GROUP WORK PROJECT # __3__ MScFE 600: FINANCIAL DATA
Group Number: __5547__

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Statement of integrity: By typing the names of all group members in the text boxes below, you confirm that the assignment submitted is original work produced by the group (excluding any non-contributing members identified with an "X" above).

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Use the box below to explain any attempts to reach out to a non-contributing member. Type (N/A) if all members contributed.
Note: You may be required to provide proof of your outreach to non-contributing members upon request.

This GWP is a submission by group 5547 including all members: Zahara Miriam, Pragati Thakur and Krishna Vamsi.

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STEP-1: FALLOUT RISKS

Scenario Description	Model Failures	Financial Crises
Money at a fixed rate for an unsecured purchase (e.g. credit card) for an individual	Insufficient risk evaluation may culminate in underpricing loans - elevating default rates. Outdated Data-reliant static models lead to undermining effective risk management.	-Reduced consumer spending & increased delinquencies during the financial crisis, can impact the stability of finance institutions. - Regulatory interventions become challenging for credit card issuers(affecting their profitability and their lending strategies).
Money at a floating rate for a secured purchase (e.g. home or automobile) for an individual	- Lenders may fail to accurately assess the true risk profile of borrowers, leading to underpricing of loans where the interest rates charged do not adequately reflect the level of risk involved. This can happen during periods of economic growth and rising asset prices, where lenders become overly optimistic. - Lenders may focus too narrowly on individual borrower profiles without fully understanding the interconnected nature of the financial system and the potential for widespread economic shocks. This can be problematic in the case of real estate loans, where a downturn in the housing market can have an effect on multiple borrowers.	- When the economy takes a turn for the worse, borrowers with floating-rate loans can struggle to meet their loan obligations as their incomes decrease and asset values (like home prices) fall. This can lead to delinquencies and defaults. - In the event of widespread defaults, lenders may be forced to foreclose on properties that are "underwater," meaning the outstanding loan balance exceeds the current market value of the asset. This can result in significant losses for the lenders.
Money at a fixed rate for a business for a construction loan	Inadequate risk assessment in construction projects leading to mispriced loans. Ignored Market volatility and project-specific factors - undermines the model projections reliability.	Construction - delays or costing more than expected, could put a lot of pressure on the borrower's finances, possibly leading to them not being able to repay the loan. At the time of a construction project failure, may leave lenders burdened with unsellable assets, which could cause them to lose money and face all sorts of problems with their operations.

Publicly traded Equity (e.g. common stock)	- Flawed valuation models leading to mispricing of equities - Failure to capture tail risks and extreme events	- Steep declines in asset prices as investor confidence plummets - Forced selling and deleveraging by highly leveraged investors like hedge funds
Publicly traded bond (e.g. treasury bond, corporate bond)	-Assume we are investing in bonds, essentially IOUs issued by governments or corporations. These bonds repay you with interest over time. Now, if the model we are using to anticipate future interest rates needs to be corrected and underestimates how much those rates might rise, giving bad results will lead us to trouble. -When interest rates rise, the value of existing bonds declines. As a result, we may end up owning bonds worth less than the amount you paid for them.	-when government defaults on debt failing to pay interest payments and principal amounts to bondholders this lowers investor confidence in the government's capacity to pay its debts, lowering the value of the government's bonds. -A nation's sovereign default can disrupt financial markets by causing a sell-off in government bonds and other linked securities. This may give a shift towards assets perceived to offer stability, in which investors withdraw their capital from riskier assets such as the defaulting country's government bonds, leading bond values to fall even further. Such market disruptions can spread to other asset classes, destabilizing financial markets and potentially leading to larger financial crises.
An illiquid security	-Illiquid securities occasionally include investing in early-stage businesses with bright but unclear futures. Valuation models may make excessively optimistic predictions about future growth rates. -If the valuation does not give appropriate predictions the value of security may fall and as these assets are illiquid, which means they cannot be quickly sold or converted to cash, investors may be left holding a devaluing asset.	-During the financial crisis it becomes difficult for investors to liquidate this security due to its nature of illiquidity. If there are buyers they would ask the investors to sell at a reduced amount and steep down the price. -This makes it difficult for investors to generate funds rapidly in order to pay financial obligations or take advantage of other investment opportunities.

