# Midterm Data Translation Challenge

## Introduction Briefly explain the project's objectives and methodology.

The main objective of this analysis is to gain insights into the financial health and performance of Apple Inc. and Kroger Co. The data utilized in this analysis is sourced from the EDGAR database. Data retrieved from EDGAR has been processed to ensure alignment in the timeframe and set of data used between the two companies. In this analysis, we will be using Form 10-K which provides an annual report and comprehensive summary of a company’s financial performance. To ensure data quality of this analysis, any duplication records have been removed, and only the latest filed data is used. Five key financial ratios -- Current ratio, D/E, ROE, Asset Turnover Ratio, and Net Profit Margin have been strategically selected to cover crucial aspects and offer valuable insights for potential investment opportunities. I hope that this analysis provides you with comprehensive financial insights that help guide investment decisions and aid in the allocation of $1 million for further in-depth analysis.

## Data Retrieval Describe the companies selected and the EDGAR API data retrieval process.

In this analysis, we will evaluate the financial standing of both Apple Inc. and Kroger Co. Below is a brief overview of these two companies.

Apple Inc. is a multinational technology company founded by Steve Jobs, Steve Wozniak, and Ronald Wayne in 1976. Its headquarters are in Cupertino, California, within Silicon Valley. The company is currently led by CEO Mr. Timothy D. Cook and the current number of employees is approximately 161,000. Apple Inc. is classified as a Consumer Electronics industry. According to Forbes, Apple has achieved remarkable success, becoming the first company to reach a net worth of $3 Trillion (Smith, 2022). Apple Inc is primarily recognized for its icon iPhone, but its scope extends across design, development, and sale of consumer electronics, computer software, and online services including products such as iPad, Mac, Apple Watch, and various services such as Apple Arcade, Apple Fitness+, Apple Music, and more. In 2022, Apple’s revenue reached an impressive US$394.3 billion, the highest revenue generated among technology companies. As of March 2023, it was the world’s largest company by market capitalization (Apple Inc., 2024).

Kroger Co. is a retail company founded by Bernard Kroger in 1883. Its headquarters are located in Cincinnati, Ohio. It is under the leadership of the current CEO, Mr. William Rodney McMullen. Kroger operates an extensive network of 2,719 grocery retail stores spread across 35 states in the United States, including the District of Columbia. The store formats include multi-department stores, combo stores, marketplace stores, and price-impact warehouse stores. Additionally, it also has 33 manufacturing plants, 1,642 supermarket fuel centers, 2,254 pharmacies, 225 The Little Clinic in-store medical clinics, and 127 jewelry stores. Its workforce is approximately 465,000 employees in 2022. Kroger stands as one of the largest American-owned private employers in the United States and is ranked #17 on the Fortune 500 rankings of the largest United States corporations by total revenue. In 2022, Kroger generated US$137.888 billion in revenue. (Kroger, 2024). Furthermore, Kroger Co. has a VGM Score of A, indicating it may be undervalued and presenting a potential investment opportunity. (The Kroger Co. - Sell)

#### EDGAR API Data Retrieval Process

Data used in this analysis are sourced from SEC EDGAR database obtained by performing an API call to get all companies data from <https://www.sec.gov/files/company_tickers.json>. User-Agent in the request headers used for this connection is “sberg@seattleu.edu”. Using the tickers obtain from the first API, we can then get the Central Index Keys (cik\_str) to retrieve data from the company facts for both Appl Inc (0000320193) and Kroker Co. (0000056873) through API connection to <https://data.sec.gov/api/xbrl/companyfacts/CIK##########.json>.

For each file obtained from data.set.gov, I investigated the data structure and examined the content. Subsequently, I used Univariate visualization and obtained summary statistics to understand the data structure, identify trends in the data, and assess the need for data cleanup. The following files were what I retrieved and examined data structure to check for any patterns or anomalies in the datasets.

Below are data that I brought in to use for financial ratios calculation:

* RevenueFromContractWithCustomerExcludingAssessedTax, this data provides the revenue data.
* Assets, this data provides the total assets as of the balance sheet.
* AssetsCurrent, this data provides the current assets as of the balance sheet.
* Liabilities, this data provides Sum of the carrying amounts as of the balance sheet date of all liabilities that are recognized. Liabilities are probable future sacrifices of economic benefits arising from present obligations of an entity to transfer assets or provide services to other entities in the future.
* LiabilitiesCurrent, Total obligations incurred as part of normal operations that are expected to be paid during the following twelve months or within one business cycle, if longer.
* StockholdersEquity, Total of all stockholders' equity (deficit) items, net of receivables from officers, directors, owners, and affiliates of the entity which are attributable to the parent. The amount of the economic entity's stockholders' equity attributable to the parent excludes the amount of stockholders' equity which is allocable to that ownership interest in subsidiary equity which is not attributable to the parent (noncontrolling interest, minority interest). This excludes temporary equity and is sometimes called permanent equity.
* NetIncomeLoss, The portion of profit or loss for the period, net of income taxes, which is attributable to the parent.

