



UNIVERSITY *of* NICOSIA

Department of Digital Innovation

MSc in Blockchain and Digital Currency

BLOC 526 - Emerging topics in fintech

**Session 3 - Banking and insurance business models**

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# Learning objectives and expected learning outcomes

## Summary

Session 3 introduces the fundamental business models of the banking and insurance industries. Banking (lending) business models are often understood based on the concept of maturity transformation between (short term) deposits and (long term) assets. Similarly, insurance (underwriting) business models are understood based on the concept of risk pooling and the pricing of risk. However, both banking and insurance firms have evolved their business models to incorporate several other services that are offered under the Bank or Insurance umbrella.

## Learning objectives

- Understand how banks transform short term funding to long term assets and the risk management considerations relating to this maturity transformation
- Understand how insurance firms pool risks and price for them more competitively than individuals
- Develop a critical understanding of the additional services offered by banking and insurance institutions and how they open them up to fintech disruption

## Expected learning outcomes

- Develop an understanding how the fundamental banking business model of maturity transformation is performed and its implications
- Develop an understanding how the fundamental insurance business model works and its implications
- Use the understanding of the fundamental business models in order to evaluate the disruptive potential of fintech

# Agenda

- Introduction and recap
- Banking business model(s)
- Insurance business model(s)
- Concluding remarks
- Appendices

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## The fundamental proposition underlying our analyses



The same analytical lens applies to insurance



**BY FINTECH BOOKS CONTRIBUTOR, PERIKLIS THIVAIOIS**

<https://fintechcircle.com/insights/insurtech-business-model/>

# Takeaways

## 1. Banking and insurance are umbrella terms

- Both banking and insurance are not pure business models
- Rather, they are convenient terms referring to an amalgamation of business models that happen to be offered by these firms

We need to analytically differentiate between the various business models underlying banking and insurance

# Agenda

- Introduction and recap
- **Banking business model(s)**
- Insurance business model(s)
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## Question: What do banks do?

1. Extend credit (make loans)
2. Hold deposits (collect, manage and safeguard customer and commercial deposits)
3. Facilitate transactions (money transfers, payments, etc.)
4. Offer advice (financial advice, investment advice, etc.)
5. Manage data (customer data, balance sheet and income statement data, transactional data)
6. Offer customer service (branches, call centres, web portals)
7. All of the above



# Having said all this, it is generally held that the main activity of banking institutions is “maturity transformation”

Banks can be visualised as financial intermediaries between depositors (savers) and borrowers

Banks take deposits from savers  
(individuals, businesses, governments, etc.)



Banks use the funds from deposits in order  
to extend loans to borrowers

## Why is there maturity transformation?

Most deposits are short term in nature (can  
be withdrawn instantly)



Loans are longer term in nature, from a few  
months to several years

Even long term (closed) deposits usually  
have a maximum maturity of 5 years

Some loans can have a maturity of over 20  
years (mortgages, infrastructure)

# Several risks are associated with maturity transformation

## Risks of maturity transformation

- During a funding crisis, bank funding costs may soar, while loan rates are somewhat 'fixed'
- Depositors may request their savings all at once, leaving the bank with no funds (bank run)



**However, maturity transformation also has benefits, both for banks, consumers as well as the economy**

### Benefits of maturity transformation

#### Benefits for banks

- Banks make a margin between (lower) deposit rates and (higher) lending rates
- Some of the margin has to be kept for risk management purposes; the rest is 'profit'

#### Benefits for consumers

- Borrowers can use future cash flows to acquire an asset today (e.g. a home)