STEP-2: IDENTIFYING DATA

Data Source-	Data Type:-	Data Processing:-	Data Frequency:-	Data Class:-	Data Variety:-
30-Year Fixed Rate Conforming Mortgage Index: Loan-to-Value Less Than or Equal to 80, FICO Score Greater Than 740 (OBMMIC30YFLVLE80FGE740) https://fred.stlouisfed.org/series/OBMMIC30YFLVLE80FGE740	Market indices	Here each index is calculated as the average of all appropriate rate locks.	Daily	Credit Score	Percent, Not Seasonally Adjusted.
Average Sales Price of New Manufactured Homes: Single Homes in the United States (SPSNSAUS) https://fred.stlouisfed.org/series/SPSNSAUS	Sales Price	Here average was taken on sales prices.	Monthly	Commodity	U.S. Dollars, Not Seasonally Adjusted
Blackstone group Stocks data on Yahoo Finance https://finance.yahoo.com/quote/BX/history?period1=1555433690&period2=1713286486	Stocks Data	Moving average data is mostly used.	Daily	NYSE-Market	Currency in US dollars
Exchange-Traded Funds Total Financial Assets in Municipal Bond Funds, Level(BOGZ1FL564091203Q) https://fred.stlouisfed.org/series/BOGZ1FL564091203Q	Accounts	A series of data is created using Total Net Assets, Bonds, and Municipal Bonds, for the quarter.	Quarterly	Market	Millions of Dollars, Not Seasonally Adjusted
Publicly traded Equity (e.g. common stock) https://fred.stlouisfed.org/series/SP500	Market Data	Price-to-Earnings (P/E) Ratio	Daily	Equity	Trade Data

Money at a fixed rate for a business for a construction loan. https://fred.stlouisfed.org/series/PCU44414441	Economic	Here data is processed using raw prices and returns	Quarterly	Real Estate	Actual Data