#### Data cleaning and wrangling

For each file, the following steps were used to clean up the data.

* Filter for Form 10-K data.
* Sorted data based on the end date and the filed date. This step helps identify the duplicated rows that need to be removed.
* Dropped duplicated row using the end date and retain the latest filed rows.
* Following are the extra steps for the NetIncomeLoss:
* Drop rows with quarterly mentioned in the frame column.
* Calculated the length of our data using both the start date and end date.
* Annual data are kept and quarterly are dropped data where any date length less than 12 months.
* Dropped any remining rows with the same end date.
* Merged the data together using the end date to prepare for ratio calculations.
* Removed unnecessary columns that were not needed.
* Rename columns so it’s easy to understand and read. For example, the “val” column was renamed to “assets”, “liabilities”, “equity”, etc.

These steps described above ensure data quality and prepare data for ratio analysis.

For each file, I conducted exploratory data analysis using statistical summaries and drew a line graph to gain insights into the trend in the data. The data used in each ratio calculation are analyzed to observe their relationship, pattern, and potential risks or concerns. The same process was applied to analyze each individual ratio.

#### Financial Ratios - Present the calculated financial ratios for each company.

Current ratio = Current Assets / Current Liabilities

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Debt-to-Equity ratio (D/E) = Total liabilities / Total shareholders' Equity

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Return on Equity Ratio (ROE) = Net Income / Shareholder Equity

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Net Profit Margin = Net Income/Total Revenue

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Asset Turnover Ratio = Total Revenue / (Beginning Assets + Ending Assets)/2)

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#### Data Analysis and Visualizations- Discuss your observations and insights from the ratio analysis.

## Visualizations Include visual representations of the data.

#### Current Ratio (Current Assets / Current Liabilities)

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Apple’s current ratio shows a downward trend. Until 2022, Apple appears to be able to maintain their current ratio above 1 indicates that they had sufficient liquid assets to cover for short-term debt and other payables. However, the subsequent decline and the drop below 1 after 2022 that I observed coupled with my earlier analysis on their current assets and current liability, raise several concerns. These concerns encompass Apple’s ability to meet short-term obligations with their existing liquid assets, concern on the short-term solvency risk, the concern on their negative working capital which impact their ability to fund the day-to-day operations, and the implications for operational efficiency in managing their current assets and current liabilities.

* Debt-to-Equity Ratio (D/E) (Total Debt/ Total Equity)

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According to the above graph, I observed a steady increase in Apple’s Debt-to-Equity ratio between 2013 to the end of 2022. This suggests that Apple is in a risky financial position, with their liabilities increasing in every dollar of shareholders’ equity. This trend could be interpreted as Apple having a less stable capital structure or a reduction in solvency, indicating an increasing reliance on external liability relative to equity. When coupled this analysis with my earlier observations of their total liabilities and shareholders’ equity, they signal an increase of their financial risk as their proportion of financing coming from external sources. The reduction in solvency raises concerns about their ability to cover their obligations from their equity. In summary, the analysis from D/E ratio deepens my concerns about Apple’s overall financial health and stability.

### Return on Equity (Net Income / Shareholder Equity )

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Apple’s Return on Equity remained relatively flat between 2009 to the end of 2017. Subsequently, there was an uptick, and a significantly increased in their ROE from around 2018 to the end of 2022. This indicated that Apple performed very well during these four years, as the increase in ROE demonstrates the ability of Apple in efficiently turn shareholder equity into net income and effectively use their equity capital to generate profits. However, the drop after 2022 signal risk in Apple’s financial health. We need to continue monitoring their financial status to assess whether this trend will persist, look for a signal of potential sustained decline, and whether Apple can reverse the trend and increase their ROE in the following year.

KR Return on Equity was fluctuating.

