CREDIT RISK MANAGEMENT – MSF
JP MORGAN 2024

LOAN PORTFOLIO OF JP MORGAN

The table shows 15 unique companies in the loan portfolio for JP Morgan in the financial year of 2024, specifying the company name, stock ticker, and the function or purpose of the loan. Additionally, it highlights the loan amount in millions, the start and end dates of the loans, and whether the loans are backed by collateral. It also includes the current date for reference, the financial year, the number of days and years remaining until the loan matures.

Company (borrower)	Ticker	Function	Loan amount (in millions)	Start date	End date	Collateral	Current date	Year	Days to maturity	Years to maturity	T0-TT
Macquarie Group Ltd	MQG.AX	6211: Security brokers and dealers	2505	3/3/21	3/3/26	No	11/15/24	2021	473	1.30	5
PepsiCo Inc	PEP.O	2086: Bottled and canned soft drinks	3750	5/28/21	5/28/26	No	11/15/24	2021	559	1.54	5
Enel SpA	ENEI.MI	4911: Electric services	11917	3/5/21	3/5/26	No	11/15/24	2021	475	1.31	5
Automatic Data Processing Inc	ADP.O	8721: Accounting/auditing/bookkeeping	6950	6/9/21	6/9/26	No	11/15/24	2021	571	1.57	5
Kimberly-Clark Corp	KMB	3842: Surgical appliances and supplies	2750	6/4/21	6/4/26	No	11/15/24	2021	566	1.55	5
Intel Corp	INTC.O	3674: Semiconductors/related devices	5000	3/26/21	3/26/26	No	11/15/24	2021	496	1.36	5
Best Buy Co Inc	BBY	5731: Radio, tv, & electronic stores	1250	5/18/21	5/18/26	No	11/15/24	2021	549	1.51	5

Company	Ticker	SIC	Amount	Start	Maturity	Flag	Date	Year	Num	Weight	Rating
S&P Global Inc	SPGI.K	2731: Book publishing	1500	4/26/21	4/26/26	No	11/15/24	2021	527	1.45	5
Motorola Solutions Inc	MSI	3663: Radio/tv communications equip	2250	3/24/21	3/24/26	No	11/15/24	2021	494	1.36	5
Cisco Systems Inc	CSCO.O	3661: Telephone and telegraph apparatus	3000	5/13/21	5/13/26	No	11/15/24	2021	544	1.49	5
Dominion Energy Inc	D	4911: Electric services	6000	6/9/21	6/9/26	No	11/15/24	2021	571	1.57	5
Alphabet Inc	GOOGL.O	2741: Misc publishing	10000	4/21/21	4/21/26	No	11/15/24	2021	522	1.43	5
Ecolab Inc	ECL	2841: Soap and other detergents	2019	4/16/21	4/16/26	No	11/15/24	2021	517	1.42	5
Comcast Corp	CMCSA.O	4841: Cable and other pay tv services	11000	3/30/21	3/30/26	No	11/15/24	2021	500	1.38	5
General Electric Co	GE	3511: Turbines/turbine generator sets	10000	5/27/21	5/27/26	No	11/15/24	2021	558	1.53	5

The below table highlights sectors by loan weight percentage and the number of companies. Electric Services has the highest loan weight (22.43%) across 2 companies, while Cable and Other Pay TV Services (13.77%) and Miscellaneous Publishing (12.52%) are dominated by single companies. A unique observation is that Turbines/Turbine Generator Sets contributes significantly (12.52%) despite having only one company, indicating a large loan concentration in this sector.

Sector	Number of Companies	Total Weight (%)
Electric services	2	22.43
Cable and other pay tv services	1	13.77
Misc. publishing	1	12.52
Turbines/turbine generator sets	1	12.52
Accounting/auditing/bookkeeping	1	8.7
Semiconductors/related devices	1	6.26
Bottled and canned soft drinks	1	4.69
Telephone and telegraph apparatus	1	3.76
Surgical appliances and supplies	1	3.44
Security brokers and dealers	1	3.14
Radio/tv communications equip	1	2.82
Soap and other detergents	1	2.53

Book publishing	1	1.88
Radio, tv, & electronic stores	1	1.56

MODELLING PROBABILITY OF DEFAULT

The probability of default is the likelihood that a borrower, which can be an individual, a corporate or a government fails to meet its debt obligations within a specified time period.
The probabilities of default (PD) for these companies were estimated using different approaches such as rating agency model, structural model, Reduced form model, Hybrid model, Sensitivity analysis.

