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**Introduction**

Asset Liability Management (ALM) plays a critical role in weaving together the different business lines in a financial institution. Managing liquidity and the balance sheet are crucial to the existence of a financial institution and sustenance of its operations. It is also essential for seamless growth of the balance sheet in a profitable way.

In recent times, even large multinational financial institutions were in a deep liquidity crisis and in dire need of external intervention for survival. The practical importance of ALM and Liquidity Management had been somewhat underestimated. Even managements of large institutions, regulators, and observers saw how well-reputed firms and trusted institutions folded up and were not able to find a way out of the deep liquidity crisis. This resulted in regulators attaching high importance to new measures needed to ensure a sound liquidity management system. Consequently, regulators have enhanced and in some geographies, thoroughly revamped, regulatory oversight on ALM and liquidity management.

This whitepaper seeks to cover the fundamentals of Asset Liability Management, moves on to emerging industry trends and then goes on to explain the importance of using an analytical framework and how Oracle solutions help address emerging regulatory and management expectations in this space.

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**Figure 1:** A broad scope of what managing a balance sheet typically involves in a commercial bank
Risk Types Typically Managed in ALM

In this paper, we are broadly looking at Liquidity Risk and Market Risk. Liquidity Risk is defined as the risk of not meeting the expected and unexpected current and future cash flows and collateral needs effectively. This is required to be done without affecting the financial condition or daily operations of the firm. Market Risk broadly consists of interest rate risk and foreign exchange risk. Please refer the box below for a formal definition of Market Risk and its components. Asset Liability Management essentially consists of managing the above referred to risks in an effective and efficient manner. The ALM function normally derives its charter from the Asset Liability Committee (ALCO) framework, which sets out the scope of the ALM function, the risk types that come under its purview and the acceptable levels of risk appetite. Though the primary focus of ALM is managing balance sheet risks, the ALM function increasingly tends to focus on balancing profitability while managing risks, and in the process pro-actively seeks to guard the bottom-line and even maximize profitability.

Figure 2: The different risk types encompassed in ALM and Liquidity Risk Management
Bank within a Bank

The various lines of business and the financial products offered within a financial institution invariably have a common touch point within the bank, as the Group Treasury and ALM are responsible for managing the cash flows within the institution. Viewed from an economic perspective, financial institutions are essential intermediaries that create and absorb liquidity in the financial system. The financial resources undergo a maturity transformation as they pass in and out of the bank. The maturity transformation is influenced by the market demand and supply, the policies and appetite of the financial institution and the market segments that the bank deals with. The process of financial and maturity transformation inevitably results in the financial institution undertaking significant maturity mismatch risk, interest rate risk and foreign exchange risk apart from credit risk. The core functions of ALM and Liquidity Risk Management enable financial institutions to manage and mitigate the risks within accepted levels. Notably, financial institutions are increasingly inclined to carry out this process profitably and seek to use optimal allocated capital.
Interest Rate Risk

Financial institutions borrow and lend for different terms and maturity tenors. Apart from equity and retained earnings, the average maturity of borrowings and liabilities tend to be on the short to medium term buckets. On the asset side, the maturity tends to be across a broad range from overnight to as long as a home mortgage could run. A financial institution is normally required to participate in lending short, medium and long-terms depending on the nature of financial products on offer and what segment of the market the bank operates within.

Re-pricing Risk: The assets and liabilities could re-price at different dates and might be of a different tenor. For example, a loan on the asset side could re-price at three-monthly intervals whereas the deposit could be at a fixed interest rate or a variable rate, but re-pricing half-yearly. Even if the loan and deposit re-price similarly, the re-pricing dates do not synchronize.

Basis Risk: The assets could be based on LIBOR rates whereas the liabilities could be based on Treasury rates or a Swap market rate.

Yield Curve Risk: The yield curve has the potential to change at different points for differing terms. In other words, the changes are not always parallel but it could be a twist around a particular tenor and thereby affect different tenors differently.

Option Risk: The borrowers sometimes (or many times) have the ability to prepay their borrowings based on contractual terms and conditions. Loan contracts might have caps, floors, teaser rates, prepayment options and so on. Exercise of options impacts the financial institutions by giving rise to premature release of funds that have to be deployed in unfavorable market conditions and loss of profit on account of foreclosure of loans that earned a good spread.
ALM Core Functions - Managing Interest Rate Risk, Structural Gaps and Liquidity

The ALM core function consists of managing maturity gaps and mismatches while managing interest rate risk within the overall mandate prescribed by ALCO. The key responsibilities and some typical actions initiated by the ALM team are dealt with in the following paragraphs:

