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This report aims to critically analyse the three common sources of banking risk (Interest risk, Liquidity risk and Operational risk) with a cohesive concentration towards the regulatory infrastructure of sources, measurements and management, that control, mitigate and cause these risks. The study will use HSBC Holdings PLC as the prime expletory focus adopting these risks in their work-place banking activities. Part B of this study will take into consideration all three risks and associate them with fraud risk (specific to HSBC) in order to forecast (or identify) three fraud scenarios that are assumed to have a higher likelihood of fraud risk exposure through the use of a fraud risk assessment framework.

**Note:** All HSBC findings are based on actual numbers, tables or/and figures derived from HSBC Annual Reports and Accounts for 2018 (released in 2019)

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Table of Contents

[**1. (Part A) Introduction into Interest Rate Risk** 2](#_Toc8660591)

[**1.1 IRR HSBC Overview** 3](#_Toc8660592)

[**1.2 Sources of IRR** 3](#_Toc8660593)

[1.2.1 Primary Sources of IRR 3](#_Toc8660594)

[**1.3 Measurement Models** 4](#_Toc8660595)

[1.3.1 Repricing 4](#_Toc8660596)

[1.3.2 Maturity 6](#_Toc8660597)

[1.3.2 Duration 7](#_Toc8660598)

[**1.4 Management** 9](#_Toc8660599)

[1.4.1 Financial Tools (Derivatives) 9](#_Toc8660600)

[1.4.2 Matching and Smoothing 9](#_Toc8660601)

[1.4.3 Asset and Liability Management (ALM) 10](#_Toc8660602)

[**1.5 Regulatory Requirements** 11](#_Toc8660603)

[**2. Introduction into Liquidity Risk (LR)** 13](#_Toc8660604)

[**2.1 HSBC Liquidity Risk Overview and sources** 13](#_Toc8660605)

[2.1.1 Internal LR sources 14](#_Toc8660606)

[2.1.2 External LR sources 14](#_Toc8660607)

[**2.2 Measurements** 15](#_Toc8660608)

[2.2.1 Ratio Analysis 15](#_Toc8660609)

[2.2.2 Balance Sheet Analysis (BSA) 16](#_Toc8660610)

[2.2.3 Maturity Mismatch Approach (MMA) 16](#_Toc8660611)

[2.2.4 Stress Test 16](#_Toc8660612)

[**2.3 Management** 17](#_Toc8660613)

[2.3.1 Management regulatory process 17](#_Toc8660614)

[**2.4 Liquidity Trap (LT)** 18](#_Toc8660615)

[**3. Introduction into Operational Risk (OR)** 20](#_Toc8660616)

[3.1 OR Plausible Causes 20](#_Toc8660617)

[**3.2 OR Source** 21](#_Toc8660618)

[**3.3 Measurements** 22](#_Toc8660619)

[3.3.1 Basic Indicator Approach (BIA) 22](#_Toc8660620)

[3.3.3 Advanced Measurement Approach (AMA) 23](#_Toc8660621)

[**3.4 Management** 25](#_Toc8660622)

[**4. (Part B) Introduction into Fraud Risk (FR)** 25](#_Toc8660623)

[**4.1 Source of Fraud** 26](#_Toc8660624)

[4.2.1 Fraud Triangle 27](#_Toc8660625)

[**Source:** (Free, 2015) 27](#_Toc8660626)

[**4.2 Fraud Preventive controls** 28](#_Toc8660627)

[4.3.1 HSBC Likelihood Matrix (Possible Fraud Exposure) 29](#_Toc8660628)

[**5. Conclusion** 31](#_Toc8660629)

[**References** 32](#_Toc8660630)

# **1. (Part A) Introduction into Interest Rate Risk**

Interest Rate Risk (IRR) is linked to fluctuations in interest-carrying assets (e.g. loans, bonds, asset’s option features, etc..). The tendency to develop and enhance a bank’s competitive-edge has led to the advancement of various complex products purchased and offered by the banking industry. Therefore, causing variable risk towards capital and earnings through the variance in the period of changing interest rate and actual cash flow (Comptroller of the Currency, 1997).

## **1.1 IRR HSBC Overview**

Based on IFCI (2004) diverse movement in interest rate has exposed international banks, such as HSBC, to accept, operate and mitigate IRR as a normal part of the regulatory banking activity for a preferred approach to maintaining and maximising shareholder value. HSBC’s IRR (with consideration to the banking book) is observed in non-traded and traded assets and liabilities (e.g. deposits, loans and financial instruments held for trading and non-trading intent) (HSBC, 2019).

## **1.2 Sources of IRR**

Considering a BIS (2004) report, four primary sources of IRR exist, those of which banks are commonly exposed to. These primary forms of IRR are mentioned in detail in the below table and are directly relevant to HSBC’s IRR sources