STEP-3: ETHICAL CONSIDERATIONS BASED ON FALLOUT

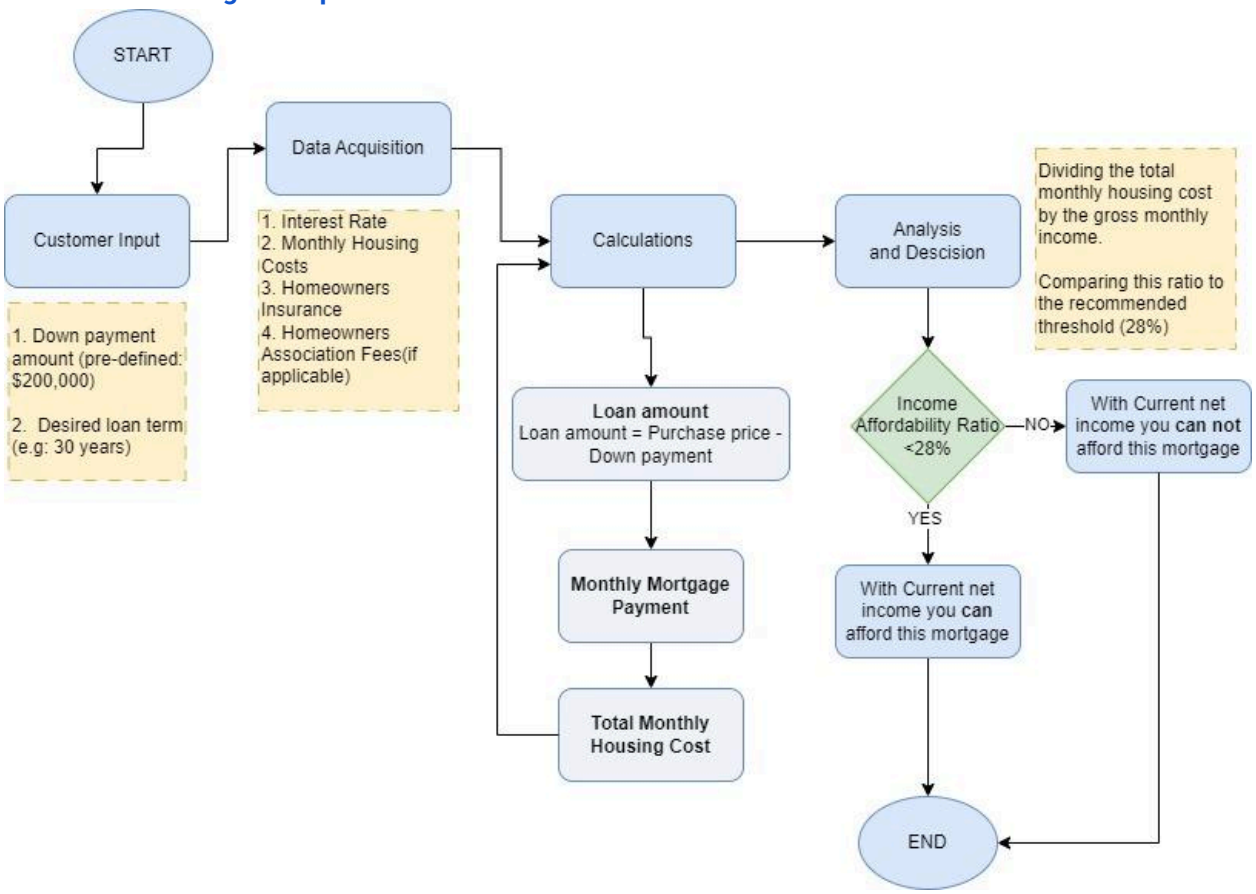
Scenario Description	Ethical Challenges	Undesirable Results
Money at a fixed rate for an unsecured purchase (e.g. credit card) for an individual	-lack of transparency regarding fees and interest rates to exploit borrowers by imposing hidden fees, and exorbitant interest rates. -Offering fixed-rate credit cards with unfavorable terms to people with minimal financial literacy and thereby exploiting them.	-Misunderstood terms or high interest rates lead to significant debt accumulation for individuals. - Ineffective management & increase in the risk of financial distress and default.
Money at a floating rate for a secured purchase (e.g. home or automobile) for an individual	- Lenders using flawed models to justify higher-risk lending - Borrowers taking on excessive debt based on unrealistic home price appreciation	- Widespread foreclosures and loss of homes for borrowers - Lenders incurring large losses on defaulted mortgages
Money at a fixed rate for a business for a construction loan	-Lenders offering fixed rate construction loans to the borrowers without disclosing involved risks.	-Unforeseen construction challenges affect the borrower's ability to meet loan obligations.
Publicly traded Equity (e.g. common stock)	- Analysts and fund managers touting overvalued stocks based on faulty models - Executives manipulating earnings to meet performance targets	- Retail investors suffering heavy losses as asset bubbles burst - Erosion of trust in financial markets and institutions
Publicly traded bond (e.g. treasury bond, corporate bond)	-Ethical challenges if the information is withheld on any bonds which have risk	-Due to this misleading information, investors can lose trust leading to more problems. If this continues it can bring down the whole economy as it is a publicly traded bond.
An illiquid security	-Risk of misallocation: Money is steered towards illiquid assets that may not be the most productive or advantageous to the economy.	-Due to this, the investors will lose trust, leading to slowing down the innovation that should have taken place.

STEP-4: ETHICAL CONSIDERATIONS BASED ON DATA

Scenario Description	Ethical Challenges	Best Practices to avoid these problems
Money at a fixed rate for an unsecured purchase (e.g. credit card) for an individual	An ethical challenge arises in ensuring Personal financial data protection. Challenges emerge in Algorithmic fairness in credit scoring.	Usage of Encryption, tokenization or data anonymization to comply with data privacy regulations. Utilizing trained algorithms(Diverse datasets) to ensure fairness in credit assessment
Money at a fixed rate for a business for a construction loan	Challenges arise in maintaining integrity of the data and reliability of financial data used for credit assessment. Failure in disclosure fees, conflicts of interests could undermine trust and transparency in the lending process.	Implementing data integrity checks, validation procedures to prevent the intentional creation of misleading data or the addition of good data to bad data, ensuring the accuracy and reliability of credit assessment models. Providing clear and comprehensive disclosure of fees, charges, potential conflicts associated with loans.
An illiquid security	Ethical Challenges emerge around mitigating conflict of interest between investment advisors and recommendation of illiquid securities Challenges arise in addressing information asymmetry and ensuring transparent suitability - risk disclosure of illiquid securities for investors.	implementing robust policies to mitigate conflicts between stakeholders and offering educational resources to safeguard investor interests from misleading data. Ensuring timely, accurate information enables investors to make investment verdicts based on up-to-date info and conducting thorough suitability assessments to empower investors based on their risk tolerance.