1. Managing Structural Gaps

In a financial institution with a mature ALM function, this is arguably the most critically and continuously monitored aspect, since the ALM Managers seek to manage the structural gaps in the Balance Sheet. While liquidity management focuses typically on short-term time ladders, the structural gap management shifts the focus on time ladders more than a year. This aspect of ALM stresses the importance of balancing maturities as well as cash flows on either side of balance sheet. It strategizes dynamically on balancing the gaps, issuing timely guidelines to adjust focus on ‘right’ product types and tenors, and actively involve ALCO in this process.

a. Static Gap: The ALM function takes into consideration assets maturing in short, medium and long time ladders and seeks to balance it vis-à-vis liabilities maturing across short, medium and long term ladders. The gaps reports typically point to funding gaps and excess funds at different points in time. The challenge with the ALM function is that the gaps are dynamically evolving and need continuous monitoring as the balance sheet changes every day.

b. Duration: Duration is considered as a measure of interest rate sensitivity. However, for our immediate purpose, let us set aside interest rate sensitivity. Macaulay's duration is traditionally accepted as a good measure of ‘length’ of portfolio or a measure of center of gravity of discounted cash-flows over life of an asset (or liability). It’s common practice to measure duration of portfolio for different product types as well as on an overall portfolio level. It’s useful to simulate how duration of portfolio will be affected by future events.

c. Dynamic Gap: It is normal practice to rely on dynamic gap reports to simulate future gap positions for assumed business volumes and exercise of options (e.g., prepayments). In addition to proposed new volumes, prepayment transactions and assumed deposit roll-overs, the ALM manager would like to include a proposed hedge transaction.

Let us assume that an international bank ABC averagely accumulates home loans to the tune of $50 MN in a month and the loans are predominantly linked to variable Swap Offer Rates (SOR). The bank likes to hedge its risk by entering into a swap transaction in order that it is less prone to vulnerable interest rates. The bank will enter into a $50 MN swap with another financial institution, so by design it receives SOR-linked cash-flows and pays fixed as part of the swap transaction. In this case, our international bank ABC would like to visualize what its forecast gap positions and interest rate sensitive positions will look like assuming that it would enter into a swap transaction say, one month from now, by using a good ALM solution.

d. Long-Term Assets / Long-Term Liabilities Ratio: ALM practitioners prefer to focus on the ratio of assets and liabilities exceeding one year and often want to set acceptable limits around this. Where there are operative limits, the ALCO meetings will usually monitor the ratio, and the institution constantly endeavors
to stay within a comfortable level around this limit. This along with liquidity gaps help to bring in any
imbalances and help maintain a structurally sound balance sheet.

2. Managing Interest Rate Sensitivity
A financial institution typically relies on certain measures to evaluate and manage interest rate sensitivities. We deal with them below:

a. Interest Rate Sensitivity Gap Reports: The ALM function seeks to monitor interest rate sensitivity by generating so-called interest rate sensitive gap reports, which provide a cash flow laddering based on re-pricing profile and frequency of interest rate sensitive assets and liabilities.

b. Duration Measures: Modified duration seeks to measure net present value of a loan portfolio (or simply bond price) under different interest rate conditions. For example, one seeks to analyze by how much percentage the bond price will be affected by a basis point up and down move in interest rates. The resulting outputs help us determine the modified duration or simply interest rate sensitivity of the net present value or bond price.

c. DV01 or PVBP: This one is arguably the most popular measure among ALM practitioners. DV01 seeks to calculate the dollar value by which the market value is affected by a basis point expected movement in the interest rates. It’s common to find leading banks setting internal limits around this measure to manage interest rate risk in the balance sheet.

d. Net Interest Income (NII) Sensitivity: Financial institutions attach much importance to assessing the impact of interest rate changes, new business, change in product-mix and roll-over of deposits on net interest income. Income statements that allow for comparison of net interest income under different scenarios are immensely helpful in understanding the impact of mild market movements and shocks on the income statement as well as balance sheet.

3. Managing Liquidity
Typically, the ALM function seeks to generate daily gaps on short-term ladders and ensures that cumulative gaps operate within pre-set limits. Of course, managing liquidity gaps alone is not adequate. A well managed liquidity function will include liquidity contingency plan, liquid asset buffers and setting liquidity policies and limits in tune with level of risk that the management believes is acceptable and manageable.

4. ALCO Reporting
In most banks, ALCO meets at pre-determined intervals and the agenda is usually pre-determined. In order that ALCO meetings are effective, the ALCO pack (comprehensive in many cases) is distributed in advance and reviewed in the meeting. The reports include some of what is listed above and certain other reports. The ALCO function is critical to ALM function and serves as the reviewing and approving authority for several key decisions including balance sheet structure, gap analysis, capital adequacy ratios and above all pro-active management of Balance Sheet.

