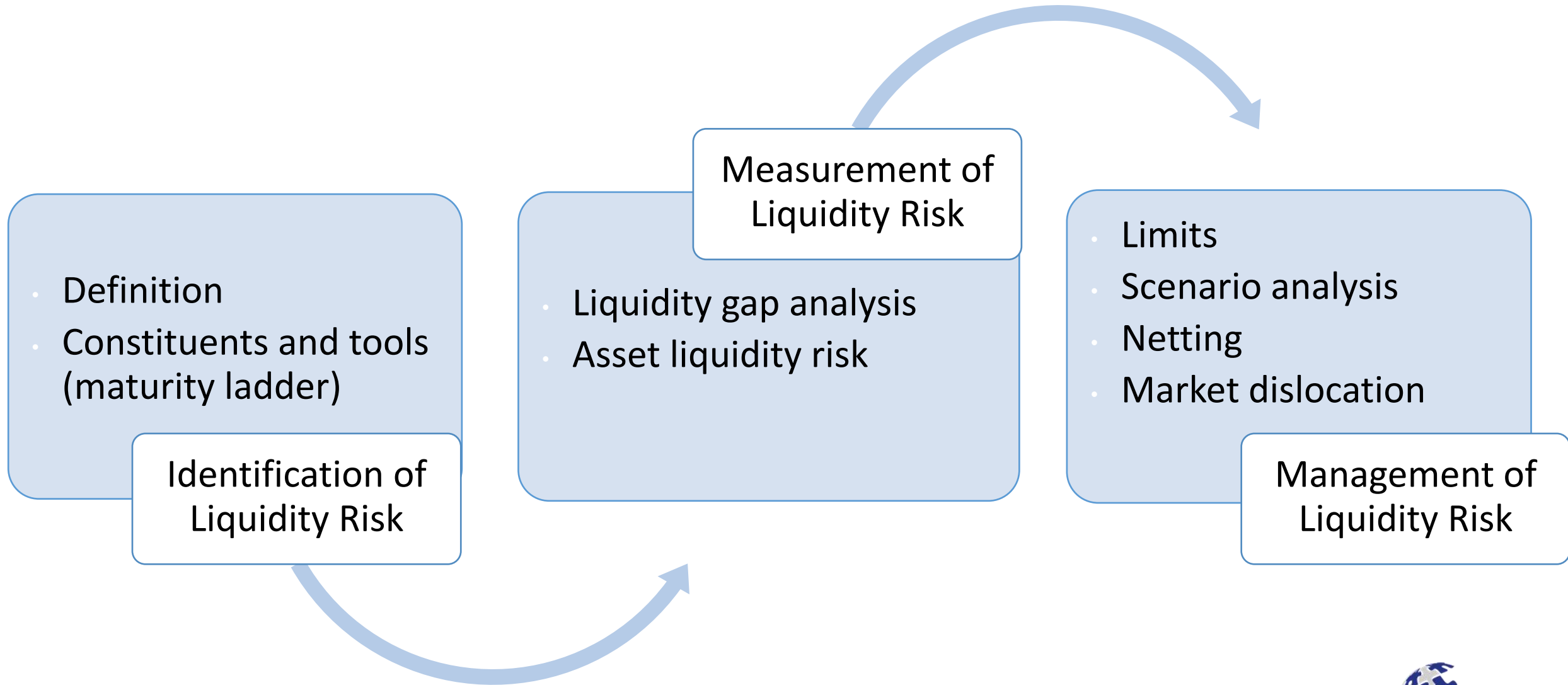
## Chapter 7

# Liquidity Risk

Questions - 10



# Chapter Summary



## Liquidity Risk

The risk that a firm has **insufficient cash** to meet its cash obligations and will either become **insolvent**, or will **suffer losses** from borrowing, selling assets at below market price, or paying contractual penalties



# Liquidity Matters

The term liquidity is used in various ways, all relating to **availability** of, **access** to, or **convertibility** into cash.