STEP-5: IMPLEMENTATION OF MONEY LENDING SCENARIO

Workflow: Including the implementation via workflow

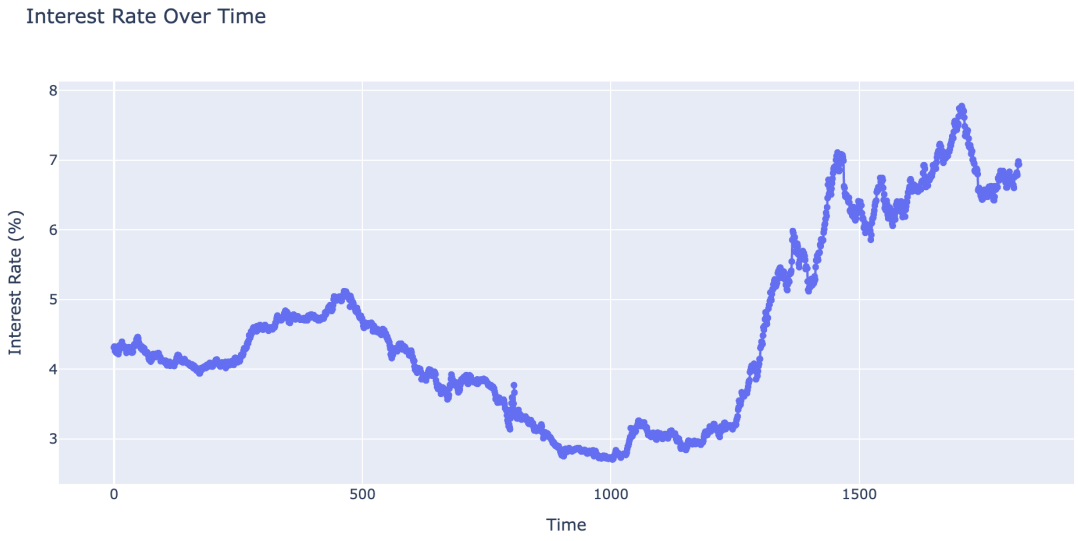


NOTE: Information Provided to Customer:

- **Estimated monthly housing cost:** This is the total projected monthly payment for the mortgage and property-related charges.
- **Affordability assessment:** This will determine whether a typical income with this monthly housing expense is considered affordable under the given income affordability ratio (e.g., the 28% rule).
- **Recommended gross income**: Based on the total monthly housing cost and the specified affordability ratio, we can calculate the gross monthly income needed to comfortably purchase this home.

VISUALIZATIONS:

Plot representing monthly payment as a ratio of salary over time.



Plot representing fixed 30-year mortgage rate over time

REPORT WRITE-UP:

INTRODUCTION:

This report outlines the risk management strategies employed in the mortgage affordability assessment for a 1 million dollar home purchase with a 200,000 down payment. To determine the mortgage loan's risk, the provided information which includes the average yearly income, down payment, mortgage duration, and interest rate—is crucial. Every element of this data is important in figuring out how risk is associated with the loan.

Identified Risks:

Inaccurate Interest Rate: The interest rate is a significant component that influences affordability. Deviations from the actual market rate may result in an underestimation or overestimation of the monthly payment.

Incomplete Cost Estimation: Leaving out important housing expenditures such as property taxes, homeowners insurance, and HOA fees might create a misleading impression of affordability.

Static Income Consideration: Focusing just on gross income without taking into account taxes and other deductions may misrepresent the net income available for mortgage payments.

Operational Risk: Errors, fraud, and system breakdowns can negatively impact mortgage lending efficiency and integrity.

Risk Mitigation Strategies:

1. Interest Rates:
    a. **Market Data Integration:** Integrating real-time or regularly updated market data on interest rates to provide the most accurate picture.
    b. **User Input Option:** Allowing users to input their pre-approved interest rate for a more personalized assessment.
2. Cost Estimation:
    a. **Location-Based Estimates:** We can use location-based data to estimate property taxes based on local averages.
    b. **Home Value Correlation:** Matching homeowners insurance estimates to the property value and selected coverage level.
    c. **HOA Fee Consideration:** Users can input HOA fees if they apply to their chosen property.
3. To reduce Operational Risk:
    a. Implement strong internal controls and processes to detect and prevent fraud and errors in loan origination and servicing.
    b. Providing regular training and instruction to staff members to raise understanding of operational risks and develop a risk-conscious and compliant culture.

