

Analysis of Risk for Online Banks during the COVID-19

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Abstract: *This article analyses the risk of UK online banks during COVID-19 by virtualising a bank, Bank Alpha, based on a real UK online bank. The article produces a risk report for 2019 and 2020 in terms of credit risk, operational risk and liquidity risk, and draws a visual risk matrix. Throughout the report it is clear that the spread of the epidemic has largely contributed to the growth and expansion of online banking, but the risks associated with the epidemic are undeniably evident and significantly higher in 2020 than in 2019. The negative impact of the epidemic can be mitigated to a certain extent by controlling and reducing the risk through countermeasures such as artificial intelligence systems and ABS. With the measures mentioned in the article, the risks encountered by Bank Alpha can all be contained within acceptable limits.*

Keywords: *Online bank, Risk analysis, Risk matrix, COVID-19*

1. Introduction

Bank Alpha is a virtual bank based in the UK. In the second part, Bank Alpha was analyzed for possible risks in its 'online-banking' operations. Each of these risks is explained in the report, with the corresponding mitigation measures, and the consequences are assessed. Since the outbreak of COVID-19 in 2020, global economies have suffered substantial setbacks. Bank Alpha was inevitably involved in this Black-Swan-Event. The third section focuses on how the risks faced by Bank Alpha under the 2020 epidemic differ from last year.

2. 2019 Risk Report

2.1. Risks

2.1.1. Credit Risk

Credit risk is the economic loss that counterparties fail to fulfill its contractual obligations, like debts or bank loans in full amount and timely for various reasons. Bank Alpha strives to never become overly reliant on any wholesale counterparty to the point that counterparty's failure would have significant negative impacts on it.

Although Bank Alpha reviews each customer's loan, it determines whether the loan can be approved by evaluating personal income, default history, etc. But Bank Alpha still cannot ensure that everyone will be repaid on time.

2.1.2. Operational Risk-External Fraud

Losses from operational risk may arise from internal or external events. In cybercrime, cases involving banks occur daily. It's also inevitable that Bank Alpha is experiencing external fraud. According to the Association of Certified Fraud Examiners, nearly 70% of external fraud in the banking sector is committed by industry insiders, i.e., bank employees. For online bank, the external fraud experienced by Bank Alpha is not only collusion between internal and external parties, but also card forgery, fraudulent collaboration between cardholders and individual merchants, and hackers impersonating users to remotely control terminals like mobile phones.

2.1.3. Liquidity Risk

(1) Funding Liquidity Risk. The balance sheet of Bank Alpha illustrates a mismatch in the maturity

structure of the Bank's assets and liabilities. Obviously, the main source of Bank Alpha's liability business is short-term customer deposits at 1,007,299 dollars, while the bank's capital is mainly used for long-term loans business. Under this asset-liability structure, when customers withdraw a large amount of credit, if other factors remain unchanged, it is difficult for the bank to meet its liquidity needs without losses (Figure 1).

Asset	£'000
<i>Loans and Advances to Banks</i>	764,602
<i>Debt Securities</i>	331,597
<i>Loans and Advances to Customers</i>	54,290
<i>Derivative Assets</i>	-
<i>Deferred Tax Asset</i>	-
<i>Other Assets</i>	29,535
<i>Property, Plant and Equipment and Intangible Assets</i>	2,403
<i>Investment in Subsidiaries and Inter-company Account</i>	19,494
Total Assets	1,201,921
Liabilities	
<i>Customer Deposits</i>	1,007,299
<i>Central Bank Facilities</i>	-
<i>Derivative Liabilities</i>	-
<i>Provisions for Liabilities and Charges</i>	1,575
<i>Other Liabilities and Accruals</i>	40,514
<i>Deferred Income</i>	83,357
Total Liabilities	1,132,745
Equity	£'000
<i>Share Capital</i>	7
<i>Share Premium</i>	159,332
<i>Other Reserves</i>	761
<i>Accumulated Losses</i>	(90,924)
Total Equity	69,176
Total Liabilities and Equity	1,201,921

Figure 1: The balance sheet of Bank Alpha

(2) Trading Liquidity Risk. Due to the 2019 data breach, negative rumors about Bank Alpha appeared in the market. This had led to a decline in the price of securities issued by Bank Alpha. The parties in the market who used to interest in these securities refused to make the transactions, therefore, Bank Alpha had to meet its obligations at a relatively higher cost, leading to trading liquidity risk.