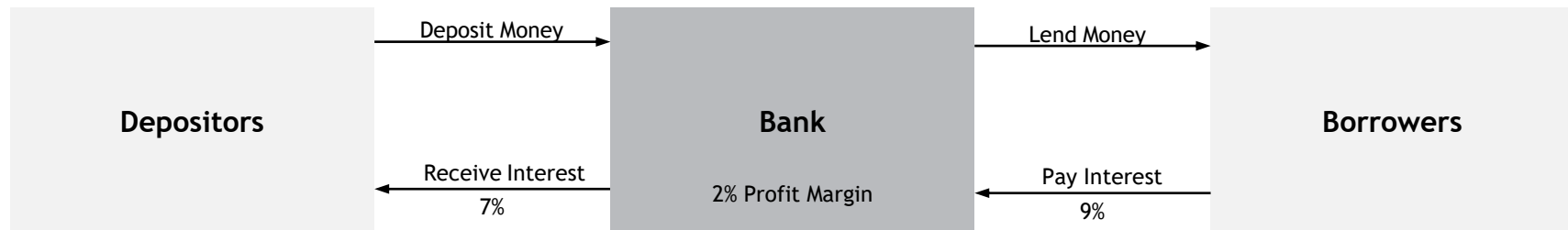
#### Benefits for the economy

- Bank lending incentivises economic activity
- Long term projects can be undertaken



# How do banks make money?

- At the simplest, banks borrow money from Retail depositors and lend it to Retail and Wholesale borrowers
- The difference between the bank's borrowing and lending rates is its profit margin



- In the simplistic example above, the bank makes a 2% profit margin on its balance sheet (assets and liabilities)

# There is no return if there is no risk (well, mostly)

## *Risk types undertaken by banking institutions*

### Credit Risk

#### Credit Risk Definition

- “the potential that a borrower or counterparty will fail to meet its obligations in accordance with agreed terms” (Basel Committee on Banking Supervision, 2000)

### Market Risk

#### Market Risk Definition

- “the risk of losses in on and off-balance sheet positions arising from movements in market prices” (Basel Committee on Banking Supervision, 1996)

### Operational Risk

#### Operational Risk Definition

- “the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events” (Basel Committee on Banking Supervision, 2004)

### Liquidity Risk

#### Liquidity Risk Definition

- “the risk that the firm will not be able to efficiently meet both expected and unexpected current and future cash flow and collateral needs without affecting either daily operations or the financial condition of the firm.” (Basel Committee on Banking Supervision, 2006)

### Other Risks

- Reputational risk
- Strategic risk
- Etc...

# The Balance Sheet and Income Statement of a bank is fundamentally different from other industries

## Banking Balance Sheet

Net Advances	Deposits
Total (gross) Advances	Retail Deposits
Home Loans	Wholesale Deposits
+ Credit Cards	Wholesale Liabilities
+ Car Loans	Securities borrowed
+ Company Loans	+ Reverse Repos
+ Structured Products	Inter Company Liabilities
- Non-performing Advances	Debt
	Senior Debt
Wholesale Assets	+ Mezzanine Debt
Securities lent	+ Subordinated Debt
+ Repos	
	<b><u>Total Liabilities</u></b>
	Common Equity Tier 1 Capital
	Common Equity
	+ Retained Earnings
Inter Company Assets	Additional Tier 1 Capital
	Tier 2 Capital
Goodwill	Preference Equity
Office buildings, hardware etc.	+ Other Equity Instruments
<b><u>Total Assets</u></b>	<b><u>Total Equity</u></b>

## Banking Income Statement

Net Interest Income (NII)
Interest Received
- Interest Paid
+ Non Interest Revenue (NIR)
Commissions and Fees
Trading Income
Other NIR
- Total Provisions
<b><u>Operating Income</u></b>
- Total Operating Costs
Direct Expenses
+ Indirect (allocated) expenses
<b><u>Net Profit from Operations</u></b>
+ Associate Income
<b><u>Net Profit before Tax (NPBT)</u></b>
- Tax
<b><u>Net Profit after Tax (NPAT)</u></b>
+ Minorities
<b><u>Headline Earnings</u></b>
+/- Exceptional Items
<b><u>Attributable Income</u></b>
- Cost of Capital
<b><u>Economic Profit</u></b>

# Takeaways

## 2. Maturity transformation is an integral aspect of banking

- Banks transform shorter term deposits to longer term loans
- Maturity transformation gives rise to risks; but banks have to manage a lot more risks

“If you are in banking and lending, surprise outcomes are likely to be negative for you”


Nassim Nicholas Taleb



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## Question: What do insurers do?