5. Funds Transfer Pricing (FTP)
A healthy FTP mechanism is part of a healthy ALM solution FTP helps to ensure the demarcation between market risk and credit risk by passing on the appropriate cost of funds to respective owners of risk. In recent years, focus has been placed on not just the base FTP, but also on including FTP add-ons like
liquidity premium and similar adjustments. Financial institutions appear to be reviewing their FTP practices including the basis for liquidity premium both as a result of process improvement and increasing regulatory interest.

**Building Blocks of Asset Liability Management**

In this section, we discuss the building blocks of an ALM solution from an Oracle perspective while observing those aspects that the institution must address functionally as part of their ALM solution.

![Diagram of Key Components of Oracle Financial Services ALM Solution](image)

**Figure 5: Key Components of Oracle Financial Services ALM Solution**

1. **Cash-flow Engine**: A significant aspect of ALM consists of forecasting and generating future cash flows based on historical data and assumed scenarios. A time tested cash flow engine that’s capable of modeling a wide range of financial products on and off the Balance Sheet is a crucial part of an ALM solution. Oracle’s solution provides extensive amortization modeling capabilities, the flexibility to define and associate yield curves and even associate unique payment schedules and re-pricing schedules at an instrument level.

2. **Unified Data Model**: Having a pre-defined, financial products-specific and time tested analytics data model accelerates implementation by providing a head-start. Further it helps leverage and makes much wider use of data for a wider range of analytics apart from ALM. This is useful especially considering that enterprise-wide time series data at a granular level is stored in our analytical applications over time. Oracle has taken this seriously and we facilitate a whole range of financial analytical applications, including ALM, FTP, Profitability, Regulatory and Economic Capital plus Balance Sheet Planning, all running on top of integrated unified data model.
3. Market Rates and Economic Scenarios: Define external economic indicators as well as define interest rate scenarios and forecast rate movements. Maintain economic assumptions separately to quickly develop alternative forecasts and stress test the Balance Sheet under alternative environments.

4. Deterministic and Stochastic Analysis: There are broadly two approaches to making ALM forecasts. In the deterministic approach, the user makes explicit assumptions about interest rate movements and forecasts interest rates and currency exchange rates for various scenarios and different term points. In Stochastic scenario, the forecast rates are modeled using Monte Carlo simulation method and the output is then generated at desired confidence intervals. The modeling framework additionally allows for simulating the impact of hedging strategies and in forecasting what a gap report generated at a future point in time will look like.

5. Behavior Modeling: The contractual behavior alone is not adequate in modeling the Balance Sheet. It is essential to take into consideration behavioral maturity based on historical observations in order that cash flow predictions are more reliable and in tune with demonstrated behavioral trends. This applies to core and non-core parts in current and savings accounts, deposit roll-over assumptions and prepayment assumptions. It is also possible to develop a model for behavioral trends using certain additional and optional infrastructure components. This tends to be a separate and more involved stream of the project.

6. Powerful Analytical Reporting: Oracle Business Intelligence is pre-integrated with the analytical data model referenced above in order to analyze and report the cash flow outputs and financial element calculations. A comprehensive, pre-built set of reports is available, including static, dynamic and interest rate sensitive gap reports, market value and economic value added reports, duration reports, NII reports and stochastic reports, and liquidity risk reports.

Emerging Trends in Liquidity Management

Liquidity Management Guidelines
Regulators in many countries are attaching increased significance to Liquidity Management and its impact on ALM and funds transfer pricing. There is an increasing realization that while different types of risks and exposures may have contributed to the financial crisis in many ways, the liquidity, or lack thereof, contributed significantly to the closure of financial institutions. There is a school that believes that institutions like Lehman might have survived if they were provided liquidity and an extended life.

Regulators like FSA were early to come up with guidelines outlining a new liquidity framework. The new regulatory framework includes scenarios and assumptions, revised and new guidelines for liquidity buffers and new reports to be furnished by the banks. The revised approach is focusing not just on how things are working out in one bank but the regulators seem to be increasingly interested in observing potential systemic risks and pockets of liquidity concentration in order to anticipate and stall risk events before they snowball into a crisis.

The liquidity management framework impacts the assumptions underlying FTP too. It is common practice in many banks to include a liquidity premium on top of base FTP. Financial Institutions are now attaching importance to determining liquidity premiums and reviewing practices. Oracle Financial Services FTP Solution provides unmatched flexibility in calculating and assigning liquidity premium, basis risk and other similar FTP add-ons on top of base funds transfer price.
The Dodd-Frank Act has dealt with the ‘too big to fail’ syndrome in a manner that going forward the inclination is to let banks liquidate their affairs in an orderly fashion rather than let governments rush to bail them out on taxpayers’ money. This implies that despite the costs associated with increasing liquidity buffers, there is some irrefutable wisdom in ensuring liquidity buffers for bad days for prolonged and sustained stress scenarios.