Monitoring and Review:

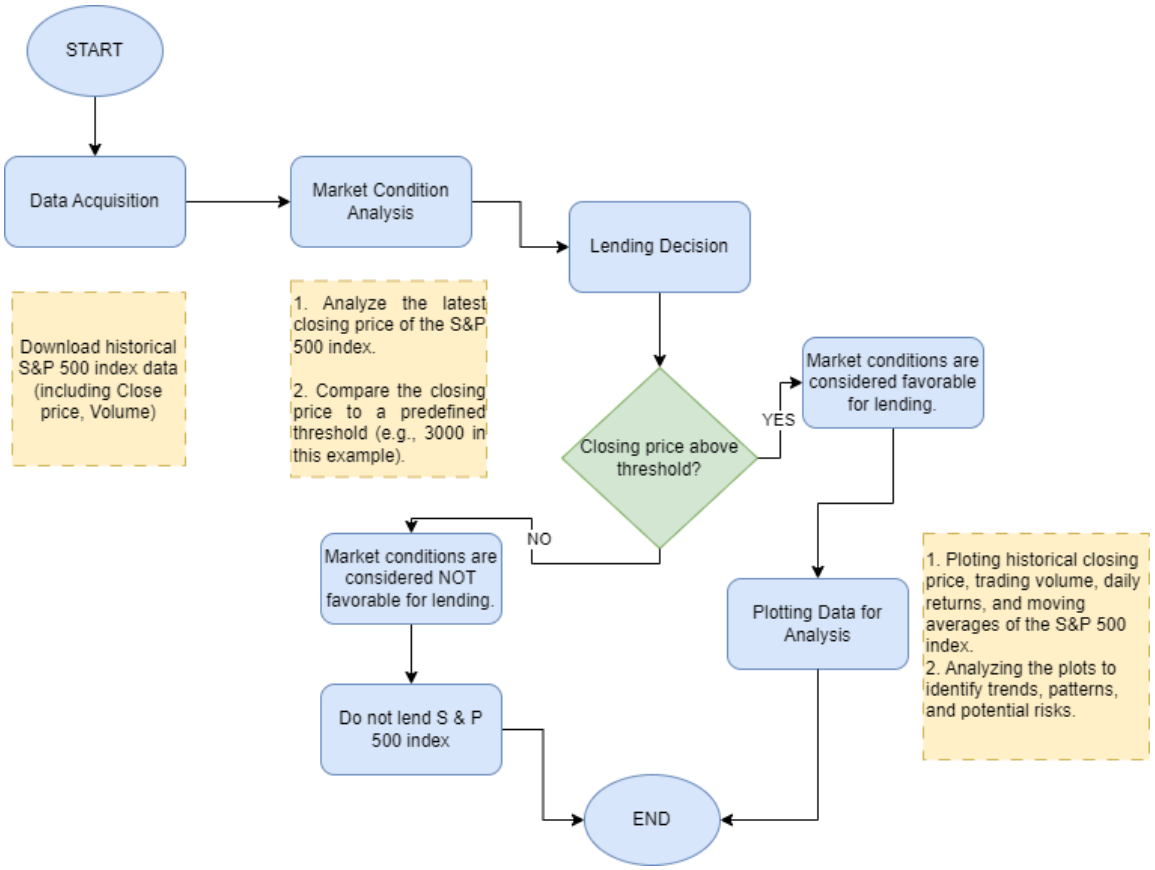
The affordability assessment tool's effectiveness will be reviewed by collecting user feedback and comparing anticipated monthly housing costs to actual mortgage payments made by customers. Regular evaluations will be performed to confirm the accuracy of integrated market data and cost estimations.

Conclusion:

Effective risk management is critical to maintaining the stability and profitability of mortgage lending operations. Mortgage lenders can successfully minimize credit, interest rate, liquidity, and operational risks by using customized risk management techniques based on the data provided. These strategies give a framework for the risk management team to proactively detect, assess, and reduce risks, therefore defending the institution's financial interests and retaining stakeholder trust and confidence.