## Conclusion Summarize your findings and any recommendations or insights you have gained.

### Total Assets and Toal Liabilities:

* The highest assets value recorded was approximately $375B and the lowest value was $36B. The average Assets value across the dataset was around $248B.
* The highest liabilities value recorded was approximately $302B and the lowest value was $16B. The average liabilities value across this dataset was around $163B.

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* Based on the Assets graph, Apple’s assets exhibited a steady increase from 2010 to around 2017, followed by a slight declined after 2017 until around the end of 2020. Subsequently there was a renewed upward trend after 2021. However, it has not reached the peak value observed in 2017.
* Apple’s assets and liabilities moved in the same direction and align, as assets increased, so did liabilities.

### Current assets and Current liability

* The highest recorded value for current assets was approximately $162B and the lowest value was around $32B. The average current assets value was around $95B.
* The highest recorded current liabilities value was approximately $154B and the lowest value was $12B. The average current liabilities value was around $77B.

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* Based on the current assets graph, Apple’s current assets show a consistent YoY increase, peaking around the end of 2019. However, it subsequently experienced a decline until approximately the end of 2022 to early 2023 when a gradual recovery began. This pattern indicates a reduction in assets that can be converted into cash within one year, coinciding with an increase in current liabilities.
* Apple’s current liabilities, as shown in the graphs, also generally moved upward in tandem with their current assets. Noticeable drop around the end of 2018, aligning with a sharp increase in their current assets. However, in 2021, their current liabilities surpassed their current assets. This raised concerns as it indicated a potential decrease in available net assets for operating activities.
* According to the graphs, Apple’s working capital showed a decrease around the end of 2014-2015. This signifies a period with company financial were less stable but still have more current assets than current liabilities.
* Their working capital in 2022 turned negative which signals potential liquidity issues and challenges in meeting short term obligations. This shift raises concerns about the company’s ability to cover its short-term liabilities with their available short-term assets.
* According to ABC News (2022), Apple’s shares experienced a significant plunge, which coincide with the company’s negative working capital we saw above. The combination of the financial indicator and the news raises concerns about Apple’s financial stability. As this data represents historical information, ongoing monitoring is needed to assess whether Apple’s financial trajectory undergoes any changes in the following year.

### Total liabilities and Equity

* The highest total liabilities value recorded was approximately $302B and the lowest value was $15B. The average total liabilities value across the dataset was around $163B.
* The highest equity value recorded was around $134B and the lowest value was $22B. The average equity value was approximately $85B.

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* According to the graph, Apple’s total liabilities show an upward trend, consistently increasing YoY. This indicates a growing financial obligation for the company, which could potentially impact on their financial health and leverage.
* The equity graph reveals an increase until around the end of 2012, followed by a period of stability until the end of 2017. However, a decline occurred after 2018, and this drop in equity could potentially be attributed to the pandemic situation. This is also raising some concern as the shareholders’ equity indicates the company’s net worth and it appears to be declining.

### Net Income and shareholders’ equity

* The highest net income value recorded was around $998B and the lowest value was $61B. The average net income value was around $490B.
* The highest equity value recorded was around $134B and the lowest value was $22B. The average equity value was around $845B.

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* According to the graph, Apple’s net income appears to increase gradually until around the turn of 2020-2021. There was a significant spike in the following year, followed by a seeming plateau in the latest data.
* The observed spike in net income during 2020-2021 doesn’t appear to be sustained as it is plateauing in the following year. This pattern suggests that this increase could be influenced by an event or set of circumstances specific to that timeframe.
* We should continue monitoring to observe the plateau period, as it may have implications for investor confidence and the overall perception of Apple’s financial performance.
* Apple’s shareholders’ equity experienced a sharp increase between 2009-2013, however, there is noticeable variance in their shareholders’ equity in the following year.
* The period from the end of 2012 to the end of 2013 shows minimal change, followed by a dip in 2014. Subsequently, there is a renewed upward trend until the end of 2017, followed by a decline again until the end of 2019. The fluctuation in Apple’s shareholders’ equity raises a few potential concerns on their financial health.

# References

*Apple Inc.* (2024, January 29). Retrieved from Wikipedia: https://en.wikipedia.org/wiki/Apple\_Inc.

Smith, Z. S. (2022, January 3). *Apple Becomes 1st Company Worth $3 Trillion—Greater Than The GDP Of The UK*. Retrieved from Forbes: https://www.forbes.com/sites/zacharysmith/2022/01/03/apple-becomes-1st-company-worth-3-trillion-greater-than-the-gdp-of-the-uk/?sh=5f84055603fc