UNIVERSITY OF LEICESTER | SCHOOL OF BUSINESS

Module:	Financial Risk Management	Weighting:	70%
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Module Co-ordinator:	Prof, Daniel Ladley	Due:	12/4/19
Assessment:	Group Risk report	Anonymous Marking:	Yes
Method of Submissions:	Turnitin	Feedback Issue Date:	3/5/19
Length:	12 Pages	Feedback Session Date:	6/5/19, 4pm 0.21 Teaching Centre

This assignment has been designed to assess the following intended learning outcomes:

- Be able to define, calculate, apply and evaluate value-at-risk techniques for a range of assets and portfolios;
- Analyse and manage the risks present within an organisation;
- Define counterparty risk and liquidity risk and show how they may be measured and mitigated;
- Discuss the role of risk management and its use within companies including the use of RAROC;

Curriculum Group Approval: 29/11/18 External Examiner Approved:

STUDENT TO COMPLETE THE FOLLOWING

Student Numbers: 189015469, 189031324, 189004405, 189039407, 189024631

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ASSESSMENT HEALTHCHECK

Quality of Presentation

- All material is thoroughly and correctly referenced. ☒
- Citations are given in the Harvard format, unless specifically specified otherwise in the assignment brief. ☒
- Direct quotations from sources are referenced with page numbers. ☒
- Appropriate use has been made of tables, diagrams, graphs and pictures. ☒
- The use of formatting (line spacing, font, justified margins etc) is consistent throughout. ☒
- The text is clear and readable, without typographic errors and spelling mistakes. ☒
- The assignment is within the maximum word length. ☒
- The reference list contains only the works cited in the assignment, is presented in author alphabetical order and is complete, accurate, and consistently formatted. ☒

Quantitative Analysis

- All questions and sub questions are answered. ☒
- All numerical values requested are clearly shown. ☒
- The methods used for the calculation of numerical answers are clearly shown. ☒
- Numerical answers are provided in the correct units. ☒
- Proofs start from initial statements and work through to required relationship. ☒
- All steps in proofs are set out clearly and logically. ☒

Quality of Analysis

- The selection of techniques are justified by the problem or issue outlined. ☒
- Techniques are correctly applied. ☒
- Choices in the use of techniques and analysis are justified. ☒
- The analysis results from the use of judgement and discernment in selecting theory and applying it to the situation or problem. ☒

Structure and Argument

- Where requested a coherent argument is evident, which presents justifiable conclusion based on evidence. ☒
- Theory is integrated into the analytical and/or practical elements of the assignment where appropriate. ☒
- Meaning is not obscured by poor grammar, paragraph or sentence construction. ☒

- **REMINDER**
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- I have a declared disability and have attached the relevant cover sheet to my work. ☐

Barclays Risk Report

Content:

STUDENT ID NUMBERS:

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Executive Summary

This risk report provides a snapshot of the key risks associated with Barclay Bank. Such information will be useful for an investor with £100,000 deciding whether to invest or not. The key risk accompanied with Barclay is as follows:

Firstly, the key market risks that Barclay bank faces are interest rate, exchange rate and market volatility. Investor can lose about £15,000 to £25,000 in one month. In respect to liquidity, major risks include structural risk, prepayment risk, and recruitment risk. In our case, an investor can lose £163 in one month from liquidity risk. As for Sector risks, major risks include rapid growth in Fin Tech, and the uncertain implications from Brexit referendum (KPMG, 2017). Furthermore, reputational risks include failure to comply with regulation management and government's policy and failure in technical system.

In addition, the main operational risks are cyber treat fraud, processing error and technology changing. Barclay have set aside a minimum capital of £56,660 m under Basel II standardized approach requirements. Moreover, credit risks is another key aspect of attention which includes impairment, loan and advances from borrowers and counterparties, credit quality deterioration and consumer affordability. Barclay Bank recent credit rating is 'A' based on Moody assessment criteria, and the probability to remain the same is 99.17% in one month period.

Finally, country risks involve political, economic, government debt burden and regulatory risks. The sovereign rating for US, UK and India (key countries) are Aa2, Aaa, Baa2 respectively. And legal and compliance risks include contractual arrangements, litigation management and contact with regulators and competition/anti-trust.

All the risks mentioned above can have an influential effect on the investment result, thus the investor should consider them before investing in Barclay Bank.

Introduction:

Barclays Bank was established since 1736 and has been part of a major banking industry offering; mortgages, credit cards, investment banking and other financial services. Barclays currently operates in 29 countries worldwide including; USA, Europe, Latin America, Middle East, Africa, Asia, Indian ocean islands.

Barclays mission statement:

"Our common Purpose is "Creating opportunities to rise". We are a company of opportunity makers working together to help people rise- customers, clients, colleagues and society" (Barclays, 2019).