RATING AGENCY MODEL

The Rating Agency Model is a way to evaluate creditworthiness, we look at financial health, market conditions, and past repayment behavior to predict the likelihood of default, helping lenders and investors make informed decisions.

For this model, we used Moody's ratings for different companies to calculate average Probability of Default (PD) from 2015 to 2024.
We calculated the **Hazard Rate h(t)** using the following formulae in excel

$$h(5) = -1/5 \times \ln(1 - \text{default rate for 5 years})$$

and **Probability of Default (PD)** calculated using the following formulae in excel

$$PD(5) = 1 - \exp(-h(5) \times 5)$$

Company (borrower)	Average PD for 10 years
Macquarie Group Ltd	0.44%
PepsiCo Inc	0.44%

Enel SpA	1.48%
Automatic Data Processing Inc	0.30%
Kimberly-Clark Corp	0.44%
Intel Corp	0.54%
Best Buy Co Inc	1.06%
S&P Global Inc	0.75%
Motorola Solutions Inc	1.48%
Cisco Systems Inc	1.48%
Dominion Energy Inc	1.48%
Alphabet Inc	0.30%
Ecolab Inc	1.06%
Comcast Corp	0.44%
General Electric Co	1.17%

The calculation for this part can be found in the Excel File attached named Rating Agency Model

In this manner by using the following above formulae we obtained the PDs for 10 years and calculated the average. The Rating Agency model evaluated the creditworthiness and associated default risk for various corporations over a decade-long period (2015–2024). It analyzes credit ratings, default rates, hazard rates, and cumulative probabilities of default (PD) to identify trends and shifts in risk. Several companies, such as Macquarie Group Ltd, Pepsi Co, and Alphabet Inc, demonstrated consistent ratings and risk metrics, reflecting strong financial stability. In contrast, companies like ENEL S.p.A., General Electric Co, and Motorola Solutions Inc faced higher default rates of 1.48%, indicating elevated credit risk. Notably, companies like Automatic Data Processing Inc and Alphabet Inc exhibited the lowest default rates of 0.30%, signifying minimal risk. The analysis also revealed significant rating transitions for companies such as General Electric Co, which downgraded from A1 to Baa1 over the period, resulting in an increased cumulative PD of 1.17%. Similarly, Ecolab Inc and Best Buy Co Inc experienced shifts in credit ratings, with cumulative PDs of 1.06%. Hazard rates remained closely aligned with default rates, reflecting heightened risk during rating downgrades. Overall, we tried to highlight the dynamic nature of corporate credit risk and the critical role of rating transitions in shaping financial assessments.

STRUCTURAL MODEL

A Structural Model is used to assess credit risk by linking a company's asset value to its debt. It predicts default by comparing the company's asset value to its liabilities, using concepts like equity as an option.

We calculated the structural model for calculating the Probability of Default (PD) using methodologies from the **Week 6 lecture materials**. **The asset value was obtained from Yahoo Finance, while the asset volatility was derived using Bloomberg data. The debt value was calculated as the sum of 50% of long-term debt and the total short-term debt, sourced from Yahoo Finance. A 5-year Treasury bond rate of 4.30%, as reported by Bloomberg, was used as the risk-free rate** in the analysis. The Distance-to-Default (DD) was computed using the **formulae DD= (LN(V) -LN(D))/σ** and the Probability of Default (PD) was determined using the standard normal cumulative distribution **function, PD=NORMSDIST(−DD).** These calculations provide a quantitative assessment of default risk based on the structural model framework. The computations and results are below

Company (borrower)	DD	PD
Macquarie Group Ltd	3.27	0.05%
PepsiCo Inc	2.74	0.30%
Enel SpA	3.42	0.03%
Automatic Data Processing Inc	0.71	23.86%
Kimberly-Clark Corp	2.26	1.20%
Intel Corp	2.47	0.67%
Best Buy Co Inc	1.94	2.60%
S&P Global Inc	7.17	0.0000000000365%
Motorola Solutions Inc	1.74	4.11%
Cisco Systems Inc	3.54	0.02%
Dominion Energy Inc	2.02	2.18%
Alphabet Inc	4.91	0.0000451%
Ecolab Inc	4.35	0.000678%
Comcast Corp	3.59	0.0165%
General Electric Co	1.73	4.1448%

The calculation for this part can be found in the Excel File attached named Structural Model

From the results, companies like S&P Global Inc. and Alphabet Inc. demonstrates exceptionally low PD values, indicating financial health and minimal default risk. Conversely, companies like Automatic Data Processing Inc. and Motorola Solutions Inc. exhibit higher PD, suggesting relatively greater vulnerability to financial distress. Factors such as asset volatility and debt levels play a critical role in influencing these probabilities. The analysis also highlighted the sensitivity of PD to changes in DD, with a direct relationship between lower DD values and higher PD. Overall, this model effectively quantifies default risk and offers insights into the financial resilience of the companies assessed.