2.2. Mitigation plans and intended consequences

Based on the three risks that Bank Alpha is currently facing, the following mitigation measures will be given.

2.2.1. Credit Risk

Bank Alpha should strengthen its internal controls based on the establishment of a sound credit mechanism which includes rating and real-time monitoring of credit risk based on the establishment of a suitable credit risk environment (Akwaa-Sekyi, E. K., et al., 2017).[1]

Bank Alpha can use artificial intelligence refinement algorithms to rate each level of risk accurately (Biecek, P. et al., 2021), which will help banks to identify the likelihood and extent of credit default of customers. Additionally, AI can also monitor credit risk in real time and automatically provide daily reports to the Board Risk Committee, which also help to identify and control credit risk in a timely manner.[2]

Expected results: With the credit rating controlling credit default risk by identifying customers. The non-performing loan ratio declines and the assets quality get improved.

2.2.2. Operational Risk-External Fraud

According to the previous section, control of internal staff permissions and monitoring of external miscreants are the main focus of efforts. Firstly, increasing the use of technology products like payment passwords in settlement process. Secondly, Bank Alpha needs to strengthen internal staff supervision and safeguard private data. Those internal operations from employees that are suspicious should be scrutinised and reviewed repeatedly, and suspected transfers that occur at the meantime should be monitored. Bank Alpha prevent external fraud by eliminating internal and external collusion from the

inside out.

Expected results: The adoption of an external management system enhances the security of the transaction process. Monitoring of internal and external operations reduces the likelihood of suspicious transactions. The risk of external fraud is reduced in both respects.

2.2.3. Liquidity Risk

In response to the aforementioned liquidity risk, Bank Alpha can assess its ability to meet the liquidity needs and external financial constraints in long-term operation through the internal liquidity adequacy assessment process (ILAAP) (Figure 2).[3]

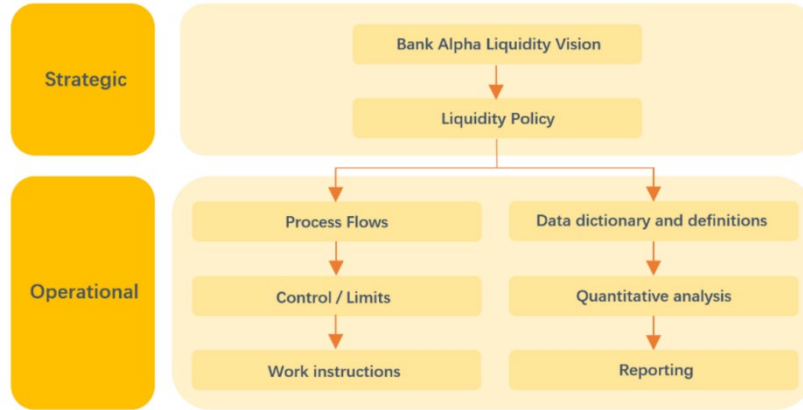


Figure 2: Procedure of ILAAP

Asset-based-security (ABS) can be used as another measure to mitigate liquidity risk of Bank Alpha. By this way, assets such as low liquidity loans but have future cash inflows, are repackaged into derivatives with security characteristics, allowing for more efficient pricing and allocation, improving the bank’s liquidity ratio (Figure 3).

