Dow Jones Case Study

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### Detailed Risk Analysis of Dow Jones Stocks Using CAPM

CAPM provides a robust framework for evaluating the risk of individual stocks relative to the market. By analyzing beta, R-squared, and alpha, along with scatterplots of excess returns, we can delve deeper into the risks associated with different stocks. This section discusses various risk dimensions, including systematic risk, stock-specific risk, and volatility, to offer a comprehensive assessment of Dow Jones stocks.

### 1. Systematic Risk: Beta Analysis

Systematic risk, or market risk, measures a stock’s sensitivity to market movements and is captured by beta (()) in CAPM. Stocks with higher beta values are more volatile and tend to magnify market returns—both gains and losses. Conversely, low-beta stocks provide a buffer against market fluctuations but may offer lower returns.

#### **High-Beta Stocks: Elevated Systematic Risk**

* **Boeing (BA)**: With a beta of **1.6256**, BA demonstrates significant market sensitivity. Its steep regression slope shows that BA amplifies market movements, making it highly volatile. While this can yield high returns during market rallies, it poses considerable downside risk during downturns.
* **Caterpillar (CAT)**: Beta **1.493** reflects its strong correlation with the market. CAT thrives in favorable economic conditions but is vulnerable to cyclical downturns due to its reliance on industrial demand.
* **Disney (DIS)**: With a beta of **1.4881**, DIS is heavily tied to consumer sentiment and economic cycles, exposing it to amplified market risks.

#### **Moderate-Beta Stocks: Balanced Systematic Risk**

* **IBM (Beta: 0.9226)** and **Coca-Cola (KO, Beta: 0.6811)** offer a balance between risk and reward. Their moderate beta values suggest they move with the market but are less volatile than high-beta stocks. These stocks are suitable for investors seeking moderate growth without excessive exposure to market fluctuations.

#### **Low-Beta Stocks: Reduced Systematic Risk**

* **Kraft (KRFT)**: With a beta of **0.19**, KRFT is minimally sensitive to market movements, making it a defensive stock. Investors holding KRFT face reduced risk during market downturns but may not benefit significantly during rallies.
* **Procter & Gamble (PG)**: Beta **0.4855** shows limited market sensitivity, offering stability for conservative investors. PG’s returns are relatively independent of market trends, as reflected in its flatter scatterplot regression line.

### 2. Diversification and Stock-Specific Risk: R-Squared Analysis

While beta captures systematic risk, R-squared ((R^2)) measures the proportion of a stock’s variability explained by the market. A high (R^2) indicates that the stock’s performance aligns closely with the market, while a low (R^2) suggests greater idiosyncratic or stock-specific risk.

#### **Stocks with High Market Dependence (High (R^2))**

* **United Technologies (UTX)**:
  + (R^2 = 0.6857): A significant portion of UTX’s performance is explained by market movements, making it predictable but also vulnerable to systemic shocks.
* **3M (MMM)**:
  + (R^2 = 0.7426): Similar to UTX, MMM aligns closely with the market, offering high predictability but limited diversification benefits.

#### **Stocks with Low Market Dependence (Low (R^2))**

* **Kraft (KRFT)**:
  + (R^2 = 0.0237): KRFT’s low market alignment suggests high idiosyncratic risk, but this independence provides diversification opportunities within a portfolio.
* **Bank of America (BAC)**:
  + (R^2 = 0.0789): While moderately tied to market movements, BAC’s low (R^2) implies that factors beyond market trends—such as regulatory policies and interest rates—play a significant role in its performance.

### 3. Volatility and Return Stability

Volatility, represented by standard deviation, provides an additional lens to understand a stock’s risk. Combined with CAPM metrics, it offers insights into the consistency of returns and the potential for extreme price swings.

#### **High-Volatility Stocks**

* **HP (HPQ)**:
  + High standard deviation of **0.0391** and a beta of **1.4257** highlight significant return variability. HPQ’s scatterplot shows widely dispersed points, indicating frequent deviations from market expectations.
* **American Express (AXP)**:
  + Standard deviation of **0.0287** with a beta of **1.090** shows considerable risk, particularly during economic downturns that affect consumer spending.