### 1.2.1 Primary Sources of IRR

#### Table 1.1 Sources of IRR

|  |  |  |
| --- | --- | --- |
| Source Name | Description | Example |
| **Repricing risk** | The most commonly recognised and conversed primary source of IRR, arising due to time difference in the maturity of a fixed rate and a floating rate of a particular banks liabilities, assets and off-balance-sheet placement (Federal Deposit Insurance Corporation, 2018) | A long-term funded loan with a fixed rate, including a short-term deposited amount, could face a decrease in the future income and an increase in the underlining value interest. Due to the variability of interest paid, on the cashflow’s fixed lifetime and the increase of capital paid on the maturity of the short-term deposit |
| **Yield curve risk** | Yield curve risk regularly arise when an unexpected shift on the yield curve is caused which in turn affect a bank’s expected returns or prime economic value (CFA, 2019) | A bank’s planned 5-year hedged placement in a 10-year bond, could intensively decline due to the yield curve steepening, inclusive of any parallel movement already hedged in the yield curve |
| **Basis risk** | A raise in imperfect correlation due to the adjustment in interest rates of liabilities and assets that share similar characteristics of the repricing factor. These raised deviations could cause changes in the earning spreads between different assets and liabilities in addition to unexpected outcomes in the bank’s cash flow statement (Rohrer, 2004) | A one-year planned loan that is priced differently (repriced), due to U.S treasury bill rate. Which is in line with a one-year deposit, which is also repriced based on the monthly libor rate, causes unexpected exposure towards an unanticipated spread of the two mentioned index rates |
| **Optionality** | An option which is embedded on agreed-on banking assets, liabilities and off-balance-sheets (OBS). The option which provides an entity or individual the rite to sell, buy or otherwise alter a financial contract, or instrument. This financial security is to be accounted for (depending on the party) this can be considered a beneficial asset or a liability (BIS, 2015) | An Over-the-counter (OTC) contract with an option to sell (assuming it was purchased for 1Mn QAR). Can be sold back to the agreed-upon party for the previously purchased amount of 1Mn QAR, when in fact the OTC’s current market value is way below the market evolution of 1Mn QAR. |

## **1.3 Measurement Models**

### 1.3.1 Repricing

The repricing model, (a.k.a. Funding gap) is the most frequently sought-after form of measurement, due to its simplicity and value-added results. Analytically showcasing the different price assumptions in a specific period of time (BIS, 2001).

As briefly referred to above, the repricing model **strengths** are regularly noticed in its simplicity to calculate (assuming the required information is available) and the value of information brought forth. However, **limitations** of this measurement tool are noticed in the market-value-effect, comprehensively indicating that the adverse effect of constantly changing interest rates can result in major FI (Financial institutions) net worth to significantly shift (Håkansson and Aberg, 2012). Hence, this places consideration that the repricing model is only a partial measurement of IRR. Another limited observation of the model is the runoff factor. The ability of reinvesting assets of long-term nature, places the assumption that the principle and the interest on cashflow play major key roles on amortization payments that can be invested elsewhere (demonstrating how runoff factor is rate-sensitive). (BIS, 1993)

Repricing Formula

Repricing = Risk Sensitive Assets (RSA) – Risk Sensitive Liabilities (RSL)

#### Table 1.2 HSBC Repricing Model – derived from HSBC’s, 2019 Annual Financial Report

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Period** | **RSA**  **($ In Mn)** | **RSL**  **($ In Mn)** | **GAP**  **($ In Mn)** | **CGAP**  **($ In Mn)** |
| ≤ 1 Months | 1,148,610 | 1,831,591 | -682,981 | -682,981 |
| 1-3 Months | 189,529 | 103,645 | 85,884 | -597,097 |
| 3-6 Months | 109,476 | 57,302 | 52,174 | -544,923 |
| 6-9 Months | 63,397 | 31,265 | 32,132 | -512,791 |
| 9-12 Months | 60,309 | 22,680 | 37,629 | -475,162 |
| 1Y-2Y | 157,077 | 36,979 | 120,098 | -355,064 |
| 2Y-5Y | 322,367 | 81,284 | 241,083 | -113,981 |
| 5Y Plus | 507,359 | 103,587 | 403,772 | **289,791** |

As shown in the table above, HSBC demonstrates an overall positive repricing gap, which is considered to be a favorable outcome. However, all short-term horizons display a negative cumulative gap. Hence, HSBC is at exposure of rising interest, which could result in an increase in liabilities cost, which in return could provide an overall negative net return. Thus, reinforcing the limitations previously mentioned, and placing a plausible gap in HSBC’s interest rate (inherent risk), (HSBC, 2019).

#### Table 1.3 HSBC Net Interest Income – derived from HSBC’s, 2019 Annual Financial Report

|  |  |  |
| --- | --- | --- |
| **Repricing Gap** | **LIBOR (as of 2018) Change** | **NII** |
| 403,772 | -0.010% | 14.00% |

### 1.3.2 Maturity

In order to clarify the maturity measurement model, it must be noted that the funding gap model does not reflect on current market-values. However, the maturity model specifically incorporates current market-value influences. Therefore, it is argued that the maturity measurement brings forth a more recent assessment of interest rate risk when referring to HSBC’s IRR (Concha, et al., 2012).

In reference to the below table, it is evident that HSBC’s maturity gap presents a positive outcome. Nevertheless, a high percentile is exhibited in 5 year plus maturities, and once these are excluded, the maturity gap heavily falls close-to zero. This demonstrates high dependency on future maturities, and thus, exposing HSBC to higher future uncertainties. Furthermore, it should be mentioned that the maturity model does suffer from limitations. The mentioned model does take into account the timing of cashflow over the exhibited life-span of assets or liabilities. In addition, the model excludes balance-sheet level of leverage (Avery, et al., 1988).

#### Table 1.4 HSBC Maturity Model – derived from HSBC’s, 2019 Annual Financial Report

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Period** | **Weightage (by Period)** | **RSA**  **($ In Mn)** | **RSL**  **($ In Mn)** | **RSA**  **Wet.** | **RSL**  **Wet.** | **Assets**  **Wet.xRSA** | **Liabilities**  **Wet.xRSL** |
| ≤ 1 Months | 0.017 | 1,148,610 | 1,831,591 | 45% | 81% | 0.0075 | 0.0135 |
| 1-3 Months | 0.050 | 189,529 | 103,645 | 7% | 5% | 0.0037 | 0.0023 |
| 3-6 Months | 0.100 | 109,476 | 57,302 | 4% | 3% | 0.0043 | 0.0025 |
| 6-9 Months | 0.150 | 63,397 | 31,265 | 2% | 1% | 0.0037 | 0.0021 |
| 9-12 Months | 0.200 | 60,309 | 22,680 | 2% | 1% | 0.0047 | 0.0020 |
| 1Y-2Y | 2.000 | 157,077 | 36,979 | 6% | 2% | 0.1228 | 0.0326 |
| 2Y-5Y | 5.000 | 322,367 | 81,284 | 13% | 4% | 0.6301 | 0.1792 |
| 5Y Plus | 5.000 | 507,359 | 103,587 | 20% | 5% | 0.9917 | 0.2283 |
| **Total** |  | 2,558,124 | 2,268,333 | 100% | 100% | 1.7685 | 0.4624 |
| **Maturity GAP, Inclusive of all 2018 Recorded Maturities (Assets – Liabilities)** | | | | | | | **1.3060** |