STEP-6: IMPLEMENTATION OF SECURITY LENDING SCENARIO

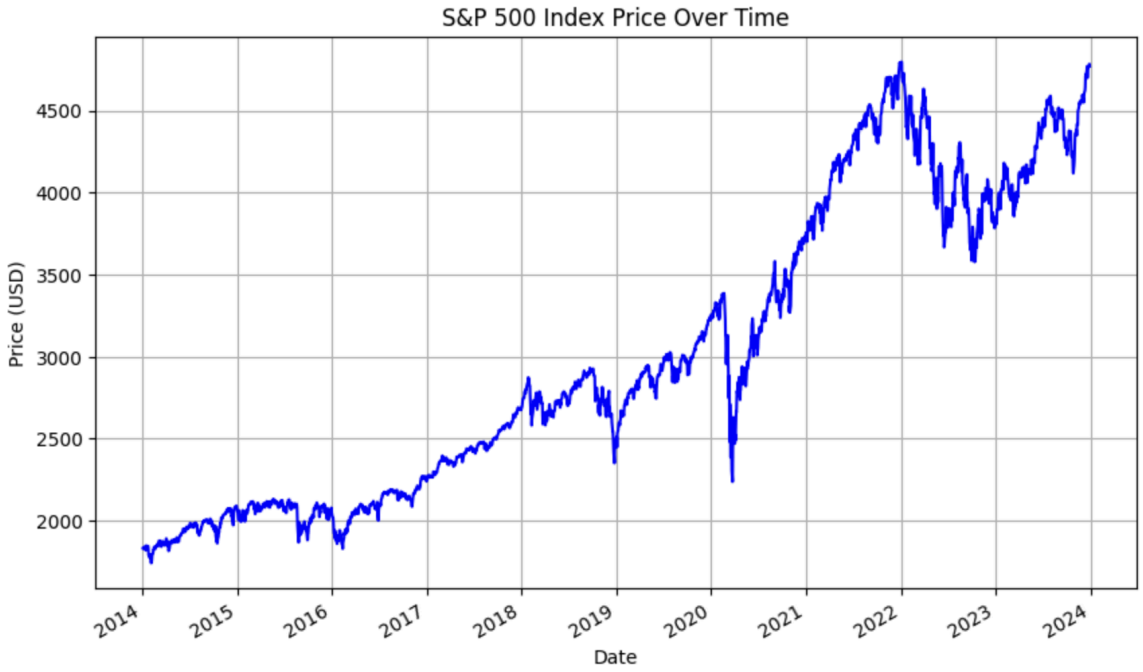
Workflow: Including the implementation via workflow



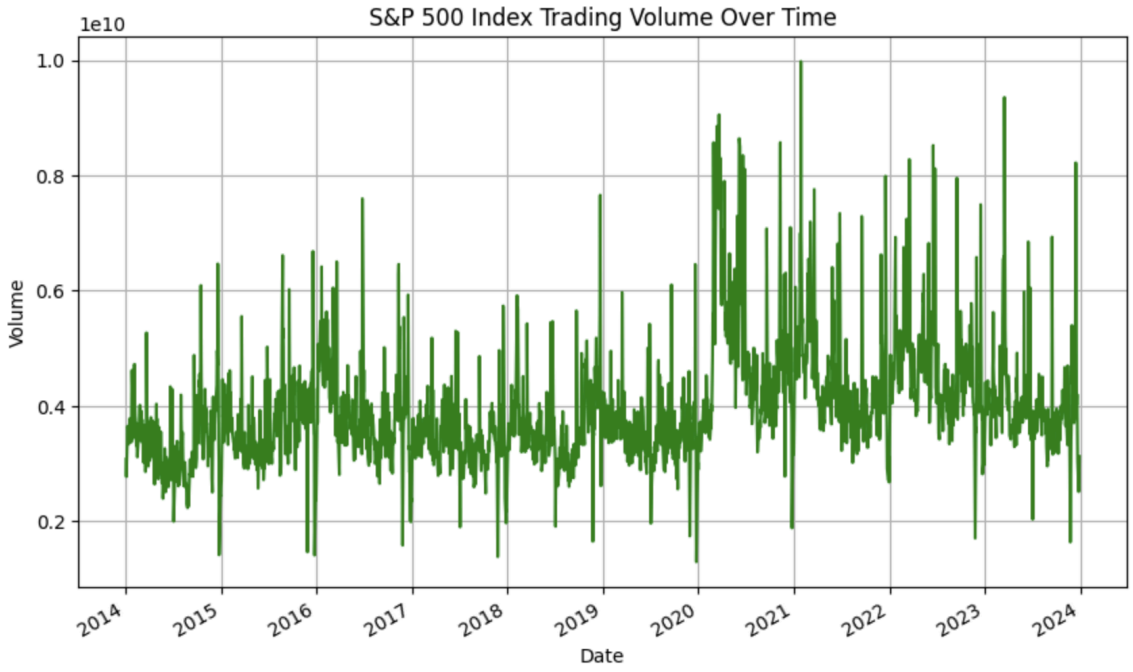
NOTE: Information Provided to Customer:

- **Lending decision:** Whether or not to lend the S&P 500 index based on the market conditions.
- Analysis of the S&P 500 index data through plots and visualizations.
- Justification for the lending decision based on the market condition analysis **(HERE: closing price above the threshold**).

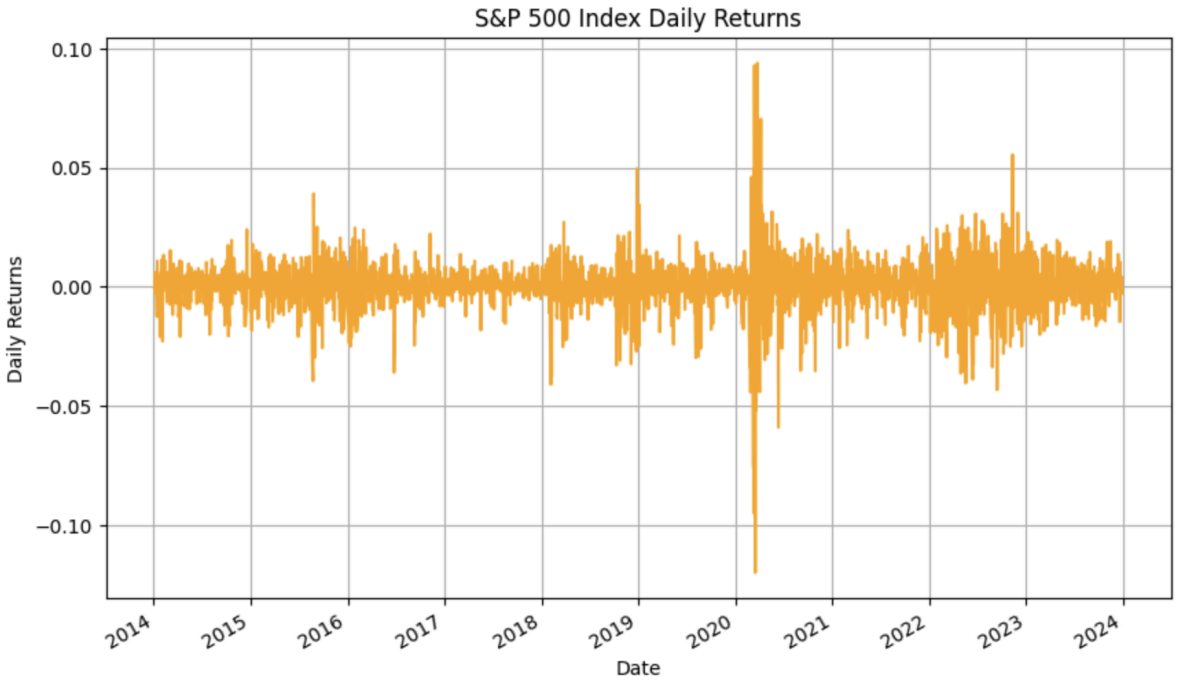
VISUALIZATIONS:



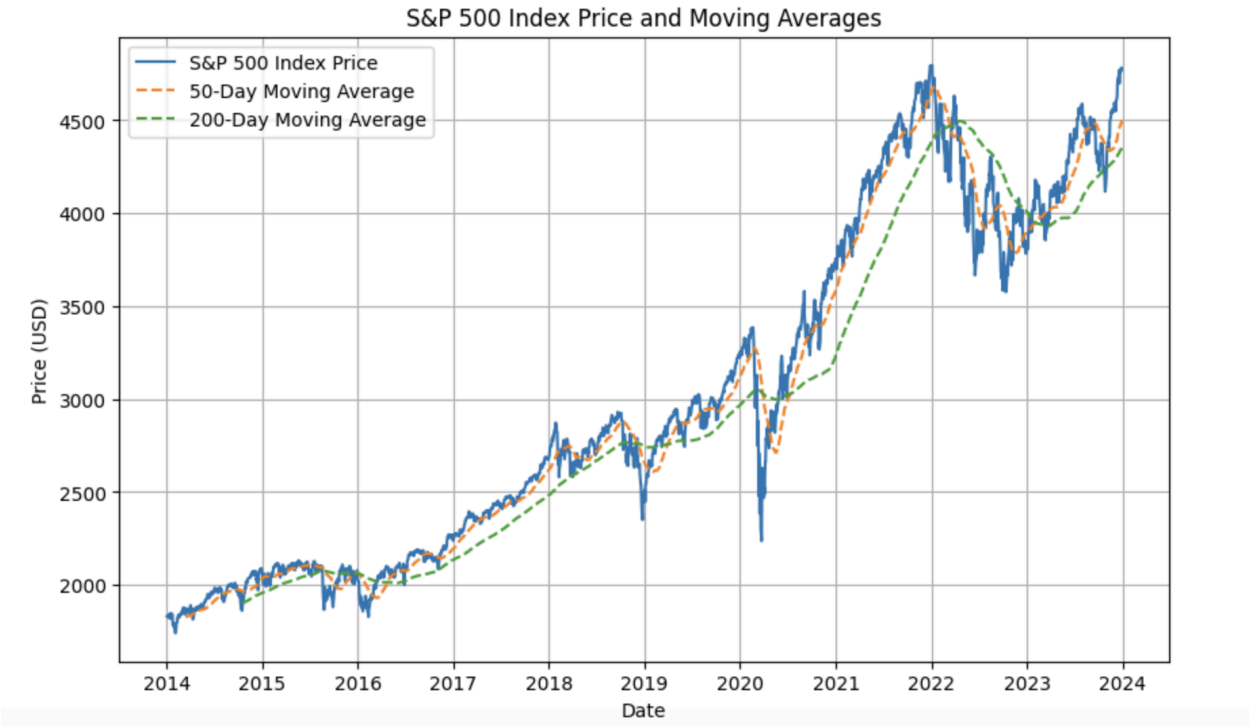
Plot representing S&P 500 index's historical prices



Trading volume of the S&P 500 index



Calculation and plot representing the daily returns of the S&P 500 index



Calculation and plot of rolling 50-day and 200-day moving averages of the S&P 500 index

REPORT WRITE-UP:

INTRODUCTION:

This report discusses the risk management of publicly traded equity using the S&P 500 index. The historical data on the S&P 500 includes closing price and other important data such as trading volume, open, high, and low. This data is used for analysis and assessing the lending decisions.

Risk: Market Volatility:

A predetermined market condition is used to imitate the lending decision, which implicitly takes market risk into account. In the above example, lending the S&P 500 index is determined if the index's most recent closing price exceeds a predetermined threshold, in this case, $3000.

This cutoff point can be seen as a risk management strategy to guarantee that lending happens only if the market is judged to be favourable. Lenders can reduce the risk of lending during volatile or unfavourable market conditions by establishing such criteria. This criterion will change depending on the market conditions hence we have to closely monitor this and update accordingly.

Risk: Liquidity Challenges:
Understanding the ease of obtaining and selling S&P 500 shares in the market can be gained by examining the historical trading volume. Reduced trading volumes could be a sign of forthcoming issues.

A negative market with greater volatility will be indicated if the moving averages continue to decline. Given the higher chance of price decreases throughout the lending period, this may indicate that lending the S&P 500 should be done with caution.

Monitoring and Adaption:

Proactive Approach: By continuously monitoring market conditions, lenders can foresee any possible risks and take preventative measures. This proactive approach helps the lending entity avoid losses and maintain its financial health.

Adapting to Change: As market volatility, liquidity, and other factors change, lenders must adjust their lending standards accordingly. This could include tightening loan restrictions during economic downturns and lowering them during periods of expansion.

Furthermore, using real-time data and analytics enables fast adjustments to lending activities, assuring alignment with risk tolerance levels and overall company objectives.

Conclusion:
Effective risk management is required to ensure the stability and profitability of loan activities involving the S&P 500 index. The risk management team can minimize potential risks and optimize lending strategies by applying preset market condition thresholds, analyzing historical data, assessing market risk, and regularly monitoring market conditions. Moving forward, we can do an analysis using external data to assess creditworthiness and other broader market conditions.

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