IMEN891H

Valuation on Cyber Insurance Companies

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1. Introduction

Increased Dependence on IT Devices with the Advent of COVID-19

- The COVID-19 pandemic, which occurred in 2019, led to a widespread shift to remote environments, significantly increasing dependence on IT devices.
- According to Bahkir and Grandee (2020), the usage of digital devices has gone up across the globe because of the declaration of the lockdown due to COVID-19.

- This heightened reliance on IT devices also amplified the potential risks associated with cyber risks.
- During the COVID-19, there were a large exposure to cyber risk by the move towards more working from home(WFH) and other operational challenges(Radanliev et al., 2020 ; Aldasoro et al., 2021).

- The overall context emphasized the critical importance of cyber insurance, driving an increase in demand for cyber insurance policies.

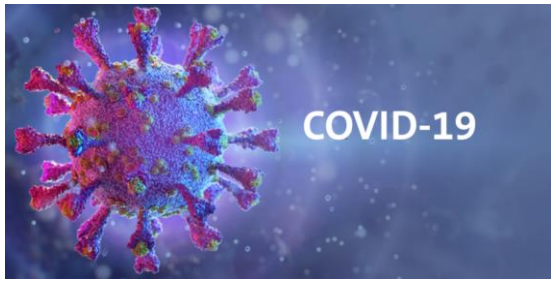
Bahkir, F. A., & Grandee, S. S. (2020). Impact of the COVID-19 lockdown on digital device-related ocular health. *Indian journal of ophthalmology*, *68*(11), 2378-2383.
Aldasoro, I., Frost, J., Gambacorta, L., & Whyte, D. (2021). *Covid-19 and cyber risk in the financial sector* (No. 37). Bank for International Settlements.
Radanliev, P., De Roure, D., & Van Kleek, M. (2020). Digitalization of COVID-19 pandemic management and cyber risk from connected systems. *arXiv preprint arXiv:2005.12409*.

1. Introduction

Comparison of the value of Two main Cyber Insurance companies

- This project aims to evaluate the value of two leading cyber insurance companies: AIG and AXA.
- This evaluation is based on the methodology outlined in

- The key objectives of this project are as follows:
  - Analyze changes in the value of cyber insurers during the COVID-19.
  - Forecast and compare the future value of cyber insurers based on the findings.



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AIG

AXA

1. Introduction

Comparison of the value of Two main Cyber Insurance companies

- The overall framework for this project is as follows:

Steps	Task to do
Step 1	• Choose two firms in the same industry and set the plan for work → Set the **two main cyber insurance companies, AIG and AXA**.
Step 2	• Determine several drivers, including revenue, operating expenses, capital expenditures, and tax rates, from annual reports and other verified websites (i.e. Bloomberg or Yahoo Finance) for valuation to build up the pro forma statements and the logical reasons for selections. • With the projections, calculate the companies' free cash flow (FCF) for each year.
Step 3	• With the DCF model, **discount FCF projections** to their present value using each firm's weighted average cost of capital (WACC), estimating intrinsic value. • Compare the valuation results of two firms and suppose any insights or opinions on each firm's result and comparison in the perspective of unique strengths, growth potential and strategic positioning in the expanding cyber insurance market.
Step 4	• Write the final report and presentation based on the comparison results.

2. Experimental settings

Metrics and assumptions used for estimating FCF/WACC

- The financial metrics we used to calculate FCF are as follows:

Purpose	Metrics	Experimental settings
FCF	EBIT	Alpha Insights (2020) assumed that the distribution of EBIT's growth rate follows a **normal distribution**.
	Taxes / Net Working Capital	(Assumptions) • If there is a linear trend, the values are estimated using **linear regression**(i.e. 200 → 230 → 470 → 930) • Otherwise, the values are assumed to follow a **normal distribution.**
	Depreciation	In Jorgenson (1973), empirical studies on specific assets conclude a **geometric pattern** of depreciation is appropriate.

https://alphabridge.co/featured/monte-carlo-simulation-canadian-tire/
Jorgenson, D. W. (1974). The economic theory of replacement and depreciation. In *Econometrics and Economic Theory: Essays in Honour of Jan Tinbergen* (pp. 189-221). London: Palgrave Macmillan UK.

3. Free Cash Flow on observed period (1/2)

FCF and comparison to the period of COVID-19(AIG)

- **AIG's FCF** for 2019 to 2023 is as follows
- The COVID-19 outbreak occurred in early 2020, and the pandemic was intense from then until 2022.

- AIG's FCF shows a noticeable increase from 2020 to 2021, but declines thereafter.

(Units: $M)

	2019	2020	2021	2022	2023
EBIT	6,600	2,737	12,416	16,363	4,748
Taxes	22.05%	0.00%	18.29%	21.16%	0%
(Plus) Depreciation	5,006	4,120	4,542	4,409	4,214
(Less) NWC	6,036	-3,600	-2,796	21,179	7,277
FCF	**4,114.7**	**10,457**	**17,483.11**	**-3,869.41**	**1,685**

https://stockanalysis.com/stocks/aig/financials/

3. Free Cash Flow on observed period (2/2)

FCF and comparison to the period of COVID-19(AXA)

- **AXA's FCF** from 2019 to 2023 is as follows.
- Similar to the trend we observed for AIG, we see a noticeable increase in FCF from 2020 to 2021, but a decline thereafter.