### 1.3.2 Duration

As a side-by-side comparison, Macauley Duration model is considered to be most comprehensive measurement model among the previously mentioned forms. This is due to the model’s extent of scope and aptitude to cover maturity and timing of cashflow. In addition to syndicating the variance between maturity and coupon rates it is a preferred method of use by BIS (Mishkin, 2009).

Table 1.5

Duration Formula

|  |  |
| --- | --- |
|  | |
| **Symbol** | **Description** |
| t | Time Period |
| C | Coupon Payment |
| y | Periodic yield |
| n | Total period |
| M | Value at End of Maturity |
| Current Bound price | Present Value of Cash Flow |

**Source:** (CDIAC, 2007)

#### Table 1.6 HSBC Duration Model – derived from HSBC’s, 2019 Annual Financial Report

|  |  |
| --- | --- |
| **HSBC’s Corp Bond, Duration Measurement** | |
| Settlement Date | 20/02/2019 |
| Maturity Date | 19/02/2024 |
| Coupon | 5 |
| Payment Frequency | Semi-Annually |
| Yield | 3.616667 |
|  | |
| Macaulay Duration | 4.618 |
| Duration | 4.616 |

Based on the calculations in table 1.5, HSBC will require ~4.6-years to recover the true cost of the bond; this signifies a more favorable result when the considered maturity date is in 5-years. However, it is to be noted that the duration model (similar to the previous measurements) has its own limitations, such as the ambiguity of floating rates, the inadequate use of off-balance sheet material, and the unaccounted-for conflict between shareholders and regulators (L. Beck, et al., 2000).

## **1.4 Management**

### 1.4.1 Financial Tools (Derivatives)

Due to the ongoing cycle of fluctuating interest rates, HSBC depends on over-the-counter derivatives, such as, Interest-rate-swaps, Swaptions, Cap, Future Contracts and Future-rate-agreements. Which are contracts devised to provide financial leverage among counterparties (FI’s), see figure 1.1. This is a common approach for all banks (Rivas, et al., 2011). However, HSBC’s reported financial statement (2018) displays a highly negative exposure of ~$1,488 Mn (see figure 1.2). This is irregular considering that the past four years of operation demonstrates a positive outcome of over $1,000 Mn. This is presumed to be the reflected cause of the 62% drop in profits, which had occurred in 2016.

#### Figure 1.1

**Counterparty**

**HSBC**

**OTC Contract**

**Fluctuating Rate**

**Fixed Rate**

### 1.4.2 Matching and Smoothing

Smoothing is a tactic used by FI’s (HSBC in this scenario); it is where the FI assess its capacity to maneuver between variable and fixed rates, and in return devises a best situated split between variable and fixed loans. This in return minimises the FI’s exposure when an economic recession occurs, and maximises profits when the economy is strong, whilst maintaining collateral (Liu and Ryan, 2006).

On the other hand, by linking aims to closely maintain the same interest rates between both assets and liabilities, the object of the tactic is to get the two variables as close as possible (Gebhardt and Novotny, 2011).

### 1.4.3 Asset and Liability Management (ALM)

#### Table 1.7 Hedging

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **HSBC, Derivative Tactic** | | | | | |
| Market Positioning | Effect | Effect on Asset | Effect on Liabilities | Outcome | Collateral |
| Interest rates increase | HSBC collects the agreed on fixed amount, but pays more variable | Value depreciates | Liabilities decrease | Interest ratio is maintained | HSBC recompences |
| Interest rates decrease | HSBC collects the agreed on fixed amount, but pays less variable | Value appreciates | Liabilities increase | HSBC collects |

The table indicates that the key objective of the ALM is to stabilise NII whilst maintaining interest exposure. ALM aims to maximise shareholders’ wealth by maintaining long-term value as well as ensuring regulatory compliance and mitigating liquid risk. All three gap measurements (Funding, Maturity and Duration) are conducted by ALM and supervised by the asset-liability management committee (ALCO) (Charumathi, 2008). ALCO (Asset-Liability Committee) oversee ALM’s collection of interest-rate impact scenarios in order to develop a scenario simulation test (SST). The SST provides a keen understanding on the typical types and levels of IRR exposure, and augment the risk-return trade-off. The simulation process requires the following (Choudhry, 2011):

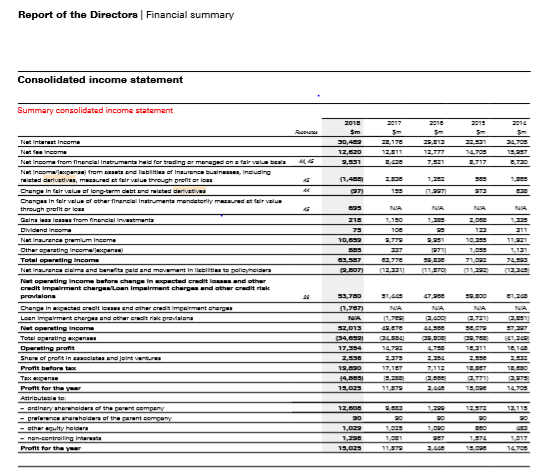
* A comprehensive selection of target variables
* Classification of IIR scenarios
* Keeping into consideration the time path of interest rate calculation
* Preparation of future-balance-sheets based on the model outcome
* Forecast net income and margins based on developed model scenario

