BANKING FOR BEGINNERS

(Everything you wanted to know but were too afraid to ask)

In this month's newsletter we hope to demystify the Financial Services sector in general and the Banking sector specifically. We will begin with a basic overview of the balance sheet items which we will use to help illustrate the concepts involved and the typical operating model.

As always, we will begin with the basics before moving to the more technical and prescriptive. In this way we hope that by introducing the underlying terminology we hope to provide you with a greater understanding of the sector.

For the purpose of this paper we will use the term bank in reference to **retail or commercial banks** (as opposed to investment banks, NBFI[1] or co-operative societies) which would ordinarily manage deposits and loans from personal and business customers. We will use the terms Bank and Financial Institution ("FI") interchangeably, although we note, financial institutions include many other financial intermediaries.

Debits and Credits

If you or I wish to open a bank, after having been granted a banking licence (from the BoE), we would be required to deposit some of our own funds (raise equity), accept deposits from (very trusting) customers, before using these funds to then provide loans to other customers and earn income on the difference between interest income earned and interest paid (the "net income margin").

While the deposits we hold remain our customers' assets they become the bank's liabilities as we are obliged to return these funds. We therefore classify this as a liability and a **credit,** which represent a source of capital.

Conversely the loans we extend are a borrower's liability but are a bank's assets as we have a claim on this loan and hence classify it as an asset and a **debit**.

The Capital Ratio

One of the most important concepts in banking, particularly for regulatory reasons, is the **Capital Ratio**. If we invested £80 to open a bank and then borrowed £920 (or accept as cash deposits) we would have then £1,000 to lend out in order to generate income and cover the cost of our debt and equity capital. The **equity/capital ratio** is now 8% and should not decline below this level as it represents a buffer to losses.

If the £1,000 loan were to default and the bank only received £870, the bank would then become insolvent and we would have insufficient funds to repay our depositors leading to a banking collapse. All our equity would also be lost.

[1] Non-bank financial institutions

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The belief that such an event may occur or even a lack of liquidity, can lead to a run on the bank as was experienced with Northern Rock in 2008. For this reason, banks must hold liquid assets equal to a portion of their current liabilities (**fractional reserve banking**). Retail deposits are also now insured under the FCSC[2] (in the UK) or by the FDIC[3] (in the US).

BALANCE SHEET - ASSETS

Cash and cash equivalents - comprise banknotes on hand, deposits held at the Central bank (BoE, the Fed, ECB) and deposits held at other financial institutions. These accounts facilitate daily operations, liquidity needs (operating outflows and repayments to depositors) and serve to meet legal reserve requirements.

Investments - are short term fixed income securities held to meet liquidity needs, earn interest and manage interest rate risk (discussed in more detail later). These may include time deposits, federal funds sold, repurchase agreements (Repos), Treasuries[4] or TIPS[5] (for US banks) or gilts[6] for UK banks. Other securities may include corporate and foreign bonds and various types of MBS[7].

For **IFRS reporting** purposes, banks must designate these securities as either held-to-maturity, available-for-sale or held for trading based upon the purpose for holding each security. This will impact the treatment of unrealised gains or losses (when interest rates change) and consequently net income or consolidated equity (Other Comprehensive Income).

Loans are the primary earning asset of most banks and are also designed to support other services offered (e.g. investment banking). While loans typically earn the highest yield before expenses, they also exhibit the highest risk, default rates and administration costs. Banks must also hold a **loan loss reserve** to cover future expected loan losses

[2] Financial Services Compensation Scheme
[3] Federal Deposit Insurance Corporation
[4] **Treasury bills**, notes and bonds are direct obligations of (debt issued by) the US Treasury. Bills are sold at a discount therefore all interest is price appreciation, while notes and bonds are issued at par and carry a fixed term and rate.
[5] **Treasury Inflation Protected Securities** are inflation indexed bonds, which pay a fixed semi-annual coupon rate but the principal adjusts for CPI every 6 months, therefore investors are protected against inflation and credit risk. Index-Linked Gilts are the UK equivalent
[6] **Gilts** are bonds issued by HM Treasury
[7] **Mortgage-backed securities** are backed by a pool of residential (RMBS) or commercial (CMBS) mortgage loans.