Barclays in the past couple of years introduced the digital eagle which protects their customers from fraudulent activities. They have also assisted young individuals by providing workshop sessions to prepare them with the real working environment and the acquirement of recruitment skills.

Overview of the role of risk management in organizations:

ERM approach comprises of pre-set processes and methods that are directed towards ensuring a holistic risk management procedure across the whole organization; where the responsibility lies within each and every individual inside the company. In order to tackle risks effectively, banks usually conduct risk control self-assessments aimed at risk identification, assessment, evaluation, deciding on suitable mitigation techniques (controls), monitoring and proper reporting. This mechanism has to be transparently disclosed through categorization, evaluation (based on severity and likelihood), prioritization and most importantly proper communication seeking not only materialized events, but also risks that might occur in the future. Organizations must have a solid non fragmented GRC structure, to ensure proper address of uncertainty triggers, reliable achievement of pre-set targets and integrity. Governance revolves around the idea of having a set of processes that are initiated and executed by upper level management (board of directors) reflected in the structure of the company itself and managed in a way targeting goal achievement. Risk Management is a holistic approach based on the concept of risk culture and directed towards predicting and mitigating risks that an organization might face and might prevent it from overall goal accomplishment and sustainability. As for Compliance, it is related to the adherence to all the laws and regulations imposed by the central bank which bases its regulations on government, regulatory entities and basil accord. Furthermore, a risk appetite framework must be outlined as a way of defining the risk level that the company is willing and able to tolerate and act on the basis of it. In respect to the approaches that banks specifically use in terms of risk management, there is a risk decomposition and aggregation. Risk decomposition aims at tackling risks individual to ensure full coverage, and risk aggregation is about the reduction of systematic risk through diversification.

Role of RAROC in banking sector:

In Financial Risk Management, the major objective of RAROC is to allocate capital across different sectors or units of the whole bank to determine the optimal capital structure by which the economic capital would have a close correlation with that particular business unit risk. Risk-Adjusted Return on Capital (RAROC) as a measurement of profitability, based on the risk profile is used as a threshold to compare the financial performance of the Bank with its competitors in that particular business line. RAROC is calculated by subtracting Costs, expected losses and taxes from Revenue and dividing it by Economic capital (Klaassen and Eeghen, 2014).

Hence, analysts can measure the financial performance of Barclays bank with other financial institutions such as ING bank, Lloyds, Credit Suisse by examining its RAROC value.

Risk Identification and Qualitative Analysis of Barclays Bank

Risk Type	Definitions	Specific Risk of Each category	Mitigation Techniques	Situations faced by Barclays
Market risk	[1]Market risk is the probability of losses due to change in market factors that affect the value of the firm's assets and liabilities.	[1]Interest rates, Traded credit, Foreign exchange, Equity prices, Commodity prices, Credit spreads, Implied volatilities, Asset correlations.	[1]Robust measurement, Limit setting, reporting Overseeing Controlling of market risk according to the allocated risk appetite.	[1]Management Value at Risk in Barclays is £540 million (11% rise on year) driven by a higher volatility environment in 2018.
Credit Risk & Counterparty Credit Risk	[1&3]Banks are exposed to the risk of loss to the firm from the failure of clients, customers or counterparties, including sovereigns, to fully honour their obligations to the firm, including the whole and timely payment of principal, interest, collateral and other receivables, which is called Credit Risk and Counterparty credit risk	[2]Impairment, Credit risks in specific sectors and concentrations, Consumer affordability, Real estate market, Credit rating changes and impact on stock price and funding cost, Adverse change in foreign exchange rate impact capital ratio, counterparty defaulting before the final settlement of a transaction's cash flows.	[2]Netting and Set off, Collateral, And Risk transfer	[1]Barclays' total Risk Weighted Asset for credit risk have decreased to £190.0 billion (2017) from £241.2 billion (2016)[1]. [1]The Counterparty credit risk decreased to £38.0bn (2017) from £48.4bn (2016)[2].
Operational Risk	[1]Operational risk is the probability of loss resulting from failure in systems or policies.	[1]Data Management and Information Risk, Financial Reporting Risk, Fraud Risk, Payments Process Risk, People risk, Premises and	[1]Managers in the businesses use self-assessment means to identify the risks; The bank can take action to reduce the level of risk in its operational risk management framework by considering a certain threshold;	Many customers in UK on September, 2018 could not access their accounts online via website and online banking as well since 10.45 a.m.

[1] This is driven by the proportional consolidation of BAGL, securitisation of corporate loans, the depreciation of period end USD against GBP, the re-measurement of US DTAs as a result of the US Tax Cuts and Jobs Act and the disposal of Non-Core related assets. (Barclays PLC 3 Pillar (2017)).

[2] This is primarily driven by the improvement in modelling of exposures, increase in hedging as well as reductions in Non-Core related assets (Barclays PLC 3 Pillar (2017)).