## **1.5 Regulatory Requirements**

#### Table 1.8 Adopted Regulations

|  |  |
| --- | --- |
| **HSBC Adopted Regulatory Requirement** | |
| **1** | **Measurement, monitor, identification and controlled process of the banking books IRR and credit risk** |
| **2** | **To adhere by the board’s responsibility to supervise IRR management approach and the banks risk capacity** |
| **3** | **Aligning risk appetite to earnings and capital** |
| **4** | **Complying risk measurements with a competent number of scenarios and term rates** |
| **5** | **The clear documentation of procedures, assumptions and methodologies used** |
| **6** | **The complete and accurate placement of factual data for future audit and testing** |
| **7** | **IRR testing and outcomes to be reported on a timely bases to board members** |
| **8** | **To report IRR positioning and limits to both regulators and market on a timely basis** |
| **9** | **To align risk appetite and internal capital with board approval** |

#### Figure 1.2



# **2. Introduction into Liquidity Risk (LR)**

Liquidity risk signifies a FI’s inability or ability to match its inflow of cash to its outflow of cash towards FI’s short term financial requirements. Liquidity risk sensitivity is mostly observed in a declining economic life cycle (the focal period of depreciation in a specific economy or market) (Acharya and Pedersen, 2005). Hence, the inability to meet liquid demands due to external factors is the most direct variable considered (e.g. recession). However, factors such as method of disbursement, maturity gaps and attention towards short-term tenors have made internal liquidity risk an additional vital source. Nevertheless, LR (Both external and internal) have become considered among regulatory requirements and best-practices (Garleanu and Pedersen, 2007)

## **2.1 HSBC Liquidity Risk Overview and sources**

#### Table 1.7

|  |  |  |  |
| --- | --- | --- | --- |
| **Asset Side** | **Liability Side** | **Off-Balance-Sheet** | **HSBC Identified Sources** |
| **1.** Limitations due to NPL’s (None-paying-Loans). The inability to acquire new loans, due to limited demand (commonly caused by economic depression)  **2**. A decrease in borrower loans, and company funds | **1.** The inadequate maturity mismatch between deposits and loans  **2.** A decrease in the public’s trust of FI’s, resulting in deposit withdrawals (The 2008 economic crisis, A.k.a. great recession, caused by mortgage defaults and hedge fund trading is a prime example)  **3.** Limited ability in obtaining Money-Market-Funding | **1.** Restricted activity in derivative markets (e.g. OTC), due to economic recession (Stressed-Market).  **2.** Corporations and individuals with un-utilised credit-lines | **1.** As per HSBC’s audited financials, it is apparent that the most Liquid sensitive source is the cashflow mismatch, among loans and deposits.  &  **2.** Credit related commitments and financial guaranties to subsidiaries, and established contracts (e.g. insurance) |

### 2.1.1 Internal LR sources

The sources below (both internal and external) are directly related towards HSBC’s LR sources.

#### Table 2.0

|  |
| --- |
| **Internal HSBC’s LR Factors** |
| * Heavy reliance on short-term Corporate deposits * Expansion of HSBC’s Assets conceivable to exceed company funds, and in turn increase liability * Higher attention to short-term tenor loans * Uneven utilisation of liquid-government-instruments (e.g. bonds and treasuries bill) * Not placing adequate funds into long-term deposits * Over-developed Off-Balance-Sheet exposure * Uncalculated gap among asset and liability maturity dates |

**Source:** (Banks, 2014)

### 2.1.2 External LR sources

#### Table 2.1

|  |
| --- |
| **External HSBC’s LR Factors** |
| * Unexpected withdrawals of government entities * Poor performance, due to underdeveloped economies * Economic recession causing:  1. Immense cash withdrawals 2. Decreased trust in FI institutes 3. The development of sensitive investors and depositors 4. Economic depression |

**Source:** (Banks, 2014)

## **2.2 Measurements**

### 2.2.1 Ratio Analysis

#### Table 2.2 LR Ratio’s

|  |  |  |  |
| --- | --- | --- | --- |
| Ratio | Formula | HSBC outcome (as of 2018)  Conclusion | |
| Working Capital Ratio (WCR) | Current Assets**/**Current Liabilities **=** | 1.08 | HSBC’s current asset to liability analysis is just over the minimal threshold indicating a possible negative future outcome when covering current liabilities. Most analysis favor 1.2 – 2 working capital, which shows that HSBC’s results are less than ideal. |
| Cash Ratio (CR) | (Cash + Marketable securities)/Current Liabilities = | 0.96 | The results imply that HSBC has less (short-term) cash and cash equivalents than current liabilities. This suggests that there is less cash on hand to pay obligations. |
| Debit Ratio (DR) | Total Liabilities/Total Assets = | .48 | As exhibited by the result, for every $1 of asset $0.48 is towards liabilities. The ratio is under the 50% assumption, therefore displaying safe results |
| Gap Ratio (GR) | Total Interest-sensitive Assets/Total Interest-Sensitive Liability = | 2.51 | The gap ratio demonstrates that HSBC is interest sensitive. With increasing interests, profits rise. |
| Liquidity Coverage Ratio (LCR) | High Quality liquid asset amount/ Total Net Cashflow Amount = | 158.1% | The results showcase that HSBC, is 1.58x over the minimal threshold regulated by the Basel Accord. |
| Loan to Deposits Ratio (LDR) | Total Loans/Total Deposits = | 65.6% | The ratio tells us that HSBC lent approximately ~66% of its deposits by 2018-year end. The believed adequate amount ratio is between 80 – 90%. However, HSBC’s results display a supposed safe approach |
| Cash Assets Ratio (CAR) | Cash/Total Assets = | 6.8% | This demonstrates that 6.8% of HSBC’s total assets is currently cash |