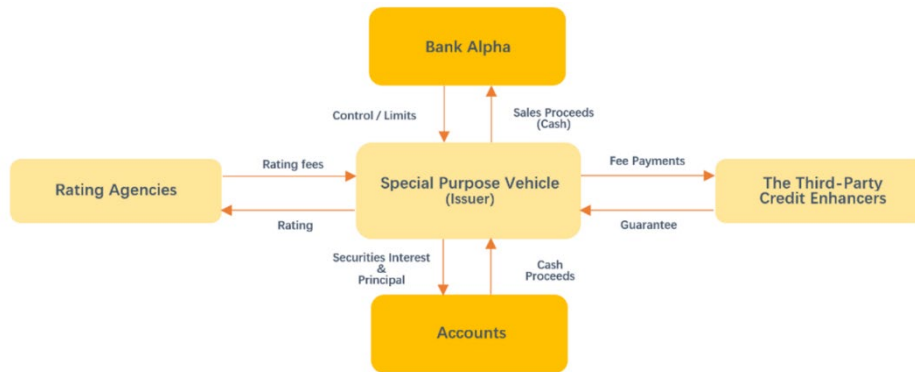


Figure 3: Procedure of ABS

Expected results: ILLAP allows Bank Alpha to have contingency funds to deal with liquidity difficulties under the stressful situations.

By launching ABS, Bank Alpha can effectively eliminate its risky assets from the balance sheet (Boesel, Nils, et al., 2018). With the securitization of credit assets, Bank Alpha have more financing sources, the funds absorbed improve operations, optimizing its assets allocation.[4]

3. 2020 Risk Report

3.1. Risks

3.1.1. Operational Risk-External Fraud

The epidemic and its accompanying social distance have led the business volume of Bank Alpha to increase significantly, and the digital payment volume has increased continuously (Munteanu, I., & Baraghin, G. D., 2020). This has also been accompanied by an increase in external fraud.[5]

Through the "Fraud Triangle" conceived by Donald Cressey (1953), Bank Alpha has realized that under the impact of the COVID-19 epidemic, reasons for the increase in external fraud are reflected in three aspects of the theory (Figure 4)[6]:

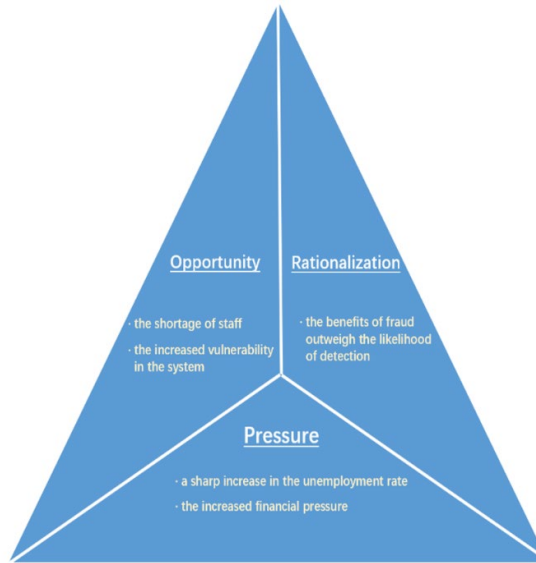


Figure 4: Diagram of the Fraud Triangle for Bank Alpha

- (1) Due to insufficient staff, Bank Alpha is unable to process a large number of transactions in a timely manner. The lack of supervision leads to increased opportunities for fraud.
- (2) The spread of the epidemic led to a sharp rise in unemployment, and crime caused by unemployment would also be an incentive for Bank Alpha to be perpetrated as external frauds.
- (3) Due to the pressure of weak regulation and economic recession caused by the COVID-19, fraudsters concluded that the benefits of fraud outweighed the losses if they are found, leading them to believe that fraud was rational.

3.1.2. Liquidity Risk

In 2020, Liquidity risk will still pose serious challenge on Bank Alpha. The most possible factor is the loss of bank trading sources.

Based on the previous market risk analysis, after the outbreak of COVID-19, the financial market fluctuated severely. As shown in the figure below, the S&P 500 and Nasdaq stock index fell significantly from the beginning of the year (Figure 5).