- However, we see a noticeable resurgence in 2023.

(Units: $M)

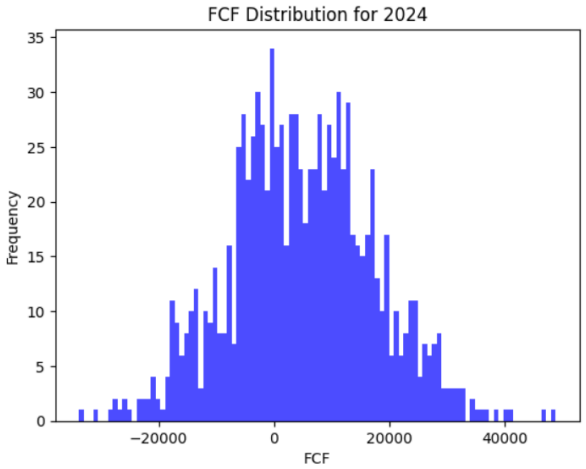
	2019	2020	2021	2022	2023
EBIT	6,313.36	5,782.3	10,316.98	7,860.96	9,810.3
Taxes	25.23%	31.63%	18.36%	20.90%	17.03%
(Plus) Depreciation	1,458.56	1,246.56	922.2	922.2	0
(Less) NWC	1,886.8	1,181.9	110.24	125,349.2	934.92
FCF	**4,292.2593**	**4,018.019**	**9,234.742**	**-118,209**	**7,204.686**

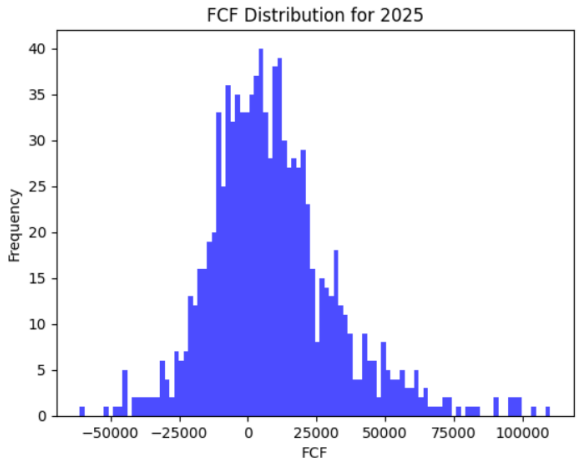
https://stockanalysis.com/quote/etr/AXA/financials/

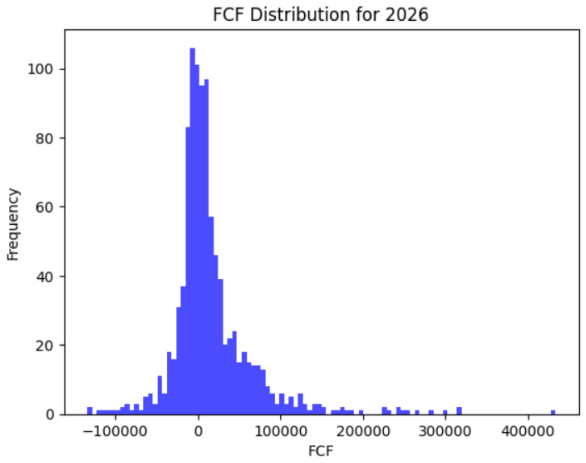
3. Free Cash Flow on planning period (1/2)

Results of FCF during COVID-19 (AIG)

- The FCF results from the Monte Carlo simulation for AIG Insurance Company were as follows.







2024	
Mean	4,865
Std.Dev	12,429
Min	-33,765
Max	48,846
Median	4,331

2025	
Mean	8,968
Std.Dev	23,069
Min	-61,104
Max	110,070
Median	6,273

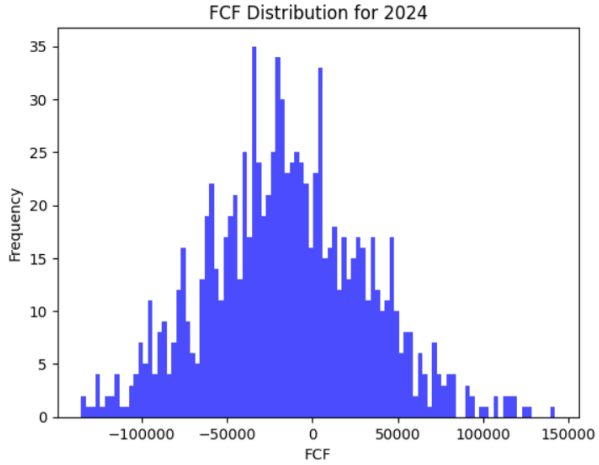
2026	
Mean	15,947
Std.Dev	50,251
Min	-133,838
Max	432,872
Median	5,116