**Sources:** (Durrah et al., 2016), (Qadir Dar and Ahmad Dar, 2017)

Based on table 2.2 findings, HSBC demonstrates a less than ideal LR placement. However, according to regulatory requirement (Basel Accord), LCR is maintained above adequate requirement

### 2.2.2 Balance Sheet Analysis (BSA)

BSA is a form of quantitative measurement were liquefiable assets and liabilities are compered among industry averages (comparison analysis). There are various limitations to using this method, such as (Matz, 2011);

* No time-frame statement on due liquidities
* Figures might not represent actual FI (HSBC) cashflows
* Off-balance-sheet accounts are not reflected, and thus, might heavily expose HSBC to LR
* Estimations of securities are based on market-value and not actual liquefiable amount, which causes LR
* The coverage of does not take into account volatile and stable securities
* Non-banking deposits, such as insurance positioning is not identified

**Source:** (Matz and Neu, 2006)

As observed, BSA is assumed to be an inadequate form of LR measurement. The measurement is also not adopted by HSBC, due to its vague measurement.

### 2.2.3 Maturity Mismatch Approach (MMA)

This is a standard method of identifying liquidity exposure. The method depends on a periodic gap evaluation of assets and liabilities as a means of detecting liquid outflow and inflow. This approach is conducted on a periodic scale (e.g. 1 – 5years). HSBC has not applied this approach to is liquidity measurement rubric (Allen, 2002).

### 2.2.4 Stress Test

Stress Tests have been regularly mandated after the 2007 – 2009 financial crisis. The test places different FI’s (in this case HSBC) under economically unfavorable circumstance, which is similar, if not worse than the 2008 economic recession. The purpose of this is to identify whether FI’s have enough capital reserve to withstand the impact of severe economic changes. FI’s that complete the stress test are mandated to publish the results. Hence, a fail or pass scenario will be published and can negatively (if failed) or positively (if passed) impact reputation (BIS, 2017).

#### Table 2.3

|  |  |  |  |
| --- | --- | --- | --- |
| **HSBC Stress Test** | | | |
|  | 2016 | 2017 | **2018** |
| Ratio at start point of scenario | 11.9% | 13.6% | **14.6%** |
| Minimal ratio after scenario and strategic management action | 9.1% | 8.9% | **9.1%** |
| **Fall in Ratio** | 2.8 | 4.7 | **5.5** |

**Source:** (HSBC, 2019)

As demonstrated on table 2.3, HSBC has passed the stress test three-years in a row. The scenarios that were put into consideration are; 1) a global recession; 2) the euro Brexit. The above results exceeded the BoE (Bank of England) and minimal required reserve as per the FRB (Federal Reserve Board) (HSBC, 2018).

## **2.3 Management**

HSBC’s LR management is conducted on two fronts;

* **Stored Liquidity Management (SLM):** raising liquidity through assets, such as, bonds, deposits and securities (Elsharif, 2016).
* **Purchased Liquidity Management (PLM):** this process is managed through the use of market funds. This approach uses market-rates, and hence, is considered expensive. Therefore, this process is typically avoided unless FI liquid is at a critical low (Hrbek, 2012).

### 2.3.1 Management regulatory process

According to the HSBC financial report, the following principles are followed (see table 2.4),

#### Table 2.4

|  |  |
| --- | --- |
| **Principle #** | **HSBC Mandatory Policy** |
| **Principle 1** | HSBC takes full responsibility of its LR management approach |
| **Principle 2** | A clear degree of tolerance which is applicable to HSBC’s strategy and market positioning is developed and adopted before commencement of liquidity operations |
| **Principle 3** | LR ratios and stress tests are developed by management, conducted as per regulatory requirement and adhered by on a year-to-year basis. These tests develop sufficient material for the continues development of appropriate contingency plans, if or when required |
| **Principle 4** | Internal and external models are established, with the consideration of liquidity costs and risks. These models are created to cater for both off and on balance sheet assumptions and actualities in order to align HSBC’s best-business-practices with overall business activities. |
| **Principle 5** | A conclusive projection is provided through stress-test, liquidity coverage ratio, minimal deposited cap and LCR, as a means of benchmarking, forecasting and monitoring annual developments |
| **Principle 6** | Global business-lines operate on stand-alone basis, due to operating in different liquid markets, in different regions, without the reliance central bank support |
| **Principle 7** | HSBC LR tolerance is developed by LR management ad approved by board members, for day-to-day supervision |
| **Principle 8** | Stress-test are conducted and published on a yearly base. |
| **Principle 9** | global business-line liquidity ratios and test (stress test) are published yearly on the company website, under “Investors” |

**Source:** (BCBS, 2008), (HSBC, 2019)

## **2.4 Liquidity Trap (LT)**

LT is an economic scenario where public saving is high and interests are low, rendering monetary policy ineffective. This is the aftereffect when consumers believe that interest rates will increase and securities (bonds) will presume to fall. Central banks have little control over this consumer belief, thus highlighted the continued fall in security values (Brycz, 2012), (FRBSF, 2000). An example of this scenario is the economic LT that acquired in japan in the earlier 1990’s; the repercussion of the event dropped Japan’s main index stock from a high of 39,260. In 2018, the Japanese index peaked its highest of 24,448, signifying the catastrophic aftermath of LT (Akram, 2016).