1. Underwrite insurance policies (life insurance, car insurance, etc.)
2. Aggregate risk (risk pooling)
3. Manage investments (investments for generating cash flows matching insurance claims)
4. Offer advice (financial advice, investment advice, etc.)
5. Manage data (customer data, balance sheet and income statement data, policy data)
6. Offer customer service (call centres, web portals, applications)
7. All of the above 

# How do insurers make money?

- There are two sources of insurance revenue
  - Premia raised from liabilities
  - Investment asset returns

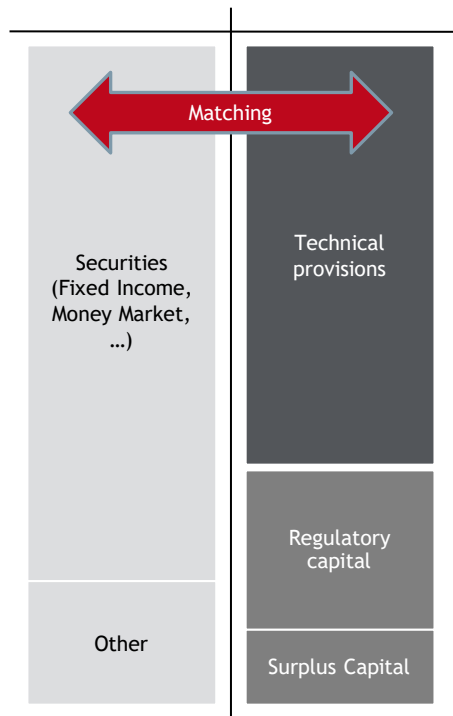


- In theory, the insurer uses the income generated from the issuance of liabilities to purchase assets
- The net return from this transaction (earnings received - insurance pay outs) is the insurer's profit

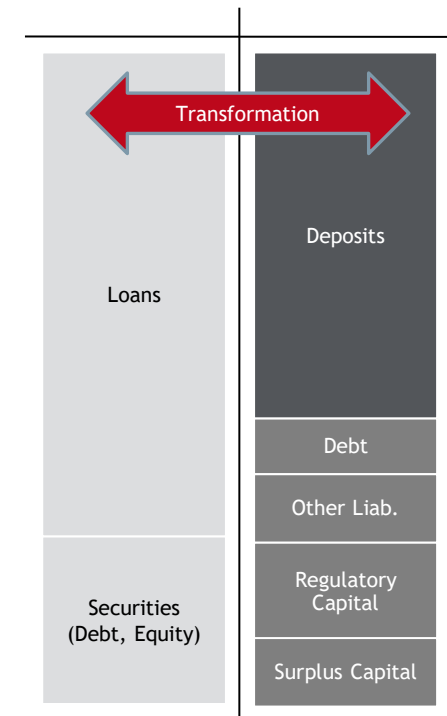
Insurers aim to generate revenues and minimise risk by pooling risk from individual policy holders and distributing it across a larger portfolio

# Unlike banks, insurers focus on maturity matching

- The structure of the balance sheet of an insurance company is relatively stable as the insurer's liabilities will not normally be accelerated through stress as the insured have an interest/ the option to cancel their policies and thus the funding will not cease
- ***The key objective is to closely match the maturities of assets & liabilities***



- The structure of the balance sheet of a bank is quite dynamic esp. ins stress events as the funding side of the balance sheet will begin to evaporate as soon as doubts over its solvency emerge as the depositors will withdraw their funds quickly and deposit at a safer place
- ***The key objective is to make money by transforming maturities between assets and liabilities***