#### **Low-Volatility Stocks**

* **Johnson & Johnson (JNJ)**:
  + Standard deviation of **0.0206** and a beta of **0.7601** suggest low volatility, making JNJ a stable performer. Its scatterplot exhibits tight clustering around the regression line, confirming consistent returns.
* **Kraft (KRFT)**:
  + A standard deviation of **0.0178** combined with a low beta and (R^2) makes KRFT one of the least volatile and most stable stocks in the dataset.

### 4. Sectoral Risks and Economic Sensitivity

CAPM metrics highlight how certain sectors exhibit greater susceptibility to macroeconomic trends: - **Industrials (BA, CAT)**: Cyclical in nature, these stocks are highly sensitive to global economic conditions and infrastructure spending. Their high betas and strong market alignment amplify this sensitivity. - **Consumer Staples (PG, KO)**: These stocks are less volatile, as their products remain in demand regardless of economic cycles. Their low betas and R-squared values reflect reduced market dependency. - **Financials (BAC, JPM)**: Banking stocks like BAC and JPM are influenced by interest rate fluctuations and regulatory changes. While their moderate betas make them market-aligned, their R-squared values highlight additional risks tied to the financial sector.

### 5. Portfolio Risk Implications

#### **For Aggressive Investors**:

High-beta stocks like **BA**, **CAT**, and **DIS** offer significant growth potential during bullish markets. However, their strong market alignment and steep regression slopes indicate exposure to elevated risk during downturns.

#### **For Conservative Investors**:

Low-beta stocks such as **KRFT** and **PG** reduce exposure to systematic risk. Their flat regression slopes and low R-squared values make them ideal for diversification, offering protection against market volatility.

#### **For Balanced Portfolios**:

Moderate-beta stocks like **IBM**, **KO**, and **JNJ** provide a mix of stability and growth. Their predictable behavior, as reflected in their scatterplots, makes them suitable as core portfolio holdings.

### Conclusion

The CAPM analysis underscores the varying risk profiles of Dow Jones stocks. High-beta stocks, while promising higher returns, come with substantial risks, particularly for sectors sensitive to economic cycles. Conversely, low-beta stocks offer stability and serve as defensive investments in volatile markets. By incorporating CAPM metrics such as beta, R-squared, and volatility into portfolio strategies, investors can construct diversified portfolios that align with their risk tolerance and investment goals.

Future research could explore macroeconomic variables like interest rates, inflation, and sector-specific dynamics to further contextualize these risks. This nuanced understanding of stock behavior ensures informed decision-making and optimized portfolio management.

### Comprehensive CAPM Analysis and Stock Returns Report (Final with Citation)

#### **Introduction**

The Capital Asset Pricing Model (CAPM) is a pivotal tool in finance, providing insights into the relationship between risk and return for individual assets. By analyzing the sensitivity of Dow Jones Index stocks to market fluctuations, CAPM aids in understanding systematic risk and expected returns. This report incorporates key CAPM metrics, scatterplot analyses, and portfolio strategies to paint a holistic picture of stock performance and market alignment. These findings are invaluable for constructing portfolios tailored to varying risk appetites.

This analysis builds on previous work, including the research by Brown, Pelosi, and Dirska (2013), which highlights the application of advanced models for forecasting financial markets and assessing risk-return tradeoffs## **Dataset Overview and Methodology**

The data consists of weekly financial metrics for Dow Jones stocks, including prices (open, high, low, close), traded volumes, and returns. The Dow Jones Index serves as the benchmark for market performance. CAPM calculations focus on: 1. **Beta**: Measuring a stock’s sensitivity to market movements. 2. **Alpha**: Indicating the excess return a stock provides above the market’s performance. 3. **R-Squared**: Quantifying how well the stock’s returns align with the market’s returns.

Scatterplots of excess stock returns versus market returns were generated for visual analysis. Regression lines overlay the plots to highlight trends, providing a graphical interpretation of CAPM metrics.

### Citation

Brown, M. S., Pelosi, M., & Dirska, H. (2013). Dynamic-radius Species-conserving Genetic Algorithm for the Financial Forecasting of Dow Jones Index Stocks. *Machine Learning and Data Mining in Pattern Recognition, 7988,* 27-41.

### Appendix: Images

Box Plots

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**Graphs**

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**Tables Stocks with Beta, R Squared and Dow Beta**A screenshot of a computer

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**Table Stocks with Expected Return**

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