		Security Risk, Supplier risk, Tax risk, Technology risk, Transaction Operations Risk	Both financial and non-financial operational risks' analysis include the completion; Barclays keeps a record of external risk events[3].	until 5pm. because of Barclay's IT system failure as a part of operational risk (Jones, 2018).
Legal Risk and Compliance risk	The risk of loss or imposition of legal penalties, damages or fines from the failure of the firm to meet its legal obligations in the industry including regulatory or contractual requirements, internal policies lead to the legal and compliance risk in the banking sector (SearchCompliance, 2019).	[2]Contractual Arrangements, Litigation Management, Intellectual Property (IP), Competition/Anti-trust, Use of Law Firms, Contact with Regulators	[2] Risk and control self-assessment, testing and monitoring(Barclays UK, 2017 ; Analysis of legal risk material control issues; -Manage legal risks resulting from upcoming changes in the control environment, system, internal organisational structures (Barclays UK Plc (2018)) MetricStream[4] enables banking organizations to meet regulatory demands efficiently using a risk-based compliance framework[5] (Metricstream.com, 2017).	Barclays failed to pay compensation claims over payment protection insurance (PPI) to its many customers in UK. So, Fines, legal fees and customer compensation costs for Barclays were close to £17 billion as a part of legal risk (This is Money, 2019).
Reputation risk	[1]Risk occurring from negative perception on customers, shareholders, investors or regulators that can affect an ability of bank to maintain existing business relationships.	[1]Failure in the Accounting standards and policies, management and legal regulations, technical systems and negative reviews from customers.	[1]Chief Compliance Officer is accountable for developing a reputation risk framework and policies to check that they are subject to limits, monitored, and reported properly[6].	Barclay's reputation got hurt due to money laundering by top officials[7] (Ft.com, 2019).
Model risk	[1]The risk occurring from financial assessments or	[1]Model risk can result from the Wrong business	[1]Correctly identify models across all relevant areas of the bank, recording models in	

[3] Barclays keeps a record of external risk events which are publicly available and is a member of the Operational Riskdata eXchange ORX (Barclays PLC 3 Pillar (2017)).
[4] See appendix: figure 5.
[5] High risk areas of compliance are assessed, appropriate compliance strategies and controls are identified, evaluated, applied and monitoring and reporting processes are conducted at regular intervals (Metricstream.com, 2017).

[6] This risk is based on more subjective judgements and other risks (Barclays PLC 3 Pillar (2017)).
[7] Barclays secured around £12 billion pounds in emergency funds from mainly Gulf investors as markets plunged in 2008 to avoid the state bailouts taken by rivals Royal Bank of Scotland and Lloyds, hence, former Barclays CEO John Varley and three one-time colleagues stand charged over deals with Qatari investors to secure cash injections that allowed the bank to overcome the crisis a decade ago which affect Barclay's reputation badly (Ft.com, 2019).

	decisions based on incorrect model outputs and reports, is the model risk for Barclays.	decisions, Financial loss, Regulatory risks, Reputational risk, and inadequate reporting of capital	the Group Models Database (GMD), Every model owner develop the model, implement, and monitor data services and regulatory requirements, and qualitative metrics are used to track and report model risk	
Conduct risk	[1]Conduct risk is the risk that is harmful and caused by the customers, clients, counterparties, bank's employees because of non-proper judgement in the execution of business activities in Barclays.	[1]Product lifecycle, Culture and strategy, and Financial crimes	[1]This risk is identified, managed and monitored by the senior managers and group chief compliance officer of Barclays	
Liquidity risk	[2]Risk that the firm is unable to meet contingent obligations and has inappropriate amount to fund and liquidate its assets	[2]Structural risk, prepayment risk, recruitment risk, margin compression risk, lag risk and asset swap spread risk.	[2]Policy information, review and governance, analysis, liquidity stress testing[8], limit setting and monitoring.	[9]Barclays uses Fundtech as their liquidity management system in an attempt to improve its cash flows.
Sector risk	The risk that all of the securities in an entire banking sector will be affected by economic or other factors which pertain to that sector more specifically than other business sectors (Defined Term - A dictionary of defined terms for the legal profession, 2019)	Valuation risk for uncertain yields, Low profitability risk, Environment climate risk, Rapid growth in Fin Tech (financial products and services), Political Risk such as Brexit (KPMG, 2017).	Take proper decision for rationale loan upgrades, Developing a successful stress testing framework to know the scenario and its impacts, Update core system of bank to reflect changes in the credit ratings and impairment analysis after a panel discussion with industry experts (Ellen Biery Sageworks, 2019).	Barclays have prepared for Brexit by expanding their subsidiaries in Ireland in order to continue passporting their services into the UK (Barclays-Preparing for Brexit, 2019).

Table Sources:

1 Barclays PLC Pillar 3 Report 2017

2 Barclays UK Plc (2018).

3 Barclays Strategic report, 2019

[8] Liquidity Stress Testing implies a 30-day Barclays-specific stress event, a 90-day market-wide stress event and a 30-day combined scenario consist of both a Barclays-specific and market-wide stress event.