An institution is said to have liquidity if it can easily meet its needs for cash



A market is said to be liquid if the instruments it trades can easily be bought or sold in quantity with little impact on market prices.



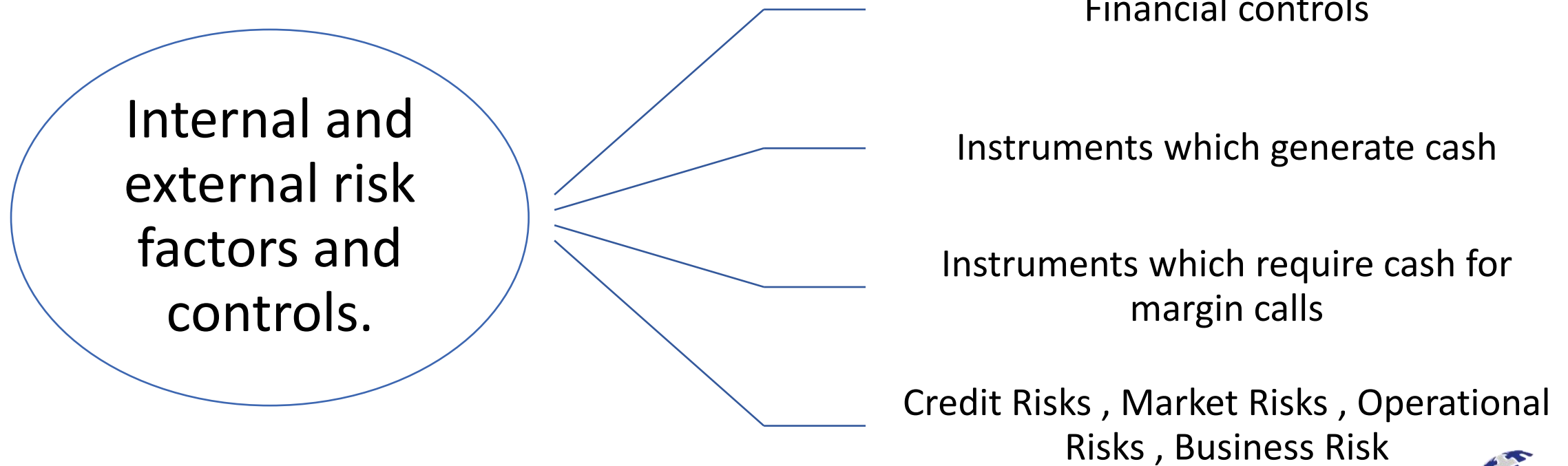
- An asset is said to be liquid if the market for that asset is liquid.



# Identification of Liquidity Risk

## Basic Constituents of Liquidity Risk

- The liquidity of an institution depends on its immediate **need for cash**, how much **cash it currently has**, its available **lines of credit**, and how easily it can transform its **non-cash assets into cash**.



# Identification of Liquidity Risk

## The Maturity Ladder

- A **maturity ladder** is a useful device for comparing cash inflows and outflows, both on a daily basis and over a series of specified time periods.



# The Maturity Ladder

Day one: Cash inflows		Cash outflows		Excess/ (shortfall)
Maturing assets	100	Maturing liabilities with contractual maturities	50	
Interest receivable	20	Interest payable	10	
Asset sales	50	Other deposit runoffs	30	
Drawdowns on committed lines	10	Drawdowns on committed lines	10	
<b>Total</b>	<b>180</b>	<b>Total</b>	<b>100</b>	<b>80</b>
Day two: Cash inflows		Cash outflows		Excess/ (shortfall)
Maturing assets	100	Maturing liabilities with contractual maturities	70	
Interest receivable	20	Interest payable	20	
Asset sales	55	Other deposit runoffs	40	
Drawdowns on committed lines	10	Drawdowns on committed lines	50	
<b>Total</b>	<b>185</b>	<b>Total</b>	<b>180</b>	<b>5</b>