# The Balance Sheet and Income Statement of an insurer is also unlike any other industry

## Insurance Balance Sheet

Cash	Policyholder liabilities
Financial investments	Insurance contracts
Fixed Income	+ Liabilities under contracts
+ Equities	
+ Other	Other
Non financial investments	
Properties	
+ Investments	
+ Other	<b><u>Total Liabilities</u></b>
Credit Assets	
Loans	Share Capital
+ Other advances	Share Premium
+ Credit Linked Notes	Retained Earnings
Goodwill	
<b><u>Total Assets</u></b>	<b><u>Total Equity</u></b>

## Insurance Income Statement

Net Insurance Premiums
Insurance Premium Revenue
- Reinsurance Premium Paid (Received)
+ Fee Revenue
Service Fees
Investment Income
<b><u>Total Revenue</u></b>
- Claims and policyholder benefits
+ Insurance claims recovered from reinsurers
+ Decreases (increases) in policyholder liabilities
+ Increases (decreases) in Fair Value of liabilities and other assets
-Total Operating Costs
<b><u>Net Profit before Tax (NPBT)</u></b>
- Tax
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+/- Exceptional Items
<b><u>Attributable Income</u></b>
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# There is no return if there is no risk (well, mostly)

## *Risk types undertaken by insurance institutions*

### Underwriting Risk

#### Underwriting Risk Definition

- “the risk of loss due to actual experience being different than that assumed when an insurance product was designed and priced.” (Bank of Montreal)

### Market Risk

#### Market Risk Definition

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### Other Risks

- Reputational risk
- Strategic risk
- Etc...

# Takeaways

## 3. Insurers primarily focus on maturity matching

- By pooling risks, insurers diversify their risk portfolio
- Unlike banks focusing on maturity transformation, insurers focus on maturity matching

“Avoiding danger is no safer in the long run than outright exposure.

Life is either a daring adventure or nothing.”

Helen Keller

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Any questions?