REDUCED FORM MODEL

The Reduced Form Model is what we used to estimate credit risk by focusing on the likelihood and timing of default. Instead of analyzing the borrower's financial structure, we relied on market data, such as bond prices and credit spreads, to predict default events, making our approach straightforward and flexible.

We calculated the Probability of Default (PD) for the selected companies using the Reduced Form Model by integrating key financial and market data from reliable sources and applying methodologies discussed in class. For these calculations, we obtained **short-term and long-term debt figures from Yahoo Finance**, ensuring the data accurately reflected the firm's current financial position. The bond yield was derived **using Bloomberg's "SRCH" function**, which provided market-driven yield data that captures current credit risk and investor sentiment. Similarly, we calculated the credit spread **using Bloomberg's "CDSV" function** to determine the risk premium associated with the bond relative to risk-free benchmarks. For the **recovery rate**, we assumed **a value of 40%, as specified in the course lecture slides**, representing the portion of the bond's value likely to be recovered in case of default. By integrating these inputs into the Reduced Form Model, we successfully calculated the Probability of Default, demonstrating a practical application of theoretical concepts to real-world data.

Company (borrower)	Spread	Recovery	Hazard	T(t)	Q(t)
Macquarie Group Ltd	0.49%	40%	0.008236667	1.30	1.07%
PepsiCo Inc	0.3950%	40%	0.006583333	1.54	1.01%
Enel SpA	0.5493%	40%	0.009155	1.31	1.19%
Automatic Data Processing Inc	0.2390%	40%	0.003983333	1.57	0.62%
Kimberly-Clark Corp	0.4368%	40%	0.00728	1.55	1.12%
Intel Corp	0.7469%	40%	0.004012545	1.36	1.68%
Best Buy Co Inc	0.4894%	40%	0.008156667	1.51	1.22%
S&P Global Inc	0.3964%	40%	0.006606667	1.45	0.95%
Motorola Solutions Inc	0.3027%	40%	0.005045	1.36	0.68%
Cisco Systems Inc	0.2601%	40%	0.004335	1.49	0.65%
Dominion Energy Inc	0.3892%	40%	0.006486667	1.57	1.01%
Alphabet Inc	0.3042%	40%	0.00507	1.43	0.72%
Ecolab Inc	0.4189%	40%	0.006981667	1.42	0.99%
Comcast Corp	0.4592%	40%	0.007653333	1.38	1.05%
General Electric Co	0.3108%	40%	0.00518	1.53	0.79%

The calculation for this part can be found in the Excel File attached named Reduced Form Model

In the above table Hazard rates and PD values are derived using inputs such as bond yields, credit spreads, recovery rates, and time-to-maturity. Among the companies analyzed, PD values range from 0.62% to 1.68%, reflecting varying levels of default risk. Companies like Automatic Data Processing Inc and Cisco Systems Inc demonstrate lower PD values of 0.62% and 0.65%, respectively, indicating relatively low credit risk. In contrast, firms such as Intel Corporation and Comcast Corp exhibit higher PD values of 1.68% and 1.05%, respectively, influenced by higher spreads and other financial factors. We also observe variations in hazard rates, with Alphabet Inc and Motorola Solutions Inc showing some of the lowest hazard rates (0.00507 and 0.005045), while Intel Corporation displays a relatively higher hazard rate (0.012448333). These results highlight the importance of bond market metrics and recovery assumptions in quantifying credit risk using the Reduced Form Model.

HYBRID MODEL

The Hybrid Model combines features of structural and reduced-form models. We used it to assess credit risk by integrating a company's financial structure from rating agency model, structural models with market data from reduced-form models, providing a more comprehensive and balanced evaluation of default risk.

We plugged in all available probability of default from each model that is Rating, Structural and Reduced Form Model. Companies like PepsiCo Inc, Enel SpA, and Intel Corp show relatively aligned PDs across all three models, suggesting stable risk profiles.