Some tactics to try and combat LT;

* Federal reserve can increase interest rates, to convince the public to invest, rather than save.
* Increased government spending, to showcase the trust government has in the national economy
* Induce a heavy drop in prices to persuade consumers in investing

**Source:** (Devereux, 2010)

# **3. Introduction into Operational Risk (OR)**

Operational risk is the secondary or direct risk developed from endogenous or exogenous loss due to FI’s processes, system failure or corruption (hardware or software), and human error or fraud (employees or other). This form of risk is often considered the residual risk, after the careful consideration of IRR, Market risk and Credit risk (Coleman, 2011).

## 3.1 OR Plausible Causes

#### Image result for umbrella iconFigure 1.3

The below figure highlight OR forms that are covered in HSBC, and supposedly other FI’s.

**Process**

**External**

**Systematic**

**People**



Execution

Information

Relationship

Human

Legal

Transaction

Limited Supervision

Scarce training

Poor Compliance

Lack of Management

Costing Structure

Settlements

Theft

Fraud

Fiduciary

Client

Process interruption

Technological

Insufficient Resources

Criminal

Rogue Traders

Tangible Assets

Strategic

Business

**Source:** (Strzelczak, 2007)

## **3.2 OR Source**

#### Table 2.5

|  |  |
| --- | --- |
| **Source of OR Risk** | **Description** |
| **Capital Asset** | * **Work-place safety:** loss of cash or other available assets due to poor infrastructure * **Security:** insufficient security, could result in theft of liquid assets * **Operating expense:** poor liquidity handling and improper use of banknote counters * **Environment:** underdeveloped infrastructure could result in fire, floods etc.… |
| **External** | * **Fraud:** money laundering * **Taxation:** inappropriate tax-return methods and an unexpected increase on tax regulations and expenditure * **Legal:** new rules and regulations e.g. the incorporated law of removing commercial banks from Sharia run nations * **Political:** war or sanctions * **Market:** economic recession * **Reputation:** fraudulent commercials or word-of-mouth |
| **Employee** | * **Turnover:** increased employee turnover, due to poor HR evaluation * **Personal:** employee personal issues could result in poor work-place performance * **Fraud:** misuse of provided power e.g. transferring client capital to a personal account and fleeing * **Error:** accidental mistakes e.g. adding one extra digit when clearing client cheque * Rogue trading: |
| **Client** | * **Disagreement:** denial of a previously signed contract due to unread clause, or unwillingness to cooperate. Dissatisfaction of provided service * **Default:** NPL on a personal loan |
| **Technological** | * **Program:** unresponsive IT software * **Information:** leak of client information due to cyber attack * Loss of electricity or telecommunication services (external) |

**Source:** (KPMG LLP, 2010)

Similar to other FI’s, HSBC is in risk of the above mentioned OR. However, due to the organisation’s use of an enterprise-wide-risk management framework as well as the credible history of mitigating OR, the majority of the above has been safeguarded. Nevertheless, based on HSBC’s audited financial report, it has come into light that the UK’s segregation from the EU nations (a.k.a. Brexit) has caused a higher OR placement on both employee and client. Which in-turn has caused disagreement with EEA-incorporated client base and the need for EU national’s employment (particularly in France and the EU region). As a result, new regulatory laws have also increased external uncertainties (HSBC, 2019).

## **3.3 Measurements**

Under the Basel committee, the regulatory requirement towards international FI’s to uphold and adopt towards Basel 1 & 2 requirements have been put into consideration by HSBC, excluding Basel 3, as this regulatory commitment (considered to be fairly new) was officially revised for release on December 2017. The recent announced date of release (as per Basel Committee on Banking supervision) is 1st January 2022, with comprehensive enhancement towards the market risk RWA regime and new regulatory framework on the FRTB (Fundamental Review of the Trading Book) (IFC, 2012).

### 3.3.1 Basic Indicator Approach (BIA)

#### Table 2.6

|  |  |  |  |
| --- | --- | --- | --- |
| **HSBC Basic Indicator Approach** | | | |
|  | **2016 ($ in Mn)** | **2017 ($ in Mn)** | **2018 ($ in Mn)** |
| Net Income | 1,299 | 9,683 | 12,608 |
| Total Net (2016-19) | 23,590 | | |
| Average Net Income | 7,863 | | |
| BIS rate (15%) | =7,863x15% | | |
| **Minimal OR reserve** | **$1,180 Mn** | | |

**Source:** (HSBC, 2019)

BIA is a credit risk analysis that indicates the minimal reserve that should be upheld by FI’s in order to mitigate exposure. It should be noted that as per market analogy, HSBC had suffered a ~62% loss in profit in 2016, due to market slowdown and the sale of the bank’s Brazil branch. Furthermore, the BIA is preferably used on small banks due to its historical view into past years as well as the availability of more comprehensive and consistent methods of evaluation (BCBS, 2014).

#### 3.3.2 The Standardized Approach (SA), Table 2.7

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Business Category** | **%** | **2016** | **2017** | **2018** | **Capital Reserve ($Bn)**  **2016 2017 2018** | | |
| Corporate Finance | 18 | X | X | X | X | X | X |
| Trading & Sales | 18 | X | X | X | X | X | X |
| Payment & Settlement | 18 | X | X | X | X | X | X |
| Commercial Banking | 15 | X | X | X | X | X | X |
| Services & Custody | 15 | X | X | X | X | X | X |
| Retail Banking | 12 | X | X | X | X | X | X |
| Asset Management | 12 | X | X | X | X | X | X |
| Retail Brokerage | 12 | X | X | X | X | X | X |
| Total Gross Income |  |  |  |  |  |  |  |
| **Required Reserve** |  | | | | | | |

**Source:** (HSBC, 2019)

The SA is another form of measurement devised by Basel 2 for measuring the adequate amount of capital reserve for OR. The method of measurement (as indicated above) is split between eight business-lines and multiplied against external credit ratings (%) and then averaged among three years of gross income (BCBS, 2015).