[9] This new system will allow companies to monitor its reserve and accounts as it will act as a regulator that sits above the bank's international payments function to bring liquidity to a specific level. (Finextra Research, 2007)

Quantitative Analysis Methodology:

1) Market Risk

The data range used throughout the market risk section is of monthly frequency covering the period between 1993 and 2019. Barclay Bank "BARC" last price was extracted via Bloomberg terminal in order to analyse market risk. A statistical summary for the key data parameters have been computed in Appendix; in order to have a more comprehensive overview of the nature of the data set. As per figure 1 in appendix, representing the volatility in price level, there is a substantial peak in 2006 prior to the global financial crisis between 2007 and 2008.

The approach used for calculating the VAR and Expected Shortfall is the "Historical Simulation". This method has been used in this report because it assumes no particular distribution pattern in relation to risk factor changes (Bohdalová, 2007). In addition, it does not rely on statistical determinants' estimations ending up with a more accurate result (Bohdalová, 2007).

In order to compute the value of VAR and Expected shortfall, historical information was used to compute the scenarios of gains or losses and the probability for each future scenario case. We used two assumptions to arrive at the likelihood for each scenario case:

1) Equal Probability: each scenario case has been assigned a similar probability. As a way of computing the probability, the number of each particular scenario was divided by the total number of scenarios.

2) Time Dependent: each scenario case has been assigned a probability based on its position in the timeline. The most recent scenarios have been assigned a higher weighting relative to previous scenarios as it is considered more important. The equation that was used to calculate weight according to time is presented in equation 1 in appendix.

The scenarios of gains and losses were calculated by subtracting the future value of the portfolio from the total amount of investment (£100,000). To arrive at the future value, we used the following equation 2 in appendix.

For this risk report, we calculated VAR and Expected Shortfall at 95% and 99%. By sorting the worse-case to best-case scenarios which we have already allocated time-weighted importance for, the VAR was computed by depicting the loss value at the probability of 5%, and 1% respectively. As for the Expected Shortfall, the figure has been calculated by

summing the values of the loss * its associated probability and based on the remainder out of the 5%, and 1% level, the total has been achieved. Findings are presented in the results section.

In order to arrive at the volatility of Barclay stock, EWMA model has been used for computing the returns across the 305 observations. The EWMA formula can be written as equation 3 in appendix.

As for the volatility, it is calculated as square root of variance. With respect to ʎ, it has been estimated by maximizing the sum of probabilities and setting 0-1 constraint in the solver function. The volatility chart is shown below in figure 2:

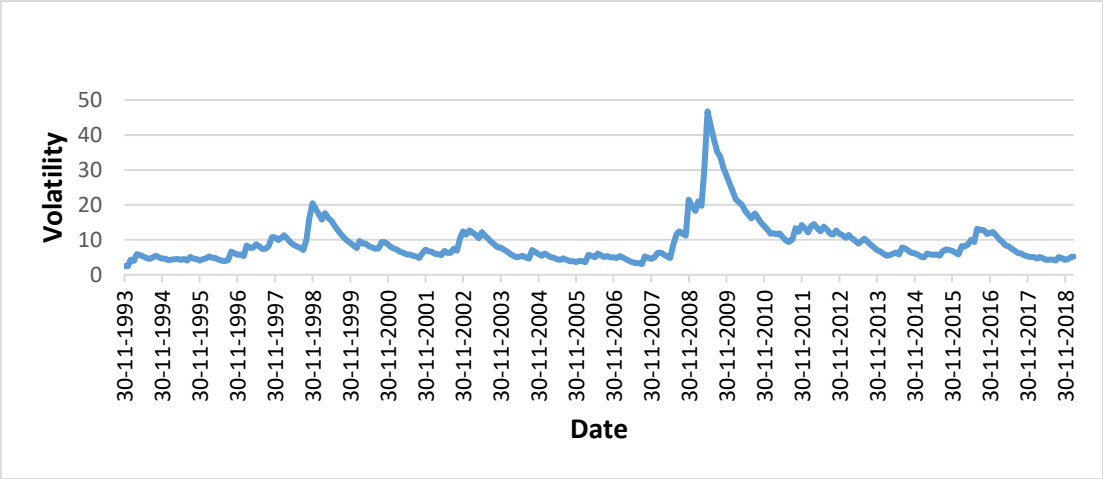

Figure 2: Volatility of Barclay Stock between 1993 and 2019.

As seen in the above graph, the peak of the volatility chart between 2008 and 2009 represent the crisis period. This matches the results from figure 1 in appendix, reflecting the extremely low stock price during the same period.