BALANCE SHEET - LIABILITIES

On-demand (transaction) accounts are a relatively attractive funding sources because (1) depositors are less sensitive to changes in interest rates and (2) rates paid are low. Therefore, stable or "core" deposits improve a bank's liquidity by reducing the potential for large-scale deposit losses.

Time Deposits (savings accounts) will pay higher interest rates but funds cannot be withdrawn until the fixed maturity date. A **certificate of deposit (CD)** is a larger term deposit account (fixed maturity and interest), which is also a negotiable instrument and can therefore be traded on the secondary market. Holders of TDs and CDs are also considerably more rate sensitive than owners of transaction accounts

Funds purchased/borrowed from central clearing banks (Fed, BoE) represent overnight obligations where one bank borrows clearing balances from another. Federal funds are primarily traded between banks to meet reserve deficiencies or offset reserve losses due to unanticipated loan demand and deposit outflows.

Repurchase agreements[8] where the maturity may range from overnight to several weeks.

LIBOR (or Eurodollar) liabilities are defined as US dollar-denominated deposits placed with banks located outside the US.

Long term **subordinated debt** (notes or debentures) of the bank are not insured and therefore tend to reflect equity-like characteristics.

Contingent liabilities are off-balance sheet liabilities and are contingent upon a future event occurring. Examples include: undrawn loan commitments; bills of exchange (a bank guarantees payment if the primary obligor fails to pay); guarantees and performance bond commitments (a bank guarantees payment if the primary obligor fails to perform an action).

BALANCE SHEET - EQUITY CAPITAL

Just like other companies, **equity** comprises common and preference shares outstanding at par value as well as a share premium reserve (if shares have been issued in excess of par) and retained earnings (cumulative net income less dividends). Significantly if a bank designates any security as available-for-sale (as discussed above), it must also include unrealised gains or losses as equity.

INCOME STATEMENT

The primary source of income is **net interest income** (interest earned less interest paid) less loan loss expense. However, because interest margins are low (particularly for low risk borrowers) most institutions wish to enhance revenue with fee and commission income from derivatives, trade finance, investment banking, investment management and proprietary trading (buying and selling securities on their own account).

TYPES OF RISK

Financial service providers face both financial and non-financial risks.

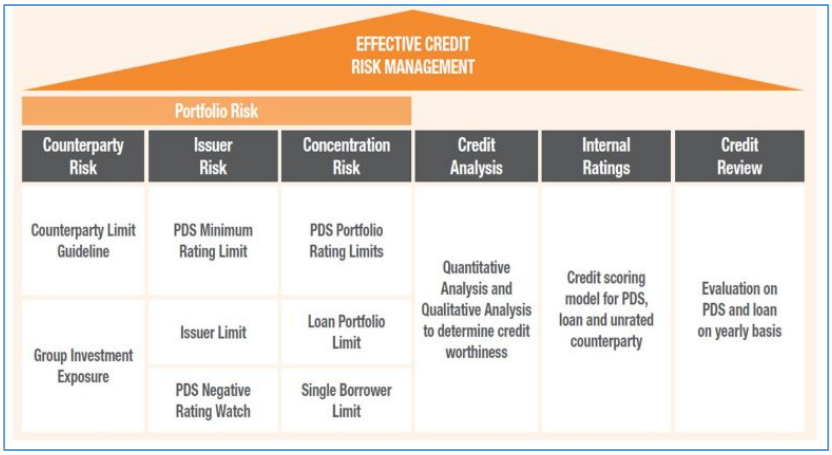
[8] **Repos** represent the sale of securities under an agreement to repurchase them later at a predetermined higher price. Similar to funds purchased, except that funds are collateralised; therefore, the repo rate is usually lower than the rate on a comparable unsecured federal funds transaction.

Credit Risk

Credit **default risk** is the primary source of bank failure and occurs when a borrower fails to make an obligated interest and principal payments on time. While different borrowers display different credit risk, loans exhibit the highest default rates while federal government and agency securities very low rates.

Credit risk is multifaceted as we must also consider the **transaction/asset type**. While longer transactions carry greater risk at the outset, risk can change during this period and may actually decline (e.g. an amortising loan). When considering derivative trades, one must consider the trade profile and the maximum **potential exposure** ("PE"), which often reflects the anticipated change in mark-to-market movement (over the life of the trade) plus the estimated replacement cost of the contract if there is a default (10-day VAR)

Collateral is also treated differently depending on whether it is securing loan or market exposure. Some transactions are inherently secured / collateralised (self-securing) such as stock borrowing and lending[9], repos[10], trade finance (where the underlying traded goods are held as security). Banks may also require a **parental guarantee**, which legally obliges the parent to repay the debt of a subsidiary.