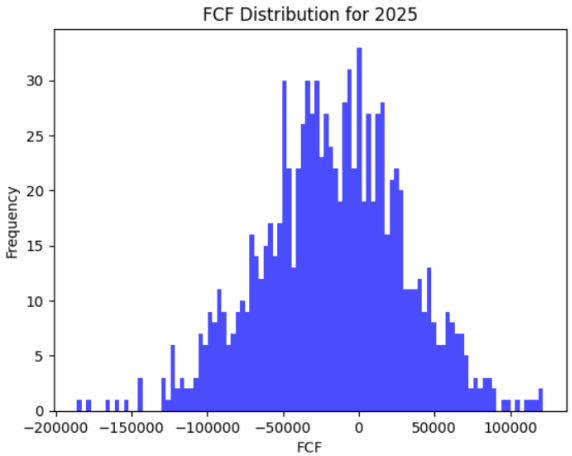
https://stockanalysis.com/quote/etr/AXA/financials/

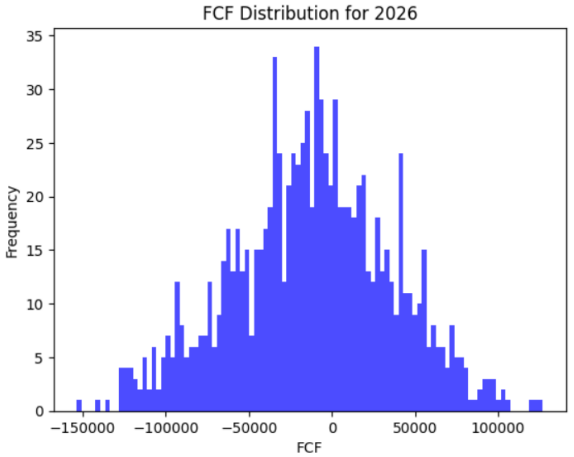
3. Free Cash Flow on planning period (2/2)

Results of FCF during COVID-19 (AXA)

- The FCF results from the Monte Carlo simulation for AXA Insurance Company were as follows.







2024	
Mean	-15,060
Std.Dev	46,495
Min	-135,551
Max	142,271
Median	-16,825

2025	
Mean	-17,390
Std.Dev	47,221
Min	-185,900
Max	121,713
Median	-16,707

2026	
Mean	-12,146
Std.Dev	48,104
Min	-153,298
Max	126,807
Median	-10,528

https://stockanalysis.com/quote/etr/AXA/financials/

4. Calculate WACC

Metrics and assumptions used for estimating WACC

- Based on the values suggested by ‘valueinvesting’, we set the financial metrics for estimating WACC as follows.
- Set a range for the WACC, taking two values, the minimum and maximum, and applying them to the discount to observe.

American International Group Inc. (AIG)		
	Low	High
Long-term bond rate	3.9%	4.4%
Equity market risk premium	4.6%	5.6%
Adjusted beta	0.68	0.82
Additional risk adjustments	0.0%	0.5%
Cost of equity	7.0%	9.5%
Tax rate	19.3%	20.5%
Debt/Equity ratio	0.47	0.47
Cost of Debt	5.0%	5.0%
After-tax WACC	**6.0%**	**7.7%**

AXA SA		
	Low	High
Long-term bond rate	3.0%	3.5%
Equity market risk premium	5.8%	6.8%
Adjusted beta	0.88	1
Additional risk adjustments	0.0%	0.5%
Cost of equity	8.1%	10.8%
Tax rate	20.1%	22.9%
Debt/Equity ratio	0.33	0.33
Cost of Debt	5.0%	5.0%
After-tax WACC	**7.1%**	**9.0%**

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5. Final Corporate value

Final value of two main cyber insurers

- For each year of the distribution, the average value was discounted to 2019 using the WACC to determine the NPV.
- The results are as follows.

(Units: $M)

	2024	2025	2026	Sum
WACC min	3,635.7	6,322.6	10,605.7	**20,564.00**
WACC max	3,357.7	5,746.9	9,488.0	**18,592.60**

AIG

(Units: $M)

	2024	2025	2026	Sum
WACC min	-10,687.7	-11,523.4	-7,514.8	**-29,725.90**
WACC max	-9,788.2	-10,369.5	-6,644.4	**-26,802.10**

AXA

https://alphabridge.co/featured/monte-carlo-simulation-canadian-tire/
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6. Conclusion

Conclusion of this project

- In this project, we calculated the FCF based on the distribution of each metric from the literature, calculated the maximum and minimum values of the WACC, and used Monte Carlo simulations to determine the value of the companies.

- In this way, we (1) confirmed the direct relationship between COVID-19 and the value of cyber insurers, and (2) evaluated the value of both companies by forecasting FCF for the next three years.

- The valuation results confirm that AIG is worth more than AXA.

- AXA had a negative value, likely due to a large NWC for 2022.

- Therefore, we expect AIG to be more valuable in cyber risk over the next three years.

Thank you

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