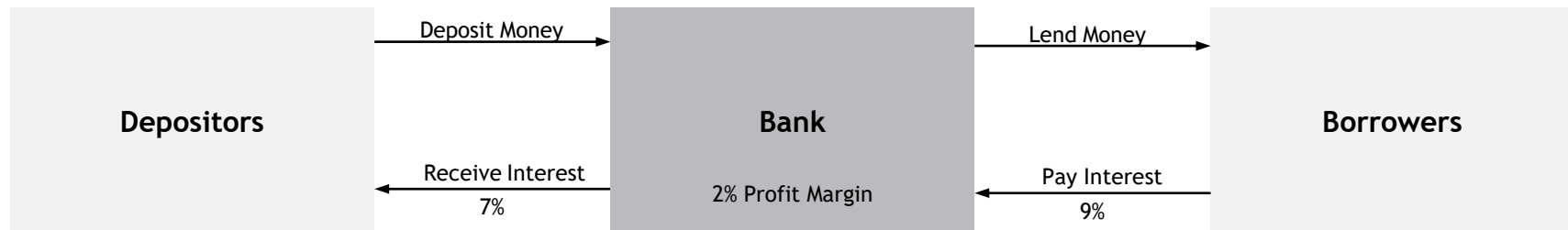
Q & A

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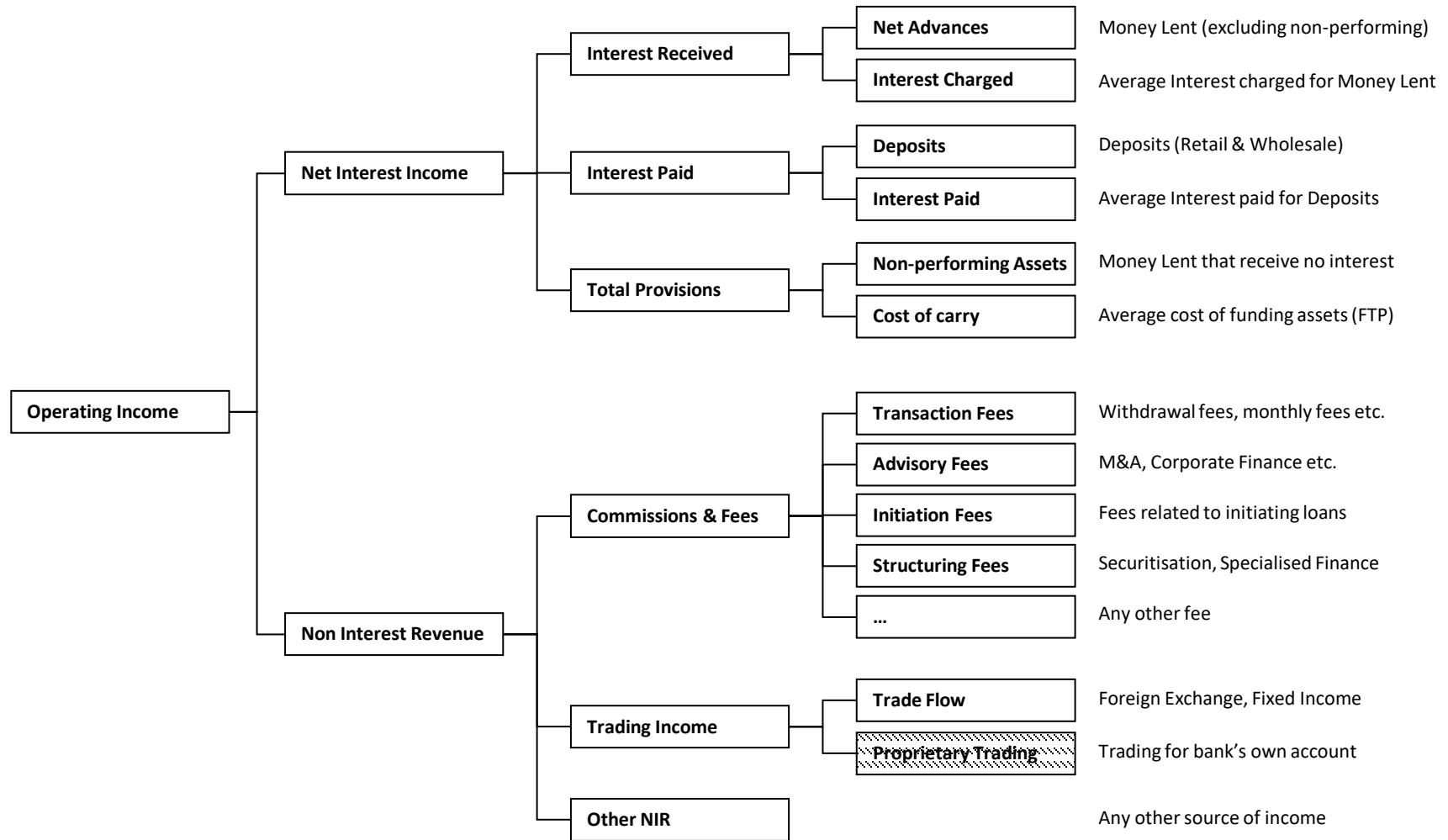
# How do banks make money?

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- In the simplistic example above, the bank makes a 2% profit margin on its balance sheet (assets and liabilities)