Borrower	Rating Agency Model	Structural Model	Reduced Form Model
Macquarie Group Ltd	0.44%	0.05%	1.07%
PepsiCo Inc	0.44%	0.30%	1.01%
Enel SpA	1.48%	0.03%	1.19%
Automatic Data Processing Inc	0.30%	23.86%	0.62%
Kimberly-Clark Corp	0.44%	1.20%	1.12%
Intel Corp	0.54%	0.67%	1.68%
Best Buy Co Inc	1.06%	2.60%	1.22%
S&P Global Inc	0.75%	0.0000000000365%	0.95%
Motorola Solutions Inc	1.48%	4.11%	0.68%
Cisco Systems Inc	1.48%	0.020%	0.65%
Dominion Energy Inc	1.48%	2.181%	1.01%
Alphabet Inc	0.30%	0.0000451%	0.72%
Ecolab Inc	1.06%	0.00068%	0.99%
Comcast Corp	0.44%	0.016%	1.05%
General Electric Co	1.17%	4.14%	0.79%

We used the following three weights as the part of analysis. In Weight Category 1, we treat all models equally, giving each an equal weight of 33.33%. For Weight Category 2, we place more importance on the Reduced Form Model, assigning it 50% weight, while the Rating Agency Model and Structural Model get 30% and 20%, respectively. Similarly, in Weight Category 3, we still prioritize the Reduced Form Model with 50% weight but shift our focus slightly, giving 30% to the Structural Model and 20% to the Rating Agency Model.

	Weight category 1	Weight category 2	Weight category 3
Rating agency model	0.33	0.3	0.2
Structural Model	0.33	0.2	0.3
Reduced form model	0.33	0.5	0.5

Borrower	W1	W2	W3
Macquarie Group Ltd	0.51%	0.68%	0.64%
PepsiCo Inc	0.58%	0.70%	0.68%
Enel SpA	0.89%	1.04%	0.90%
Automatic Data Processing Inc	8.18%	5.17%	7.53%
Kimberly-Clark Corp	0.91%	0.93%	1.01%
Intel Corp	0.96%	1.14%	1.15%
Best Buy Co Inc	1.61%	1.45%	1.60%
S&P Global Inc	0.56%	0.70%	0.63%
Motorola Solutions Inc	2.07%	1.61%	1.87%
Cisco Systems Inc	0.71%	0.77%	0.62%
Dominion Energy Inc	1.54%	1.39%	1.46%
Alphabet Inc	0.34%	0.45%	0.42%
Ecolab Inc	0.68%	0.81%	0.71%
Comcast Corp	0.50%	0.66%	0.62%
General Electric Co	2.01%	1.57%	1.87%
PORTFOLIO PD	1.47%	1.27%	1.45%

SENSITIVITY ANALYSIS

Sensitivity Analysis helps us understand how changes in key variables affect the model's outcomes. We used a correlation matrix to analyze the relationships between variables and assess their impact on credit risk predictions.

The rankings in the table were calculated by comparing the Probability of Default (PD) values for each borrower across the three models: Rating Agency Model, Structural Model, and Reduced Form Model. For each borrower, the PD values from the three models were sorted in ascending order, and rankings were assigned

based on the magnitude of the PDs, this process was repeated for all borrowers, resulting in a ranking for each model. These rankings highlight which model predicts the lowest or highest credit risk for each borrower, providing a clear view of the sensitivity of each model under varying borrower profiles.

Borrower	RANKING FOR MODELS		
	Rating Agency Model	Structural Model	Reduced Form Model
Macquarie Group Ltd	4.5	7	11
PepsiCo Inc	4.5	8	8.5
Enel SpA	13.5	6	13
Automatic Data Processing Inc	1.5	15	1
Kimberly-Clark Corp	4.5	10	12
Intel Corp	7	9	15
Best Buy Co Inc	9.5	12	14
S&P Global Inc	8	1	6
Motorola Solutions Inc	13.5	13	3
Cisco Systems Inc	13.5	5	2
Dominion Energy Inc	13.5	11	8.5
Alphabet Inc	1.5	2	4
Ecolab Inc	9.5	3	7
Comcast Corp	4.5	4	10
General Electric Co	11	14	5

CORRELATION MATRIX			
	RATING AGENCY MODEL	STRUCTURAL MODEL	REDUCED FORM MODEL
RATING AGENCY MODEL	1		
KVM MODEL	0.131173874	1	
REDUCED FORM MODEL	-0.001823488	-0.041108149	1

We found that Structural Model has a positive but low correlation with Rating Agency Model. Reduced Form Model has a negative correlation with both Rating Agency and Structural Model.