Figure 5: S&P 500 and Nasdaq stock index & United Kingdom Short Term Government Bond Year (Source: Yahoo Fiance, 2021 & CEIC data, 2021)

In the bond market, the UK government bonds yield plummeted to a record low of -0.085% on 20th July. In the commodity market, the data of London Spot Gold rose about 13.6%. Therefore, it is quite challenging for Bank Alpha to sell assets at reasonable prices to get adequate funding (Figure 6).



Figure 6: Gold Spot (U.S. Dollar) (Source: Trading View, 2021)

Under the above influences, not only the credit line of Bank Alpha is reduced, but the issuance of bonds by the bank is also hindered. Although the bank's high quality liquid assets are sufficient, these assets inevitably face the risk of impairment currently, leading to the exacerbation of liquidity risk of Bank Alpha.

3.1.3. Market Risk- Interest Rate Risk

During the COVID-19, the principal market risk of Bank Alpha is interest rate risk on the banking book.

To find the driving factors, it is necessary to analyze the external macroeconomics and UK Central Bank policies firstly. Since the outbreak of the pandemic, the global interest-rate level has been on an obvious down-trend. Following the US Federal Reserve's emergency interest rate cut on 3 March, the Bank of England voted unanimously to change interest rates to a record low of 0.1% and to keep the size of its bond purchase programme at £745 billion in response to the severe economic and financial disruption caused by the spread of COVID-19 (Figure 7).

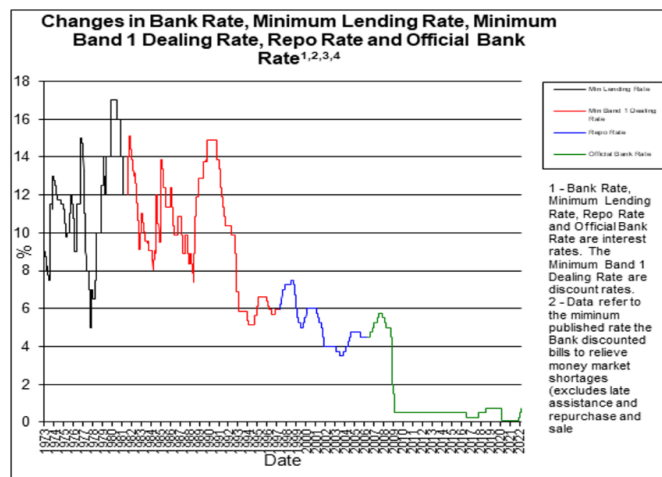


Figure 7: Changes in Bank Rate (Source: Bank of England, 2020)

Under the influence of the above external factors, as interest rate decreases, the present value of the Bank's future cash flow will also change significantly. This, in turn, changes the underlying value of the bank's assets, liabilities and off-balance sheet items, and thus its economic value.

3.2. Mitigation plans and intended consequences

3.2.1. Operational Risk-External Fraud

As a result of COVID-19, Bank Alpha can mitigate external fraud by focusing on the "Fraud Triangle" of prevention.

(1) Minimize opportunities. Bank Alpha should use AI systems to enhance internal scrutiny and minimize opportunities for external fraud.

(2) Stress mitigation. Bank Alpha can help small businesses by modestly lowering interest rates, and mitigating the potential risk to banks from unemployment.

(3) Rationalize targets. Bank Alpha could develop a "Fraud-Zero-Tolerance" policy to remind customers of the consequences and costs of fraud.

Expected results: In 2020, the "Fraud Triangle" provides a more useful framework for Bank Alpha to analyse its vulnerability to make it have a more holistic approach to external fraud risk control.

3.2.2. Liquidity Risk

Stress testing can help Bank Alpha address liquidity risk. Bank Alpha performs an analysis in a hypothetical scenario, using projections of the financial state in the coming quarters to determine whether the bank has sufficient liquidity funds to cope with COVID-19 (5% unemployment, 13.3% DJIA falling in Q1 2020).[7]

Expected results: The stress testing effectively prevented extreme events like the epidemic from hitting Bank Alpha, giving Bank Alpha more countermeasures to mitigate funding risks.