Note: Because of the unavailable segregated split between the eight business-lines, the SA calculation was not conducted. However, **$7.4 Bn** is the final SA calculation for **OR capital reserve** requirement, as per HSBC’s statement.

### 3.3.3 Advanced Measurement Approach (AMA)

AMA, similar to previous OR measurements is devised by Basel 2. AMA is considered to be the most sophisticated and complex measurement method of the three. This form of measurement provides banks with the opportunity to devise its own internal model based on company endogenous risk variables and profiles. The measurement model is commonly conducted with a minimal of three different approaches (Peters, 2016);

Table 2.8

|  |  |
| --- | --- |
| **Approach** | **Description** |
| **Internal Measurement Approach (IMA)** | the parameters the model is measured on are segregated on different business- ines and then assessed based on: Loss Given Event **x** Exposed Indicator **x** Probability of Loss Event **= Expected Loss (EL).** A conclusive fixed percentage is then identified by the FI representative (**Y**). Capital risk is then recognized as = EL **x** Y (PWC, 2015). |
| **Loss Distribution Approaches (LDA)** | does not depend on FI gross income and therefore believed to a better suited approach (Soprano et al., 2009). As a better form of understanding LDA, Basel committee has acknowledged the OR measure as a comprehensive approach to distributing OR losses specifically to each business-line, grounded on the sum of occurrence and sternness of the specified event (e.g. High–low) (Frachot, 2001) |
| **Scorecard Approaches (SP)** | a set of parameters are decided on in order to verify OR per unit cost, after timely evaluation (by managers) a set of scorecards are developed using historical data. This method is authenticated using historical data as a benchmark, hence the need for evaluation (Giudici, 2015). |

In addition to being the most comprehensive model, AMA also helps develop reputation and valued perception by FI stakeholders. The approach depends on data collection, different risk senior insights, qualitative and quantitative data (e.g. the ratio of male to female employees) (KPMG LLC, 2016). Despite the mentioned benefits, HSBC does not implement this approach, as shown in the screenshot below ↓. (HSBC, 2019)

## **3.4 Management**

As the availability of external data on OR management is very limited; the management procedure of OR has been strewn (Chernobai, 2012). However, as per Kingsley et al., (1998) the following figure illustrates OR management structure

Figure 1.4

Operational Risk Management Objective

**Source:** (Kingsley et al.,1998)

# **4. (Part B) Introduction into Fraud Risk (FR)**

FI’s fraud risk is defined as a criminal or unethical act by humans or establishments, to illegitimately and immorally attempt to obtain, receive or cause loss of financial benefits to FI’s (Hussaini et al., 2018). Even though fraud is generally characterised as such, an extended definition can be obtained by using the approaches below:

* Legal: based on the law of the current country the FI is operating in. Laws regularly change and develop (new or old) rules, thus are time sensitive as a means of improved enforcement (CIMA, 2009).
* Non-Legal: is defined by research and theory. This form requires data gathering, if not currently adherent by law (PWC, 2015).

## **4.1 Source of Fraud**

Figure 1.5

Theft of cash from FI

Internal



Employee

Falsifying employee payroll

Forging expense claim

Fraudulent accounting (Cooking the books)

Identity scam

Depositing fraudulent cheques

External



People

Organization

Fake insurance claims

Cyber hack

Money laundering

Property scheme (for mortgaging reasons)

Forged currency

Blackmail for financial leverage

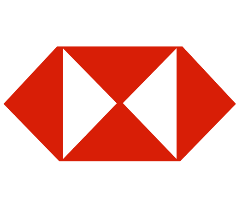
**Source:** (Own work)

As exhibited in figure 1.5, employees, individuals and criminal organisations are the most common causes of fraud. FI’s employed staff are the highest identified direct cause of internal fraud. It is assumed that the higher the form of given responsibility, the greater the fraudulent act can be (ACFE, 2012). A prime example of this is Bernie Madoff Ponzi scheme which resulted in a total gross theft of $65 Billion (Cohn, 2018). However, the figure above does reflect highly on external factors. Exogenous risk is considered to be an inherent risk, due to its less controllable nature. In order to highly-lessen this, banks such as HSBC place tight-security solutions, such as:

* Multi-process Authentication: a layered-structure of technological defenses, followed-up with phone calls and sensitive attention towards purchasing habits
* Transaction Monitor: a controlled limit of expenditure on each credit-card or cash withdrawal
* Placement of triple-controls: controls consisting of more than on operative. Meaning, an operative to develop the transaction, another to approve it and a final operative to send the transaction
* Raising Fraud Mindfulness: educating business-consumers and overall public, through events, seminars and workshops (Haire, 2019)

### 4.2.1 Fraud Triangle

Figure 1.6



Opportunity

Pressure

Rationalization

The fraud triangle is a framework developed by Donald Cressy, that identifies the causes of fraud.

* **Pressure** that drives individuals to commit fraud
* The availability of the **opportunity**
* The mindful capacity to **rationalize** fraudulent acts

Pressure can be caused by work or non-work-related situations, Rational is an independent mindset that can be very difficult to alter. However, opportunity can be controlled (to a certain extent). Hence, FI’s consider restricting opportunity as the prime focus of mitigating fraud risk

The Fraud Triangle

# **Source:** (Free, 2015)

**Source:** (Turner et al., 2003)

## **4.2 Fraud Preventive controls**

**Directors & Audit Board**

**External**

**Audit**

**Internal**

**Audit**

**Management**

The board of audit committee aims to manage external and internal audits, help navigate external audit by providing rational explanations and vital report misunderstandings (if any arise)

Based on HSBC’s annual financial statement (2018), internal Auditor’s objective is to reassure that all risk and fraud controls are working appropriately, question and interrogate control processes, monitor, detect and evaluate fraud framework. Furthermore, they provide solutions and controls to reduce fraud exposure (if required). An internal evaluation is conducted semi-annually for HSBC.