ECONOMIC CAPITAL AND REGULATION

A.) STANDARD APPROACH (rely on external agency rating)

The Standard Approach calculates economic capital using external credit ratings. We relied on Moody's ratings to determine risk weights for assets and measure capital requirements.

The companies in the portfolio were assigned external credit ratings obtained from Moody's Ratings. These ratings serve as the foundation for assigning risk weights under the standard approach. For instance, Macquarie Group Ltd and PepsiCo Inc are rated A1, which indicates strong creditworthiness and relatively low risk, Enel SpA is rated Baa1, reflecting moderate risk, General Electric Co also holds a rating of Baa1, signifying a similar level of moderate credit risk.

Companies	Ratings
Macquarie Group Ltd	A1
PepsiCo Inc	A1
Enel SpA	Baa1
Automatic Data Processing Inc	Aa3
Kimberly-Clark Corp	A2
Intel Corp	Baa1
Best Buy Co Inc	A3
S&P Global Inc	A3
Motorola Solutions Inc	Baa2
Cisco Systems Inc	Baa2
Dominion Energy Inc	Baa2
Alphabet Inc	Aa2
Ecolab Inc	A3
Comcast Corp	A3
General Electric Co	Baa1

Based on the above ratings, risk weights were assigned using the standard approach risk weighting table Companies rated A1 or equivalent were assigned a risk weight of 50%.Companies with ratings of Baa1 were assigned a risk weight of 100%.Higher credit ratings, such as Aa3, were assigned a lower risk weight of

20%.The Risk-Weighted Assets (RWA) for each borrower were calculated by applying the risk weight to the loan amount.

Companies	Ratings	Risk Weights
Macquarie Group Ltd	A1	50%
PepsiCo Inc	A1	50%
Enel SpA	Baa1	100%
Automatic Data Processing Inc	Aa3	20%
Kimberly-Clark Corp	A2	50%
Intel Corp	Baa1	100%
Best Buy Co Inc	A3	50%
S&P Global Inc	A3	50%
Motorola Solutions Inc	Baa2	100%
Cisco Systems Inc	Baa2	100%
Dominion Energy Inc	Baa2	100%
Alphabet Inc	Aa2	20%
Ecolab Inc	A3	50%
Comcast Corp	A3	50%
General Electric Co	Baa1	100%

Using the regulatory capital ratio of 8%, the required regulatory capital for each borrower was calculated by multiplying the RWA by 8%. This indicates the minimum capital the institution must hold to cover potential risks for each borrower.

Companies	Ratings	Risk Weights	Loan Amount (in Millions)	Regulatory Capital %	RWA	Regulatory Capital Amount (in Millions)
Macquarie Group Ltd	A1	50%	2505	8%	1253	100.2
PepsiCo Inc	A1	50%	3750	8%	1875	150

Enel SpA	Baa1	100%	11917	8%	11917	953.36
Automatic Data Processing Inc	Aa3	20%	6950	8%	1390	111.2
Kimberly-Clark Corp	A2	50%	2750	8%	1375	110
Intel Corp	Baa1	100%	5000	8%	5000	400
Best Buy Co Inc	A3	50%	1250	8%	625	50
S&P Global Inc	A3	50%	1500	8%	750	60
Motorola Solutions Inc	Baa2	100%	2250	8%	2250	180
Cisco Systems Inc	Baa2	100%	3000	8%	3000	240
Dominion Energy Inc	Baa2	100%	6000	8%	6000	480
Alphabet Inc	Aa2	20%	10000	8%	2000	160
Ecolab Inc	A3	50%	2019	8%	1010	80.77
Comcast Corp	A3	50%	11000	8%	5500	440
General Electric Co	Baa1	100%	10000	8%	10000	800
						4315.53

The detailed Calculation can be found in Excel

We found out from the above table that JP Morgan should hold 4315.53 M as economic capital.

B.) FOUNDATION IRB APPROACH

The Foundation IRB Approach lets banks estimate credit risk by using internal models for Probability of Default (PD) while relying on regulator-provided.

The Probability of Default (PD) for each company in the portfolio was estimated using the hybrid model with Weight Category 1, where each of the three models Rating Agency, KVM, and Reduced Form was weighted equally (33.33%). This

approach provides a balanced PD calculation, combining different modeling perspectives. The PD values reflect the risk characteristics of each borrower, considering their exposure, creditworthiness, and external conditions. All loans are classified as senior loans with no collateral, and the Loss Given Default (LGD) is assumed to be 50% for all companies.