The liquidity framework requires that financial institutions have a robust ALM and Liquidity Risk Management system and that the banks comply with the new regime in an efficient and timely manner.

**Capital Requirements**

The revised capital regulations seek to address liquidity from a short-term and long-term perspective. The revised rules require banks to hold enough capital to survive a 30-day severe stress scenario. This rule is “observational” until 2015 and will be watched for any unintended consequences. The long-term liquidity is sought to be addressed by a new set of requirements that seek to align the assets and liabilities. The net stable funding ratio, though back in drawing board, will re-appear in some updated form though its application will have to wait until 2018.

**Stress Testing**

Stress testing on a periodical basis is crucial to establish resilience levels and simulate effectiveness of remedial measures in the event of a crisis. A Liquidity Risk Management solution paves way for shocking the balance sheet under various scenarios and assumptions. Oracle’s Liquidity Risk Management Solution allows for iterating over Balance Sheet snapshots and stresses them back and forth for various conditions. This enables re-validating liquidity contingency plans and fine tune those as called for. The important part of stress testing is to ensure that assumptions are fine tuned in line with anticipated and changing realities and taking into account the liquidity buffers under stressed conditions.

Oracle’s Liquidity Risk Management solution allows for simulating ‘Business As Usual’ base scenarios and applies scenarios on top of BAU to stress the Balance Sheet. ALCO stipulations and regulatory stipulations have made it essential for businesses to simulate a run on the bank and assess the liquidity in a stressed scenario. The frame-work clearly enables to a bank to visualize taking recourse to liquid asset buffers and rehearse the application of liquidity contingency planning.

**Behavioral Modeling and Assumptions**

Behavior modeling and behavioral assumptions are being re-visited by some financial institutions in order to validate and test the continued relevance of historically used behavioral assumptions. Behavioral assumptions address cash flow assumptions underlying core and non-core portions in non-maturity or indeterminate accounts, deposit roll-overs and prepayment events. The reliability and accuracy of ALM reports as well as their dependability for purposes of forecast gaps, projected cash-flows and Balance Sheet planning depend to a reasonable extent on assumptions underlying those aspects.

Oracle’s Financial Services Analytical Applications provide the capability to re-validate and fine tune existing models, and help establish a new model in order to make behavioral assumptions.

**Counterbalancing**

A counterbalancing strategy consists of one or multiple counterbalancing positions covering the fire sale of marketable and fixed assets, creation of new repos, rollover of existing repos and raising fresh deposits or borrowings. The impact of the counterbalancing strategy on the liquidity gaps is assessed and
further refined. Additionally, multiple counterbalancing strategies are allowed to be defined on the same baseline liquidity gap report thereby enabling banks to identify and adopt the optimal strategy as part of its contingency funding plan.

The Role of Balance Sheet Planning

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Figure 6: Functional Scope of Balance Sheet Planning

It is notable that a robust Asset Liability Management eventually becomes the foundation for comprehensive Balance Sheet Planning. It is possibly not an exaggeration to state that the practices on ALM, FTP and Profitability planning all ultimately reflect in Balance Sheet Planning and this could potentially change the way businesses approach planning, thereby leading to pro-active and profitable management of the balance sheet. More than ever the constituents in financial institutions are increasingly aware of the risk weighting of assets and capital requirements for incremental business, and they recognize that it pays to focus on maximizing profitability while optimizing capital requirements. The management in the bank would like to ensure that beyond the capital planning and ALM teams, the stakeholders in each line of business are able to appreciate the cost of capital required for respective lines of business and how it is impacting the bottom-line ultimately.

Oracle Financial Services Balance Sheet Planning solution helps fulfill the need for extending ALM income forecasts and Balance Sheet projections into enterprise planning activities, thereby rendering a consistent picture of forecasts across the institution. The integration of planning solutions with the risk and performance management framework is a major milestone in this direction. Oracle's solutions help bring together ALM, FTP, Profitability and Balance Sheet Planning in an integrated framework that leverages commonness in data, functional processes and reporting scope.
Oracle Financial Services Analytical Applications

Oracle Financial Services Analytical Applications is a comprehensive and integrated suite of applications designed to help financial institutions address new and emerging requirements across the domains of Risk, Finance, Compliance and Customer Insight. The suite shares a common account level data model and applications architecture.

![Shared Components Across Applications](image)

Figure 7: Shared Components Across Applications

Oracle Financial Services Analytical Applications enable financial institutions to measure and meet risk-adjusted performance objectives, cultivate a risk management culture through transparency, and lower the costs of compliance and regulation.
Practices and Emerging Trends in Asset Liability Management and Liquidity Risk
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