Credit Risk Ratings

All customers to which financial institutions extend credit must be rated by reference to an internal rating model or an **external rating provider** (S&P, Moody's, Fitch). Individual legal entities within the customer group must be rated, either using the group rating (if parental support is provided) or on a stand-alone.

Parent guarantees are particularly important if multinationals trade in emerging markets and the Group's rating exceeds the EM country rating. If a facility is guaranteed, the rating of the guarantor is used. Tangible security or collateral cover is not considered. The aim of rating the counterparty is to derive an accurate estimate of the **probability of default** (PD) and **loss give default** (LGD). Bond spread, five-year CDS spread and share price data can also be used.

[9] **Stock borrowing & lending (SLB)** - a FI will lends funds against securities to a prime brokerage client with a relevant haircut/margin, e.g. for every $100 of securities provided, $95 cash will be lent, security driven

[10] **Repo** - similar to a repo except that the FI (cash lender) actually owns the securities received as collateral and legally required to resell them back to the "cash borrower" at maturity, cash driven

Sortable Table Key	Moody's	Fitch	S&P
Highest grade credit	Aaa	AAA	AAA
Very high grade credit	Aa1, Aa2, Aa3	AA+, AA, AA-	AA+, AA, AA-
High grade credit	A1, A2, A3	A+, A, A-	A+, A, A-
Good credit grade	Baa1, Baa2, Baa3, Baa4	BBB+, BBB, BBB-	BBB+, BBB, BBB-
Speculative grade credit	Ba1, Ba2, Ba3	BB+, BB, BB-	BB+, BB, BB-
Very speculative credit	B1, B2, B3	B+, B, B-	B+, B, B-
Substantial risks - In default	Caa1, Caa2, Caa3, Ca	CCC, CC, C, RD, D	CCC+, CCC, CCC-, CC, C, D

CREDIT RISK MITIGATION

Credit subordination

New or existing lenders do not wish to be in a materially worse position (subordinated) than other lenders or credit providers to the same borrower. This includes **structural subordination** which occurs when a lender holds credit risk to riskier entities within a group, such as non-operating companies. If the borrowing entity does not hold assets and/or generate income, the lender will be in a weaker credit position than those who have lent funds to a operating entity within the Group.

If exposure is to the **holding company**, which often acts as the Group's listed entity and/or central treasury this is acceptable if other financiers are in a similar position and have also received upstream guarantees of earnings and assets. Riskier debt (junior/subordinated) are often held by NBFI's (non-bank financial institutions).

Collateral

With the exception of covenant-lite facilities, security is most often sought from borrowers who either do not hold an externally rating or are non-investment grade (NIG). Collateral is measured by the **loan-to-value ratio** ("LTV") and insurance cover is obtained to cover any potential weaknesses in holding security.

For investment-grade credits, parental guarantees or a Letter of Comfort (for major groups) are usually held for smaller subsidiaries, while a legally-enforceable parental guarantee is generally obtained for NIG issuers.

Some creditworthy multinationals prefer to not issue formal documents to evidence support (they may be considered an off-balance sheet liability which would have to be disclosed) therefore a borrower would have to consider the importance of that entity in the broader Group. Verbal assurances can also be provided.

Collateral - lending book

Collateral may include: a **fixed and floating charge**[11] (or "debenture") over all of the entity's assets; a registered charge over real estate (mortgage) and/or hold documents of title. The value of each asset must also be discounted on the basis that they may be sold on a non-going concern (forced-sale) basis. Different assets will also incur different weightings, e.g. commercial property will generally have an LTV of 60%.

[11] **Fixed and floating charges** allows a creditor to take security over a debtor's entire asset base. A fixed charge will list be a charge over a specific asset (the creditor cannot sell it), while a floating charge includes assets that continually flow through the business (working capital, cash) therefore a creditor can be dispose of it in the ordinary course of business until such time as the charge is crystallised when a receiver or administrator is appointed

Collateral - trading/markets book

Collateral to cover the potential exposure of trading positions are generally required to be far more liquid (cash, government securities and IG corporate bonds) and should also have low correlation with the counterparty and the exposure.