The accuracy of VAR has been used in this risk report to determine the interval that reflect the error accompanied in the estimation of VAR. Based on a mean and standard deviation estimation from our data, we have used equation 4 in appendix to compute the accuracy at the 95% and 99% level.

2) Credit Risk:

The risk that the investor might lose money from the downgrade of Barclay's credit rating. This report uses the transition matrix as it provides an informative snapshot on how the credit rating have changed overtime. Furthermore, transition matrix provides the migration probability of the credit rating. This study provides Moody's one year and one month average transition matrix between 1983 and 2016 to capture the trend of the future change in credit rating. And Barclay's nineteen assessment criterion over the period 2009-2018 were used as observations.

3) Liquidity Risk:

Since Barclay have had a history in liquidity risk, we have used bid-ask spread approach of Barclay stock from 1993-2019 to assess the liquidity of its market. The formula for bid-ask spread is shown as equation 5 in appendix.

Based on the spread, additional risk has been taken into consideration to arrive at an adjusted figure for the liquidity VAR and stressed VAR at 95% and 99% levels. This is represented by equations 6 &7 in appendix:

4) Operational Risk:

Based on Basel II Accord, there are three different approaches to determine the minimum capital requirement that must be set aside to cover operational risks. The data captured for Barclay Bank covered the period between 2008 and 2018. A description of the different approaches are summarized in table 2 in appendix.

5) Country Risk:

The country risks associated with Barclay multinational stems from the different business lines and branches in various countries. In 2018, there are 26 countries Barclay Bank operates in. The sovereign issuers credit rating based on Moody, S&P, and Fitch are used in this report because it provides insight about the political, economic, government debt burden and regulatory risks associated with operating in that country. In order to arrive at a relative risk for each country, a weight has been assigned based on the share of each country out of the total turnover. The sovereign transition matrix has been used to determine the probability that countries will be downgraded.

Result Section:

1) Market Risk:

Table 3: the values of the 95% and 99% VAR and Expected Shortfall

	Equal Probability		Time-weighted	
VAR 95%	14,565	We are 95% confident that a loss level of £14,565 will not be exceeded in 1 month period.	1,468	We are 95% confident that a loss level of £9,766 will not be exceeded in 1 month period.
VAR 99%	25,289	We are 99% confident that a loss level of £25,289 will not be exceeded in 1 month period.	2,529	We are 99% confident that a loss level of £9,766 will not be exceeded in 1 month period.
ES 95%	22,916	Conditional on the loss being in the bottom 5%, we will be losing £22,916 on average in 1 month period.	2,298	conditional on the loss being in the bottom 5%, we will be losing £9,912on average in 1 month period
ES 99%	36,960	Conditional on the loss being in the bottom 1%, we will be losing £36,960 on average in 1 month period.	3,628	Conditional on the loss being in the bottom 1%, we will be losing £10,496 on average in 1 month period.

Table 4: the accuracy of VAR at 99% and 95%

	Equal Probability		**Time-weighted**	
	Var 95%	**Var 99%**	**Var 95%**	**Var 99%**
	14,565.086	**25,288.549**	**1,468.146**	**2,528.855**
upper boundary 95%	14,565.107	25,288.571	1,468.168	2,528.877
lower boundary 95%	14,565.064	25,288.528	1,468.124	2,528.833
upper boundary 99%	14,565.132	25,288.596	1,468.192	2,528.901
lower boundary 99%	14,565.039	25,288.503	1,468.100	2,528.809

- Equal Probability:

VAR 95%, boundary 95%: We are 95% confident that at 95% VAR confidence level, a loss level should lie between £14,565.064 and £14,565.107 in 1 month period.

VAR 95%, boundary 99%: We are 99% confident that at 95% VAR confidence level, a loss level should lie between £14,565.039 and £14,565.132 in 1 month period.

VAR 99%, boundary 95%: We are 95% confident that at 99% VAR confidence level, a loss level should lie between £25,288.528 and £25,288.571 in 1 month period.

VAR 99%, boundary 99%: We are 99% confident that at 99% VAR confidence level, a loss level should lie between £25,288.503 and £25,288.596 in 1 month period.

- Time-Weighted Probability: ($\lambda = 0.995$)

VAR 95%, boundary 95%: We are 95% confident that at 95% VAR confidence level, a loss level should lie between £1,468.124 and £1,468.168 in 1 month period.

VAR 95%, boundary 99%: We are 99% confident that at 95% VAR confidence level, a loss level should lie between £1,468.100 and £1,468.192 in 1 month period.

VAR 99%, boundary 95%: We are 95% confident that at 99% VAR confidence level, a loss level should lie between £2,528.833 and £2,528.877 in 1 month period.

VAR 99%, boundary 99%: We are 99% confident that at 99% VAR confidence level, a loss level should lie between £2,528.809 and £2,528.901 in 1 month period.