→ Example



# The Maturity Ladder

Day three to day 15: Cash inflows		Cash outflows		Excess/ (shortfall)
Maturing assets	130	Maturing liabilities with contractual maturities	90	
Interest receivable	50	Interest payable	30	
Asset sales	60	Other deposit runoffs	40	
Drawdowns on committed lines	20	Drawdowns on committed lines	80	
<b>Total</b>	<b>260</b>	<b>Total</b>	<b>240</b>	<b>20</b>
Day 16 to day 30: Cash inflows		Cash outflows		Excess/ (shortfall)
Maturing assets	160	Maturing liabilities with contractual maturities	130	
Interest receivable	80	Interest payable	60	
Asset sales	90	Other deposit runoffs	80	
Drawdowns on committed lines	40	Drawdowns on committed lines	80	
<b>Total</b>	<b>370</b>	<b>Total</b>	<b>350</b>	<b>20</b>





# Identification of Liquidity Risk

## Actual and Contractual Cash Receipts

Three main reasons why actual and contractual cash flows shown in the maturity ladder will differ from the actual cash receipts

It is not possible to estimate with certainty the **cash flows from all instruments**

The cash may not **materialise** on the due date i.e. credit risk

The business may not wish to hold the **instrument until maturity**.



## Asset Liquidity Risk

The cash obtained from **mature or divested (sold) assets**

There are **two main factors** that determine the liquidity risk of the firm's assets:

**Potential marketability** – how easily they can be sold for cash. This is linked to market risk.

How easily the assets can be used as collateral against which to secure increased cash inflows. This is **linked to credit risk**.



## Funding Liquidity Risk

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### Funding Liquidity

The way in which a firm **obtains liquidity** from the liability side of its balance sheet.

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### Liability Liquidity

Refer to **unsecured funding** obtained from depositors, third parties and the wholesale markets

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### Funding Liquidity Risk

Refers to the likelihood that the **bank's funding** will not be available when required.

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# Potential Impact of Liquidity Risk

When **liquidity risks materialise** within a specific firm, it may not be able to meet its obligations as they **fall due**.

The firm will face a loss in this case due to the **cost of borrowing** to meet those obligations, or through facing **contractual penalties** for non-payment.



## Funding Liquidity Risk Analysis

### Liquidity Gap Analysis

A technique called **cash matching** is used to understand a firm's or **portfolio's liquidity** risk, by examining all net future cash flows.

**A firm or portfolio is cash matched if:**

Every future cash inflow is balanced with an offsetting **cash outflow on the same date**

Every future cash outflow is balanced with an offsetting **cash inflow on the same date.**

**Gap analysis** then aggregates the cash flows into maturity brackets and checks if cash flows in each bracket net to zero.

One **disadvantage** of liquidity gap analysis is that it does not consider **credit risk** and **assumes all cash flows will occur.**



## What is Funding Liquidity ?

- A. The way in which a firm obtains liquidity from the liability side of its balance sheet
- B. The risk caused by adverse movements in exchange rates
- C. The likelihood that the bank's funding will not be available when required
- D. The risk that interest rates move against the investor

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# Liquidity Gap Analysis- Example

As a simple example, consider a portfolio whose cash flows all mature in less than three years.

The following table illustrates a gap analysis using our brackets and hypothetical cash flows.

<b>Bracket (months)</b>	<b>0-3</b>	<b>3-6</b>	<b>6-12</b>	<b>12-24</b>	<b>24-36</b>
<b>Cash inflows (£m)</b>	130	165	90	60	50
<b>Cash outflows (£m)</b>	130	25	90	70	50
<b>Gap</b>	0	140	0	-10	0



## Stress Testing

- A technique for assessing how outcomes differ when **individual inputs** to a system are **changed or stressed**.