Financial Covenants

Financial covenants for multi-period club/bilateral/syndicated facilities are used to monitor the financial health of a borrower. For trading exposures, a **standard ISDA[12] agreement** would include a ratings downgrade clause, a cross-default / cross-acceleration clause, a **CSA[13] threshold** and break clauses which are negotiated with clients prior to commencement of trading. In practice, **break clauses** are rarely exercised but allow the lender to recognise a shorter exposure. E.g. a bank provides a 10-year derivative limit, with the right to terminate every three years (3-year rolling break clause).

Third Party Guarantees

If exposure for a client is guaranteed by a third party (such as another bank or export credit agency) the risk to the guaranteeing third party is recorded against the Guarantor as a contingent (secondary) risk category. Exposure against the underlying customer would be shown as nil.

Other

Other techniques and strategies that can be used to reduce credit risk include:

- **Limiting exposure** - limit lending/derivatives exposure to any one debtor or counterparty
- **Mark to market** - interim cash flow payments to ensure credit risk never exceeds a certain level
- **Payment netting** - if two parties have credit risk to each other, they can net the balance between them to determine which side has the greater obligation
- **Closeout netting** - all the transactions b/n the bankrupt and CP are netted to determine the overall exposure
- **Credit derivatives (CDS)** - allows risk to be transferred to another (who will take a long position)

Liquidity Risk

Banks naturally require liquidity to cover unanticipated deposit losses or new loan demands. **Treasury bills** are highly liquid and can be quickly sold in a secondary market at a predictable price, while **real estate** takes longer and has both higher transaction costs and significant idiosyncratic risk. Liabilities can thus provide liquidity if a bank can readily issue new debt at reasonable interest rates.

Interest Rate Risk

Interest rate risk refers both to interest rate sensitivity of assets and liabilities and the duration gap (see below). If the rate sensitivity difference is a large proportion of assets, a bank's risk can be substantial. Banks also are required to use **asset liability models** in order to simulate changes in interest rates and the effects on earnings and capital.

[12] International Swaps and Derivatives Association
[13] Credit Support Annex

Leveraged Duration Gap

While retail (personal) customer deposits are more stable than inter-bank borrowings they are primarily short term while assets (loans provided) are primarily longer term therefore, banks are subject to asset-liability **maturity mismatch**. Given the variation in duration this results in significant interest rate risk impacting the market value of the bank's balance sheet. For this reason, banks prefer to hold short term assets in their **security portfolio**.

Capital Risk (Capital Adequacy)

The overall solvency risk of a bank is measured by its capital risk. A bank that assumes too much risk can become insolvent and fail. **Capital risk** is thus closely associated with asset quality and rate sensitivity mismatches, hence a bank with few risky assets needs less equity to protect against losses, while a bank with more risky assets should operate with a greater buffer. The same holds for banks with high or low interest rate risk. Measures of capital or solvency risk thus compare long-term debt and equity to total assets or to risk assets.

VALUE AT RISK (VAR)

Value at Risk is the most common metric of risk for financial institutions. It is also the most widely misunderstood.

VAR maybe defined as the minimum potential loss ($ or %) over a given time period (1-day, 1 week, month etc) with a given level of probability (5% or 1%). For example, if one week 5% VAR = $100m, there is a 5% chance that the value of the asset/portfolio will decline by more than $100m over a one-week period. Alternatively, we are 95% confident that weekly losses will not exceed $100m.

Because VaR is a statistical approach the primary disadvantage of the measure is that it assumes that exposure or portfolio returns are normally distributed as a function of **market risk factors** (price, rate, volatility, correlation).

In order to overcome these weaknesses (e.g. correlations increase during periods of market stress) a **Monte Carlo simulation** approach may be used which models potential value changes for a defined time horizon over a large number of possible scenarios.

This results in thousands of simulations, each one reflecting a different potential outcome. When all of the simulations are run, they are then listed in order of the largest gain to the largest loss and a cut-off point is determined based on the selected confidence level. The loss at that cut-off point is the VaR amount.

Back testing is then used so that actual daily profits and losses are compared with calculated or predicted VaR exposures in order to assess the quality and accuracy of the VaR model.