Table 5: back-testing at 5% significant level

Back-Testing				
	95%		**99%**	
Equal Probability	0.99805	The critical value is 0.998, at 5% significant level, we accept the model	0.19032	The critical value is 0.190, at 5% significant level, we accept the model
Time-Weighted	0.99943	The critical value is 0.999, at 5% significant level, we accept the model	0.00000	The critical value is 0.000, at 5% significant level, we reject the model

2) Credit Risk:

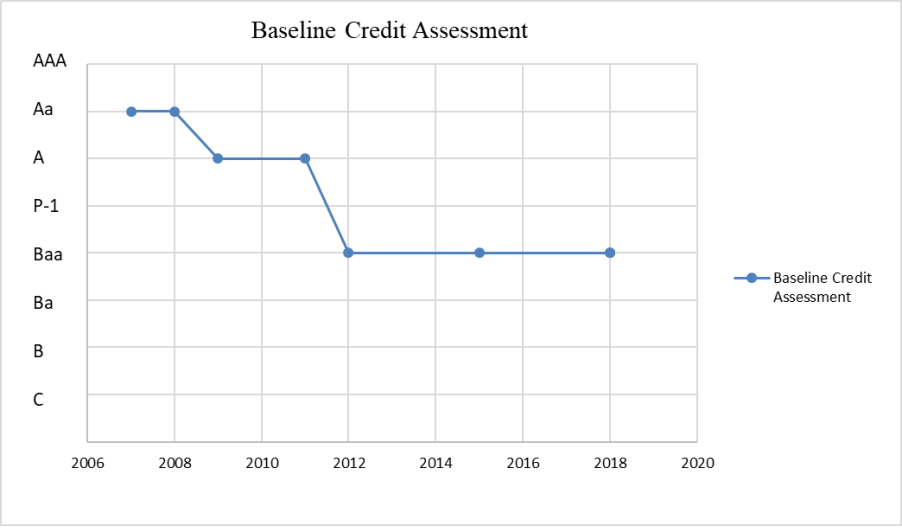

Figure 3: historical credit rating of Barclay Bank from 2009-2018

Overall there is a one-step move (up/down grade) in the credit rating of Barclay assessment criteria, in addition to a number of assessments remaining at the same level. The historical data can be described using moody matrix, where the probability to stay with the same credit rating is the highest amongst all. Meanwhile, the one step upgrade and downgrade has the second highest probability relative to others. For example: the Baseline Credit Assessment

remained with the same credit rating of Baa (prob. 85.15%) between 2012 and 2018. And there was a downgrade from A (prob. 5.59%) to Baa in 2012. One month and one year average transition matrix for 1983-2016 is shown as table 6&7 in appendix.

3) Liquidity Risk:

Table 8: Liquidity-Adjusted VAR and Liquidity-Adjusted stressed VAR of BARCLAY

		Liquidity-Adjusted VAR		Liquidity-Adjusted stressed VAR	
Equal Probability	VAR 95%	14,701.33	We are 95% confident that a loss level of £14,701.33 will not be exceeded in 1 month period.	16,411.43	We are 95% confident that a loss level of £16,411.43 will not be exceeded in 1 month period
	VAR 99%	25,424.79	We are 99% confident that a loss level of £25,424.79 will not be exceeded in 1	27,134.90	We are 99% confident that a loss level of £27,134.90 will not be exceeded in 1
Time-weighted	VAR 95%	1,604.39	We are 95% confident that a loss level of £1,604.39 will not be exceeded in 1 month period.	3,314.49	We are 95% confident that a loss level of £3,314.49 will not be exceeded in 1 month period.
	VAR 99%	2,665.10	We are 99% confident that a loss level of £2,665.10 will not be exceeded in 1 month period.	4,375.20	We are 99% confident that a loss level of £4,375.20 will not be exceeded in 1 month period.

4) Operational Risk:

Table 9: Barclay Bank Minimum Capital Requirement under the three different approach of Basel II

Year	Basic Indicators Approach (£m)	Standardized Approach (£m)	Advanced Measure Approach (£m)
2008	125	22	2,262
2009	136	26	2,288
2010	131	48	2,391
2011	112	108	2,639
2012	3,494	-	50,692
2013	3,713	-	50,600
2014	3,708	-	52,952
2015	3,708	-	52,952
2016	3,252	-	53,408
2017	3,252	-	53,408
2018	-	56,660	-
Source: Combined work from *Barclays PLC Pillar 3 Report 2009-2018*			

The minimum capital requirement have changed dramatically from 2011 to 2012 based on the updates in the regulations under Basel II accord. From 2012-2017, the minimum capital requirement of basic indicator and advanced measurement approach remained the same at about £3,500 m and £52,000 m respectively. But there is a change in the recent year, as Barclay set apart only the minimum capital of standardized approach.