Companies	Collateral	Loan Amount (EAD)	Maturity	LGD%	PD
Macquarie Group Ltd	No	2505	5	50.00%	0.5147%
PepsiCo Inc	No	3750	5	50.00%	0.5772%
Enel SpA	No	11917	5	50.00%	0.8907%
Automatic Data Processing Inc	No	6950	5	50.00%	8.1779%
Kimberly-Clark Corp	No	2750	5	50.00%	0.9135%
Intel Corp	No	5000	5	50.00%	0.9559%
Best Buy Co Inc	No	1250	5	50.00%	1.6125%
S&P Global Inc	No	1500	5	50.00%	0.5622%
Motorola Solutions Inc	No	2250	5	50.00%	2.0699%
Cisco Systems Inc	No	3000	5	50.00%	0.7080%
Dominion Energy Inc	No	6000	5	50.00%	1.5417%
Alphabet Inc	No	10000	5	50.00%	0.3380%
Ecolab Inc	No	2019	5	50.00%	0.6768%
Comcast Corp	No	11000	5	50.00%	0.4961%
General Electric Co	No	10000	5	50.00%	2.0143%

We divided the portfolio companies into groups based on their PD values, and the Weighted Contribution to Default Risk (WCDR) was calculated for each group. The WCDR accounts for the impact of Expected Loss (EL), maturity adjustments, and risk sensitivities.

The formula for **Expected Loss** used is:

Expected Loss=EAD×PD×LGD

Rho is used to assess the correlation between borrowers' credit risks based on PD
The formula for rho used is:

rho=0.12*(1+EXP(-50*PD))

Later Each rating group was divided into subgroups based on LGD. Since all companies have the same LGD of 50%, the Expected Loss and regulatory capital requirements were calculated uniformly for the LGD category. The **regulatory capital** was determined using the following formulae:

Regulatory Capital= EAD*LGD*(WCDR-PD) *MA

The **maturity adjustment** is applied here, as it directly impacts the computation of regulatory capital. The values of M and b are substituted into this formula to adjust for loan tenor when computing capital requirements. The following Formulae is used

MA= (1+(M-2.5) *b)/1-1.5*b

The calculation for expected loss, WCDR, MA, multiplier b, Rho, Regulatory Capital and VaR are given in the following table.

Companies	Expected Loss (in Millions)	WCDR	MA	b	Rho	Regulatory Capital (in Millions)	VaR
Macquarie Group Ltd	6.447	0.099	0.772	0.166	0.21	91.130	124.44
PepsiCo Inc	10.823	0.106	0.741	0.161	0.21	139.132	198.54
Enel SpA	53.070	0.133	0.633	0.142	0.20	466.558	790.34

Automatic Data Processing Inc	284.182	0.369	0.254	0.065	0.12	253.058	1281.78
Kimberly-Clark Corp	12.561	0.134	0.627	0.141	0.20	107.889	184.66
Intel Corp	23.898	0.137	0.616	0.139	0.19	196.837	343.20
Best Buy Co Inc	10.078	0.174	0.506	0.119	0.17	49.846	108.63
S&P Global Inc	4.216	0.104	0.748	0.162	0.21	55.412	78.27
Motorola Solutions Inc	23.286	0.193	0.459	0.110	0.16	88.903	217.11
Cisco Systems Inc	10.620	0.118	0.688	0.152	0.20	114.638	177.16
Dominion Energy Inc	46.252	0.171	0.515	0.120	0.18	239.432	511.53
Alphabet Inc	16.898	0.078	0.897	0.185	0.22	332.539	387.71
Ecolab Inc	6.833	0.115	0.700	0.154	0.21	76.708	116.45
Comcast Corp	27.285	0.097	0.783	0.167	0.21	397.461	535.16
General Electric Co	100.715	0.191	0.464	0.111	0.16	395.669	954.11
						3005.210	

From the above analysis, we found that under the Standard Approach, we need to hold 4315.53 million in regulatory capital, whereas under the IRB Approach, the requirement is 3005.21 million. This means the Standard Approach requires us to hold significantly more capital, while the IRB Approach, with its more detailed and risk-sensitive modeling, results in a lower capital requirement. This demonstrates how adopting the IRB Approach can lead to more efficient and tailored capital allocation for our portfolio.