## Expected Future Funding Requirement

- **Approaches Used -**
- **Analysing historical patterns** of roll-overs, draw-downs and new requests for loans
- **Conducting statistical analysis** taking account of seasonal and other effects believed to determine loan demand.
- Making **subjective high-level business** projections
- **Undertaking a customer-by-customer assessment** for its larger customers and applying historical relationships to the remainder





# Uses and Limitations of the Key Measures of Asset Liquidity Risk

## Bid-Offer Spread

The difference between the **prices quoted by market makers** for an immediate sale to them (the bid) and an immediate purchase from them (the offer).

## Market Depth

A measure of the **volume of transactions** necessary to move prices

The **deeper the market, the higher the volume** needed to move prices.

## Immediacy

A measure of the time it takes to **achieve a deal in a market.**

## Resilience

A measure of the speed with which prices **return to equilibrium** following a large trade.



## The process for managing liquidity risk

A bank must be able to readily determine its **contractual liquidity position**

A bank should then overlay that view with **assumptions about normal behaviour**

It should then undertake **stress testing** by reviewing how the **normal assumptions change** under the various stress scenarios

The bank can then **assess its current level of liquidity provision**, establish the **cost of contingency arrangements**, and compare the associated liquidity risk levels to its **risk appetite and profitability goals**.



**Techniques to ensure it stays within risk appetite & profitability goals**

Setting and monitoring **liquidity limits**

Setting and monitoring **counterparty credit limits**

Performing **scenario analyses**

Using **liquidity at risk techniques**

Ensuring **diversification**

Considering **behavioural analysis**



## What is Stress Testing ?

- A. The risk of price movements that are more uncertain than usual affecting the pricing of products
- B. The likelihood of being unable to transform assets into cash within a preferred time
- C. A technique for assessing how outcomes differ when individual inputs to a system are changed or stressed
- D. The risk that interest rates move against the investor

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# Management of Liquidity Risk

Firms in the UK that are subject to the Individual Liquidity Adequacy Assessment (ILAA) regime must provide their regulator with:

A full and complete review of the firm's liquidity position

A review of liquidity risk governance

A statement of the firm's liquidity risk appetite

Liquidity stress testing policies, processes, and methodologies

The assumptions used for liquidity stress test scenario

Contingency funding plans

A review and justification of the firm's assessment of its liquidity requirement



## Liquidity Limits

Limits would impose a ceiling on the **projected net funding** requirement along the maturity ladder

## Counterparty Credit Limits

To reduce **liquidity risks**, the bank needs to maintain **intra-day counterparty credit limits**

## Liquidity at Risk

**Value-at-Risk (VaR)** can be used to estimate the likely future value of credit and market instruments. The same approach can also be used to estimate the likelihood of **liquidity shortages within a firm.**



# Scenario Analysis

Drivers which increase the likelihood of liquidity risk:

Market concerns over availability of credit

General market and economic conditions

global shocks

## Three specific scenarios

A bank's **going-concern** condition

A **general market crisis**

A **bank-specific crisis**



# Scenario Analysis

Under each scenario, a bank should try to account for any significant positive or negative liquidity swings that could occur.

The going-concern scenario establishes a benchmark for the **'normal'** behaviour of balance sheet related cash flows in the ordinary course of business at a bank.

The last scenario is some form of **general market crisis** where liquidity is affected at all banks in one or more markets.