# How do banks make money? A net profit decomposition



# Thinking in terms of Retail, Wholesale and Investment banking assists in analysis problems and structuring solutions

<b>Retail Banking</b>	<ul style="list-style-type: none"><li>▪ Assets<ul style="list-style-type: none"><li>– Lend money to individuals and small businesses for houses, credit cards, overdrafts, personal loans etc.</li></ul></li><li>▪ Liabilities<ul style="list-style-type: none"><li>– Raise Retail deposits from individuals and small businesses</li></ul></li><li>▪ Transactions - provide banking services to individuals and small businesses:<ul style="list-style-type: none"><li>– Transaction processing (e.g. credit card payments, money transfers, payments etc.)</li><li>– Cash management (transfer of cash to ATMs, receipt of cash etc.)</li><li>– Foreign exchange (sale of foreign exchange to customers)</li></ul></li></ul>	<i>Key distinctions:</i> <ul style="list-style-type: none"><li>▪ <i>Size of client</i></li><li>▪ <i>Volume and value of transactions</i></li></ul>
<b>Wholesale Banking</b>	<ul style="list-style-type: none"><li>▪ Assets<ul style="list-style-type: none"><li>– Lend money to larger businesses and corporations (term loans, call loans, structured loans)</li></ul></li><li>▪ Liabilities<ul style="list-style-type: none"><li>– Raise deposits from larger businesses and corporations</li></ul></li><li>▪ Transactions - provide banking services to larger businesses and corporations:<ul style="list-style-type: none"><li>– Transaction processing (e.g. money transfers, supplier payments, credit card acquisitions etc.)</li><li>– Cash management (transfer of cash to ATMs, receipt of cash etc.)</li><li>– Foreign exchange (sale of foreign exchange to customers)</li><li>– Specialist services (provide guarantees, Letters of Credit, payment systems etc.)</li></ul></li></ul>	
<b>Investment Banking</b>	<ul style="list-style-type: none"><li>▪ Trade<ul style="list-style-type: none"><li>– Equities, commodities, interest rate products, exotic products</li></ul></li><li>▪ Structure<ul style="list-style-type: none"><li>– Derivatives, swaps, hedges, equity structures (e.g. BEE)</li></ul></li><li>▪ Advise<ul style="list-style-type: none"><li>– M&amp;A, Corporate Finance, structuring, strategy</li></ul></li><li>▪ Invest<ul style="list-style-type: none"><li>– Private equity, venture capital</li></ul></li></ul>	

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# How do insurers make money?

- There are two sources of insurance revenue
  - Premia raised from liabilities
  - Investment asset returns



- In theory, the insurer uses the income generated from the issuance of liabilities to purchase assets
- The net return from this transaction (earnings received - insurance pay outs) is the insurer's profit



# If we look at a Balance Sheet, there are three ways that insurers make money

## 1. Originate Liabilities

- An insurance contract is a liability on the insurer's balance sheet: an obligation to pay depending on the probability of a trigger event occurring
- Liabilities are generally valued based on the probability-adjusted Net Present Value (NPV) of future cash flows
- Liabilities generate revenue in the following ways:
  - They attract a premium
  - They require an upfront bullet payment

## 3. Manage Portfolio and Capital

- In addition to matching assets and liabilities, insurers can benefit by actively managing asset liability mismatches
  - Open positions in a mismatch where the risk-return profile is deemed appropriate
  - Hedged mismatched positions where risk-return profile exceeds the boundaries of the stated risk appetite
- In addition, insurers can use excess capital to invest in shareholder portfolios or to extend credit

## 2. Invest in Assets

- Insurers use the money raised from the liability side of the balance sheet to invest in revenue-generating assets
- The objective is for these assets to generate a higher return than the promised payout on the liabilities
- In the absence of active portfolio and capital management, the assets are 'matched' to liabilities on the basis of tenor and reference obligation
- Active management of the asset portfolio can result in better asset returns and investment alpha

# Just like we differentiate between Retail, Corporate and Investment Banks, it is useful to distinguish between Life and Non-life insurers

## Life Insurance

- Business model
  - Life insurance or life assurance is a contract between the policy owner and the insurer, where the insurer agrees to pay a designated beneficiary a sum of money upon the occurrence of the insured individual's or individuals' death or other event, such as terminal illness or critical illness
- Product characteristics
  - A life insurance policy is - if we ignore the probability of death during the coverage period - very similar to a common savings plan offered by banks
  - The only difference lies in the penalties that insurers impose when premium payments are not met, which makes life insurance contracts practically non-collable (low surrender rates)
- Actuarial challenges
  - Mortality (i.e. the death of the policyholder) is the biggest challenge in life insurance
  - However, mortality rates are well studied and their modelling does not pose a major challenge