5) Country Risk:

Figure 4: The Turnover of each Country in 2018

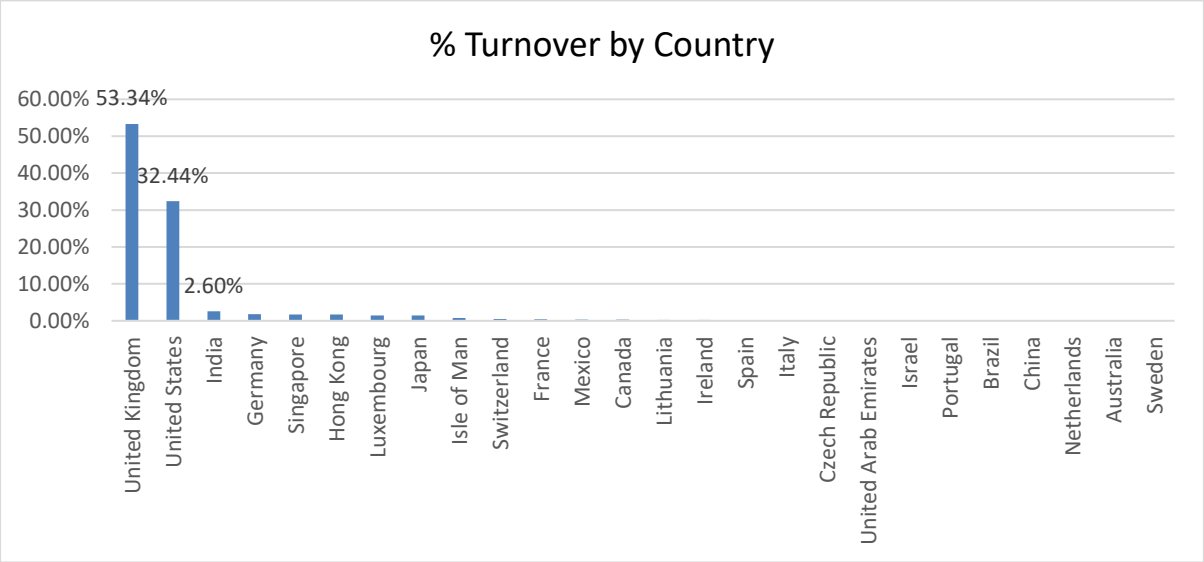

Table 10: Sovereign Credit Rating and Turnover of Top 3 Countries

Country	S&P	Moody's	Fitch	Turnover £m	Turnover %
UK	AA	Aa2	AA	12,311	53.34%
US	AA+	Aaa	AAA	7,486	32.44%
India	BBB-	Baa2	BBB-	600	2.60%
Total					**88.38%**

According to % turnover, UK, US and India account for nearly 88.38% out of the total turnover describing the return of Barclay Bank. The sovereign credit rating for these three specific countries should be considered when deciding to invest in Barclay bank. UK, US and India Aa, Aaa, Baa2 credit rating respectively. In order to invest in one year period, there is around 4% downgrade of UK and US countries. One month and one year average transition matrix for 1983-2016 is shown as table 11&12 in appendix.

Appendix

TABLE

Table 1: Statistical Parameters for Barclay Bank 1993-2019.

Statistical Parameters	
Mean	219.9101
Standard Deviation	93.66569
Range	428.41
Minimum	52.744
Maximum	481.154
Count	305

Table 2: Description of operational risk approaches

Approach:	Definition
Basic Indicator Approach:	Calculated as 15% of non-interest and interest income, averaged over the latest three years.
Standardised Approach:	Barclay bank activity have been grouped into 8 different business lines and beta factor has been multiplied as a weight to the average of each gross income in order to arrive at the total capital requirement
Advanced Measurement Approach:	Barclay Bank is considered an active international bank, therefore under Basel II accord it has been given the right to run the advanced measurement approach to satisfy the pre-specified listed conditions

Table 6: Moody's one month average transition matrix between 1983 and 2016

Corporates Issuers							
From/To	**Aaa**	**Aa**	**A**	**Baa**	**Ba**	**B**	**Caa-C**
Aaa	99.18%	0.80%	0.02%	0.00%	0.00%	0.00%	0.00%
Aa	0.09%	99.06%	0.82%	0.03%	0.00%	0.00%	0.00%
A	0.00%	0.23%	99.17%	0.53%	0.04%	0.01%	0.00%
Baa	0.00%	0.01%	0.38%	99.13%	0.39%	0.06%	0.01%
Ba	0.00%	0.00%	0.02%	0.58%	98.47%	0.79%	0.04%
B	0.00%	0.00%	0.01%	0.02%	0.50%	98.39%	0.71%
Caa-C	0.00%	0.00%	0.00%	0.01%	0.01%	1.04%	97.15%