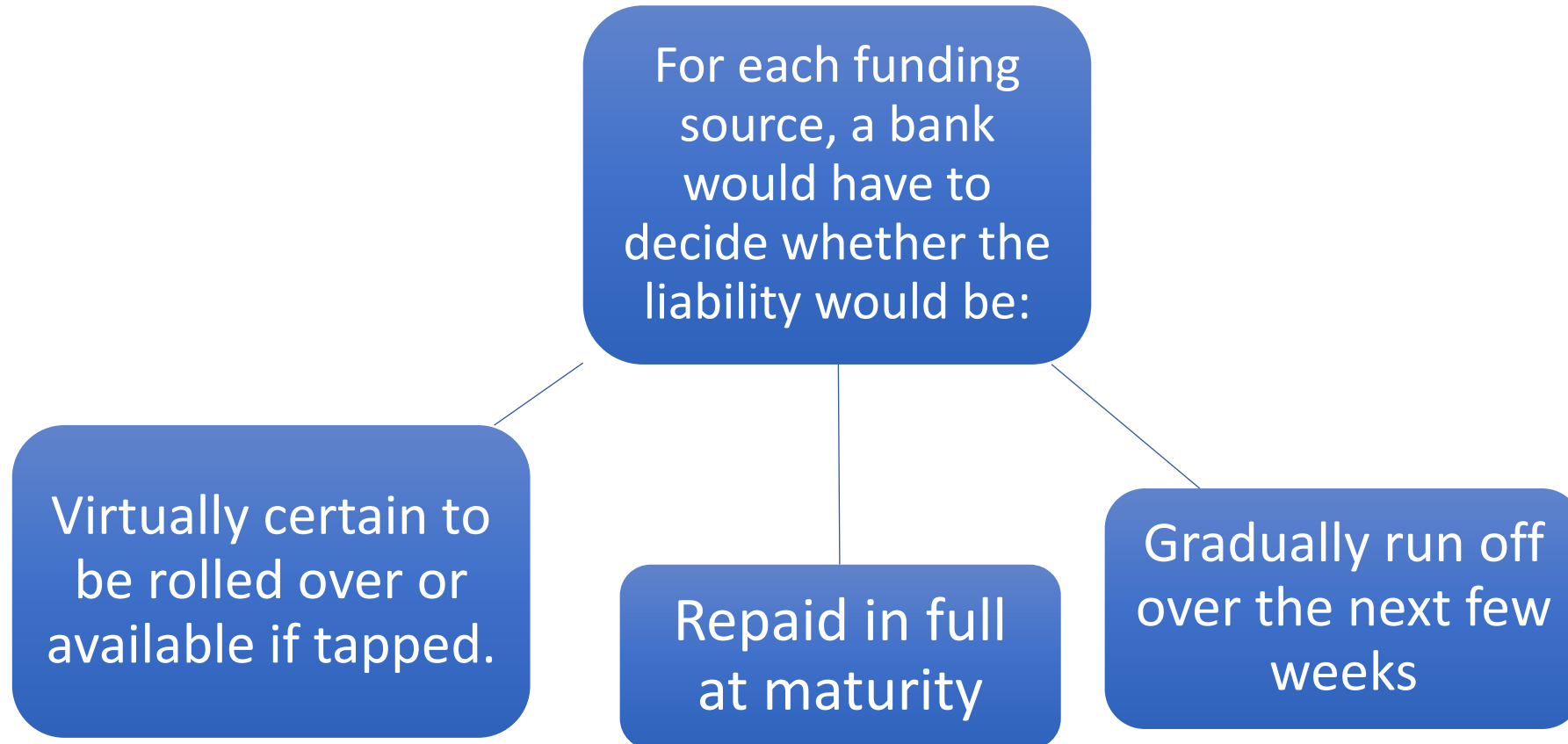
Under the second scenario, a liquidity crisis at **an individual bank** that remains confined to that bank, provides one type of 'worst-case' benchmark.





# Scenario Analysis

Decisions about the specific timing and the size of cash flows are an integral part of the maturity ladder's construction under each scenario.



# Day One of the Maturity Ladder under Alternative Scenarios

- The below table shows the day one positions of the maturity ladder under the alternative scenarios.