3.2.3. Market Risk - Interest Rate Risk

As mentioned previously, during the epidemic, the Bank of England reduced interest rates. Therefore, Bank Alpha should adjust the scale of interest rate sensitive assets, like gilts and loans, so that the decrease in interest income is less than that in interest expense to increase net interest income. And if the government decides to raise interest rates, Bank Alpha should increase the size of its interest rate sensitive assets and adjust to the sensitivity gap to a positive value.

Expected results: By changing the interest rate sensitivity gap, changes in interest rates during the epidemic do not have a significant impact on Bank Alpha as flexible adjustments to interest rate sensitive assets and liabilities keep net interest income stable.[8]

4. Risk Matrix

Board members can visualize the risk matrix to know the likelihood of each risk and the severity of the consequences of such a risk (Figure 8).

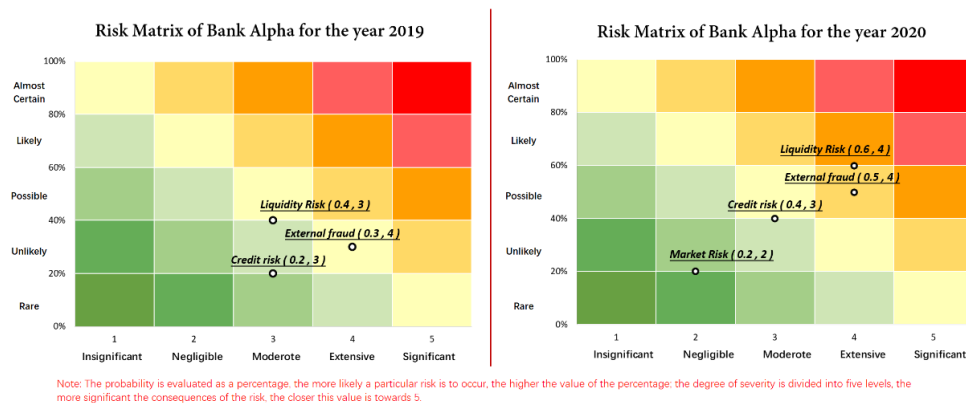


Figure 8: Risk Matrix of Bank Alpha

4.1. Credit Risk

Bank Alpha uses AI to determine whether the system can approve loans, reducing the likelihood of this risk occurring.

The COVID-19 outbreak has impact on the economy and credit risk has increased, but with national regulation and economic recovery, credit risk is generally manageable.

4.2. Operational Risk-External Fraud

In many cases, external hackers often collude with the internal management of Bank Alpha to increase the success rate of the crime. The likelihood of this risk occurring is high and the

consequences extremely serious.

The epidemic has led to a significant increase in the volume of Bank Alpha's online business and an increase in external fraud.

4.3. Liquidity Risk

Bank Alpha has the potential to process plenty of real-time transactions every second. This would be an unacceptable consequence if Bank Alpha's liquidity were to be challenged, as it would not have sufficient liquid assets to meet its financial obligations.

Under the impact of the epidemic, Bank Alpha's operations are hampered and its assets are at risk of impairment, leading to increased liquidity risk

4.4. Market Risk

With the reduction in interest rates in 2020, the underlying and economic value of all types of assets in the Bank Alpha's will decrease. Changes in interest rates will also have a further impact on banks' income.

5. Conclusion

From the entire report, the same risks that Bank Alpha faced in 2019 are reflected in 2020 and these risks have been exacerbated to varying degrees, as can be seen visually through the risk matrix.

Overall, Bank Alpha's online business has been well organised over the past two years and the outbreak of the epidemic has, conversely, largely contributed to its expansion. Bank Alpha is able to handle a wide range of potential risks through the use of artificial intelligence systems, the implementation of ABS, ILAAP and other approaches. Even though the bank was not able to keep the incidence of risk to a minimum, mitigation measures mentioned were put in place to keep all types of risk within acceptable levels.

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