Table 7: Moody's one year average transition matrix between 1983 and 2016

Corporates Issuers							
From/To	**Aaa**	**Aa**	**A**	**Baa**	**Ba**	**B**	**Caa-C**
Aaa	86.70%	8.45%	0.46%	0.09%	0.03%	0.00%	0.00%
Aa	0.76%	84.73%	8.62%	0.46%	0.06%	0.04%	0.02%
A	0.05%	2.51%	86.06%	5.59%	0.51%	0.12%	0.05%
Baa	0.03%	0.14%	4.18%	85.15%	3.90%	0.77%	0.20%
Ba	0.01%	0.04%	0.45%	6.19%	75.16%	7.61%	0.89%
B	0.01%	0.03%	0.15%	0.45%	4.75%	73.26%	7.28%
Caa-C	0.00%	0.01%	0.03%	0.08%	0.39%	6.32%	68.46%

Table 11: Moody's one month average transition matrix between 1983 and 2016

From/To	Aaa	Aa	A	Baa	Ba	B	Caa-C
Aaa	99.72%	0.28%	0.00%	0.01%	0.00%	0.00%	0.00%
Aa	0.30%	99.36%	0.21%	0.07%	0.01%	0.00%	0.00%
A	0.00%	0.36%	99.23%	0.30%	0.10%	0.00%	0.00%
Baa	0.00%	0.00%	0.57%	98.97%	0.44%	0.03%	0.00%
Ba	0.00%	0.00%	0.00%	0.75%	98.58%	0.62%	0.01%
B	0.00%	0.00%	0.00%	0.00%	0.42%	98.95%	0.39%
Caa-C	0.00%	0.00%	0.00%	0.00%	0.00%	1.79%	96.89%

Table 12: Moody's one year average transition matrix between 1983 and 2016

Average One Year Transition Matrix, 1983-2016							
Sovereign Issuers							
From/To	**Aaa**	**Aa**	**A**	**Baa**	**Ba**	**B**	**Caa-C**
Aaa	96.70%	3.14%	0.03%	0.09%	0%	0%	0%
Aa	3.45%	92.68%	2.35%	0.79%	0.12%	0%	0%
A	0%	4.02%	91.30%	3.37%	1.24%	0.07%	0%
Baa	0%	0%	6.14%	88.65%	5.68%	0.48%	0.04%
Ba	0%	0%	0%	7.88%	84.59%	6.58%	0.27%
B	0%	0%	0%	0%	4.42%	88.61%	3.77%
Caa-C	0%	0%	0%	0%	0.12%	17.11%	68.79%

N.B: The remaining percentages to complete a 100% probability (Withdrawal, Default) across each credit rating have been excluded

FIGURE

Figure 1: Change in Barclay last price per share from 1993-2019.

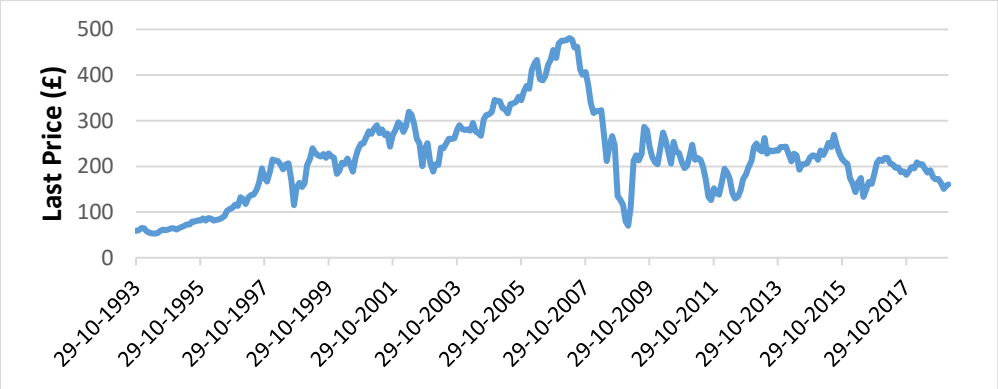

Figure 5: MetricStream Compliance Risk Management Lifecycle (Metricstream.com, 2019)

EQUATION

Equation 1:

$$w_n = \frac{\Lambda^{n-1}(1-\Lambda)}{1-\Lambda^n}$$

Equation2:

$$V_p = \frac{p}{V_n} \times \frac{V_n \times V_i}{V_{i-1}}$$

Equation 3:

$$\sigma_n^2 = \Lambda\sigma_{n-1}^2 + (1-\Lambda)u_{n-1}^2$$

Equation 4:

$$\sigma_{error} = \frac{1}{f(x)}\sqrt{\frac{q(1-q)}{n}}$$

Equation 5:

$$s = \frac{offer\ price - bid\ price}{mid\ market\ price}$$

Equations 6:

$$Liq.Adj.VAR = VAR + \sum_{i=1}^{n}\frac{1}{2}s_i\alpha_i$$

Equation 7:

$$Liq.Adj.stressed\ VAR = VAR + \sum_{i=1}^{n}\frac{1}{2}(\mu_i + \lambda\sigma_i)\alpha_i$$

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