## Non Life Insurance

- Business model
  - Non Life insurance includes shorter-term insurance contracts (such as property, casualty and auto insurance)
- Product characteristics
  - Non Life insurance contracts are shorter term, have more frequent and irregular cash outflows and can vary significantly based on the policy
- Actuarial challenges
  - The loss frequency (probability of loss events) and loss severity (magnitude of losses) are harder to estimate
  - The matching of asset and liability cash flows is also harder to manage and requires strong liquidity management skills

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# Credit Risk

## Credit Risk Definition

- “the potential that a borrower or counterparty will fail to meet its obligations in accordance with agreed terms” (Basel Committee on Banking Supervision, 2000)

## Sub-categories

- *Sovereign risk*: the risk of loss due to a government becoming unwilling or unable to meet its loan obligations
- *Transfer risk*: the risk of loss due to the possibility that funds in foreign currencies cannot be transferred out of a country
- *Counterparty Credit Risk*: the risk that the counterparty to a transaction could default before the final settlement of the transaction's cash flows
- *Concentration risk*: the risk of loss due to inadequately diversified portfolios of assets and/or obligations
- *Settlement risk*: the risk of loss due to the risk that a counterparty does not deliver a security or its value in cash as per agreement

## Examples

- Non-payment of mortgage loan
- Non-payment of bond coupon
- Non-payment of contractual cash flow
- Inability to repatriate bond coupons paid in another jurisdiction
- Non-payment of re-insurance claim

## Modelling approaches

- Scorecard (retail customers)
- Structural
- Simulation

# Market Risk

## Market Risk Definition

- “the risk of losses in on and off-balance sheet positions arising from movements in market prices” (Basel Committee on Banking Supervision, 1996)

## Sub-categories

- *Trading risk*: Risk due to the impact of changes in market risk factors (interest rates, equity prices etc.) on positions held arising from trading operations
- *Structural risk*: Risk due to the differing impact market risk factors (e.g. interest rates) have on the assets and liabilities generated by long-term structural positions
- *Investment risk*: Risk due to the impact of changing value of investments (including property portfolio)
- *Market liquidity risk*: the risk that one cannot easily offset or eliminate a position without significantly affecting the market price because of inadequate market depth or market disruption

## Examples

- Change in bond values due to changes in interest rates
- Change in bond values due to changing credit spreads
- Change in property portfolio value due to changes in the valuation of property investments
- Changes in portfolio value due to selling at mid-price minus a spread (or buying at mid-price plus a spread)

## Modelling approaches

- Parametric
- Monte Carlo
- Historical simulation

# Operational Risk

## Operational Risk Definition

- “the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events” (Basel Committee on Banking Supervision, 2004)

### Sub-categories

- *Process risk*: risk of loss due to inadequate or failed processes (e.g. failing to capture fraud)
- *People risk*: risk of loss due to people’s actions (e.g. fraudulent activities, health and safety violations, etc)
- *Systems risk*: risk of loss due to system failures (e.g. RBS system migration shut down)
- *External events risk*: risk of loss due to natural catastrophes and other events (e.g. terrorist attacks)
- *Legal risk*: includes, but is not limited to, exposure to fines, penalties, or punitive damages resulting from supervisory actions, as well as private settlements
- *Strategic and reputational risk*: usually excluded from definitions of operational risk

### Examples

- Goldman Sachs computers automatically buying options due to programming glitch
- Nick Leeson bypassing internal controls to execute trades
- Merrill Lynch data centre flooding
- Credit card theft, cloning and on-line transaction phishing

### Modelling approaches

- Basic and Standard approaches: operational risk as a percentage of gross revenues
- Advanced Modelling approaches: develop risk loss distributions from actual loss experience (bottom up data driven modelling)