According to HSBC’s annual financial statement (2018), external Audit is liable to providing feedback to company shareholders through financial, physical (on site, e.g. HSBC branches), and procedure assessment and evaluation of all risk, and fraud related controls, valuation of internal best-practices and business-lines to reassure shareholders of ethical and aligned output. External Auditors will commonly evaluate internal auditors and report directly to the board. Regulatory requirements mandate that HSBC must be audited by a certified entity. In addition, the organisation that aims to conduct the external audit must be changed every three-years; this is to ensure that no personal matters can cloud decision making. External Audits are conducted annually at the beginning of every focal year.

4.2.2 Anti-Fraud Audit Chain (HSBC), Figure 1.7

* Keeping up with day-to-day internal controls.
* Responsibility of recording and preserving financial documents and protocol.
* Continuous training in fraud framework, solutions (if any) and methodologies.
* Is questioned (if required) by internal and external auditors (mostly in audit season, or period of audit)

As demonstrated by the anti-fraud chain of command, this process (considered among best-practices midst FI organizations) is put in place as a regulatory requirement by HSBC. In order to report, minimise and find solutions toward any fraudulent crimes. In addition, this moderates the level of opportunity that employees are given, creating difficulty to conduct any immoral acts without getting caught beforehand, during the process, or getting away from legal prosecution

**Sources:** (Turner et al., 2003), (CAQ, 2010), (HSBC,2019)

**4.3 HSBC’s Fraud Risk Assessment (Three (Future) Associated Risks)**

### 4.3.1 HSBC Likelihood Matrix (Possible Fraud Exposure)

Figure 1.8

High

Medium

Low

High

Medium

Low

**Level of Impact**

**Likelihood of occurrence**

|  |  |  |
| --- | --- | --- |
|  | **Employee Misconduct (Opportunity)** |  |
| **Risk of Technological Failure (Cyber-Attack)** |  |  |
|  |  | **Money Laundering** |

**Source:** (HSBC, 2019)

4.3.1.1 Rational, Table 2.9

|  |  |
| --- | --- |
| **Type of Fraud** | **Reasoning** |
| **Employee Misconduct** | As previously mentioned under Operational Risk source. The Brexit scenario has pushed HSBC to start re-employing new staff for the EU and France region. Even though HSBC has placed their experienced HR staff for the employment procedure (in addition to a suitable employment framework and benchmark) .It has been emphasised in the 2018 yearly financial report that some risk is be observed as a result of the uncertainty observed in the quantity of new hires in such a short span-of-time. Hence, the likelihood of occurrence has been positioned as high. Furthermore, due to the chain of command (Anti-Fraud-chain), it is assumed that any fraudulent acts would only be minimal, as internal audit monitoring will be put in place. |
| **Risk of Technological Failure (Cyber-Attack)** | Technological advancements are at the core of FI development. Thus, failure due to cyber-attacks is a common associated risk with technology (Bhasin, 2016). Likelihood of occurrence has been expressed as a medium due to future decrease of employee base and increase in technological operating systems. The installation of backup drives and other technological leverages (fire-wall) has indicted a low level of impact. |
| **Money Laundering** | As the act of money laundering is a risk among all banks, it is accentuated further in HSBC. This is due to the bank having formerly gone under law-suit of money laundering (and settling with $1.9 Bn), (BBC, 2019). The bank’s sale of their brazilin branch and the 61% decrease in profits due to limited sales of banking services, can place managers under-stress and push them to take money-laundering into account. However, due to the previous settled allegations, HSBC has heavily strengthened its anti-money laundering controls, thus signifying a low likelihood of occurrence. |

**Source:** (HSBC, 2019)

4.3.2 HSBC Fraud Risk Framework, Table 3.0 **Source:** (HSBC, 2019)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **HSBC Risk Assessment** | | | | | | | |
| **#1** | **2** | **3** | **4** | **5** | **6** | **7** | **#8** |
| **Fraud Risk Schemes** | **Likelihood** | **Significance** | **Source** | **Anti-Fraud Controls (Existing)** | **Effectiveness of HSBC Controls** | **Residual Risk** | **Fraud Risk Response** |
| Newly hired employees (bribery, theft and fraudulent transfers) | Probable | Significant | New employees in the processing Division | Triple controls (Multiple approvals from management Chain) | 1.Devised with the help of the internal audit team.  2.Rechecked by management  3.Audited semi-annually by internal audit team  4.Audited annually by external audit team | Risk of criminal cooperation between employees | Employee awareness, training and workshops |
| Technological (Cyber-Attack) | Possibility | Significant | IT Support and security division | Fire-wall.  Backup servers.  Technological defenses. | Risk of high-level cyber-attacks by criminal organizations | Installing additional software updates and continues technological enhancements |
| Money Laundering | Possibility | Critical | Manager and client (Compliance) | Due diligence check. Source of liquid check. Credit Bureau report | Risk of new methods (e.g. criminals pursuing the help of credible sources) | Additional audit seasons, implementation of new added controls |

# **5. Conclusion**

Based on findings carried out in this report, it is evident that HSBC has incorporated the regulated standards required to operate in an industry that is full of risk. However, the unwillingness’ to function using sophisticated measurements, such as AMA, brings into questions if risk mitigation has been taken into the highest of concerns. LR ratio has also highlighted some risk intensive liquidity measures, but not to the extent of high alert. The IRR controls, and HSBC stress-test display clear signs of potential in preserving shareholder value. Nonetheless, HSBC isn’t a complete bank, but keep in mind, no bank is entirely risk-free.

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