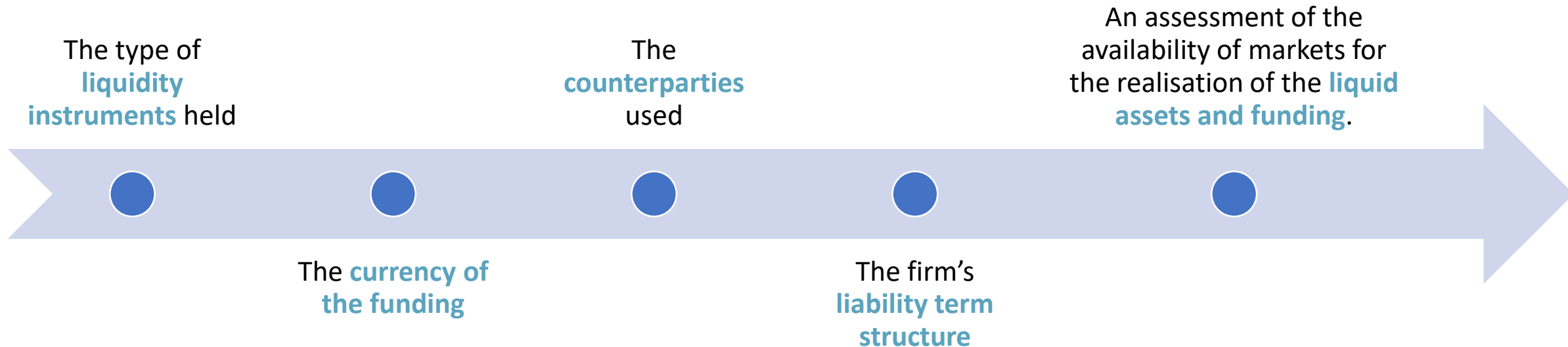
Cash inflows	Normal business conditions (1)	Institution-specific crisis (2)	General market crisis (3)
Maturing assets	100	100	90
Interest receivable	20	20	10
Asset sales	50	60	0
Drawdowns	10	0	5
<b>Total</b>	<b>180</b>	<b>180</b>	<b>105</b>
Cash outflows			
Maturing liabilities	50	50	50
Interest payable	10	10	10
Deposit runoffs	30	100	60
Drawdowns on lending commitments	10	60	75
<b>Total</b>	<b>100</b>	<b>220</b>	<b>195</b>
Liquidity excess/ (shortfall)	80	(40)	(90)



## Diversification

- A firm with a sufficiently flexible funding strategy should be able to reduce its liquidity risk by diversifying its liquidity resources.

### Resources should be diversified according to:



# Managing Liquidity Risk

## Behavioural Analysis

A bank needs to examine the **behaviour of its liabilities** under normal business conditions

## Funding Methods

Liquidity can be obtained from both sides of the balance sheet. On the liability side, firms can obtain funding in both **secured and unsecured**, from a variety of lenders and for differing maturities.

## Funding sources

Wholesale money markets

Securitisation of loan portfolios

Retail deposits

Loan facilities with the central bank



# Calculating a Simple Example of a Cash Netting Agreement

## Example

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Delta Bank has an exposure of \$40 million to each of two hedge funds, Phoenix Partners and Vapour Capital. In both cases, the bank has assets (profitable positions) of \$100 million and liabilities (losing positions) to the counterparty of \$60 million. There is a netting agreement in place with Phoenix Partners.

A major market event causes both funds, Phoenix and Vapour, to implode. Unsecured creditors of both funds will receive 40¢ on the dollar.

### With netting

- Owed to Phoenix <60m>
- Owed by Phoenix 100m
- Make claim for net amount 40m
- Recovery 40% 16m

In this case, an asset of \$40 million has become a cash inflow of \$16 million.

### Without netting

- Owed to Vapour <60m> PAID
- Make claim for gross amount 100m
- Recovery 40% 40m
- Net payment <20m>

In this case, an asset of \$40 million has become a cash outflow of \$20 million.

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**The implications of market dislocation are:**

Companies find it harder to borrow, which means they are more likely to fail, thus making the **economic situation** worse and **causing bank profits to fall further**

Consumers find that they cannot **obtain mortgages**, thus prolonging any fall in house prices

Central banks lose the use of **interest rates** as their main economic lever. Interest rates can only go as low as zero and once this point is reached, the economy risks entering into deflation.



Which of the below are Funding Sources ?

- A. Wholesale money markets
- B. Securitisation of loan portfolios
- C. Retail deposits
- D. All of the above

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