# Liquidity (funding) Risk

## Liquidity Risk Definition

- “the risk that the firm will not be able to efficiently meet both expected and unexpected current and future cash flow and collateral needs without affecting either daily operations or the financial condition of the firm.” (Basel Committee on Banking Supervision, 2006)

## Sub-categories

Funding liquidity risk cannot be broken down into risk sub-categories. However, one can identify the following sources giving rise to it

- *Event driven sources*: ratings downgrades or other negative news leading to a loss of market confidence in a firm (e.g. limiting ability to refinance or to access capital markets)
- *Transaction and product driven sources*: unanticipated market movements or events, such as a bankruptcy, default, or ratings downgrade, could cause demand for additional collateral from counterparties
- *Market trends*: movement to more volatile funding sources, such as wholesale funds; internet banking, and depositors' ability to switch funds among accounts by electronic means etc.

## Examples

- Inability to roll over short term debt
- Bear Sterns' inability to satisfy all margin calls on its derivatives
- Northern Rock's customers queuing to withdraw deposits

## Modelling approaches

- Cash flow mismatch approach
- Liquidity gap approach
- Regulatory (short term and stable funding) approach (not modelling approaches per se)

# Insurance (underwriting) Risk

## Underwriting Risk Definition

- “the risk of loss due to actual experience being different than that assumed when an insurance product was designed and priced.” (Bank of Montreal)

## Sub-categories

- *Premium risk*: the risk that expenses plus volume of losses (incurred and likely to be incurred) for future claims (comprising both amounts paid during the period and provisions made at its end) is higher than the premiums received
- *Reserve risk* (part of premium risk) stems from the absolute level of the claims provisions that may be mis-estimated and/or the actual claims fluctuating around their statistical mean
- *Mortality risk*: related to insurance contracts where an increase in mortality rates is likely to lead to an increase in technical provisions
- *Longevity risk*: applicable to the class of insurance contracts where a decrease in mortality rates is likely to lead to an increase in technical provisions
- *Catastrophe risk*: stems from extreme or irregular events

## Examples

- A hail storm hits commuters on a busy Friday afternoon
- Life expectancy of the population increases dramatically
- A disease destroys wheat crops

## Modelling approaches

- Cash flow simulation: simulate the cash flows from all existing and new insurance products, accounting for lapses, surrenders and claims
- Parametric
- Reserving based



# Main differences between the respective regulatory capital standards for banks (Basel II/III) and insurers (Solvency II)

	Basel II / III	Solvency II
Scope	Banking, excluding insurance and other financial subsidiaries	Insurance (life and non-life) and re-insurance undertakings
Application	Framework with no legal force, potentially global application	A legal directive (binding in the European Economic Area)
Regulatory focus	Individual banking institutions	Individual policyholder
Structure	3 pillars - quantitative requirements come first	3 'pillars' - risk management and governance first
Approach	Mixture of fair value and amortised cost	Total Balance Sheet (fair valued assets and liabilities)
Quantitative coverage	Credit, Operational, Market; Liquidity principles based	Insurance, Credit, Operational, Market
Confidence Interval	Credit and Operational: 99.9%; Market: 99%	All: 99.5%
Diversification	Market risk only	Across all BSCR risk types, within market and default risk
Capital buffers	Capital conservation buffer; Countercyclical buffer; G-SIB	None
Capital eligibility	Common Equity Tier 1, Additional Tier 1 and Tier 2	Basic own funds, ancillary own funds
Leverage	Risk-insensitive leverage ratio	Embedded in capital requirement
Liquidity standards	Explicit (non-capital based)	Embedded in overall risk management system
Time perspective	Retrospective across risk types	Prospective: existing and new business within next 12 months
Risk measurement typology	Rules-based (AIRB approach also based on a pre-calibrated formula with internal modelling of PD, EAD and LGD only)	Standard Formula: several more internally estimated parameters; IM: principles-based



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