GROUP WORK PROJECT # 2
Group Number: 6306

MScFE 600: FINANCIAL DATA

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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.

N/A

Step 1

	Leverage challenge	Non-linearity challenge
Money at a fixed rate for an unsecured purchase	- High leverage: borrower can reach credit limit without immediate repayment. - Borrower's income may not be enough to cover its debt	- Exponential debt growth occurs when repayments are missed. - Risk of default grows highly as debt accumulates.
Money at a floating rate for a secured purchase	- Leverage is created with a low down payment percentage of the full price - High leverage compared to property equity	- Variable payment amounts are due to variable interest rates. - Mortgage work as an equity option, where borrowers can walk away when heavily underwater, resulting in non-linear repayment structure - Sudden interest rates rise increase risk of default
Money at a fixed rate for a business for a construction loan	- Project cost overruns, which result in defaults on loan repayment. - For non-recourse loans, there's the potential to incur losses when there's decline in the initial worth of the project (mainly as a result of recession). Leverage amplifies losses for the lender.	- Poor financial health of the borrower for a certain period can impact their ability to refinance loans. There is a negative correlation between revenue losses/unexpected costs, and credit worthiness. - Changes in the project scope will create a non-linear relationship between the initial loan interest rates and the current value of the project.
Publicly traded equity	- Frequent changes in the credit ratings affect the financial health of the company. - Market volatility significantly amplifies extreme profits or losses for the company.	- Periodic variations in cash flow and returns may have an impact on the ability to service debt. - Advancement in the market capitalization of the company can render existing business models

	- Company's capacity to service its debt may be strained by high leverage, particularly in times of economic downturn.	obsolete, resulting in non-linear impacts on a company's financial viability and debt-service pattern. - Sector-specific changes can create a non-linear impact on a company's performance. - Non-linear relationships between market implied probabilities of default and historical data (based on credit ratings) can influence a lender's decision.
Publicly traded bond	- Highly leveraged companies face increased risk of default (eg: corporate bonds) - Inflation in interest rates reduces bond value and potential returns and might result in credit defaults. - Reinvestment risks: investment of bond capital into assets that are less profitable (securities with lower interest rates).	- Non-linear relationship between interest rates and bond value, especially in long dated bonds. - Difficulties in evaluating and controlling collateral risks as a result of non-linear changes in market sentiment that can magnify bond price fluctuations and raise volatility.
An illiquid security	- Price fluctuations can result in significant portfolio losses or margin calls, especially if positions are highly leveraged. - Operational risks: Unexpected events can affect illiquid industrial markets, resulting in significant losses.	- Non-linear relationship between asset valuation and market liquidity. - Non-linear correlation between the trading price and trading volumes.

Step 2

	Liquidity challenges	Regulation challenges
Money at a fixed rate for an unsecured purchase	- Credit card debt is liquid for lenders if the default rate is low. They can become illiquid if default rates rise	- Regulation prevent lenders to set excessive interest rates and predatory lending - Regulation sets credit limits that cannot be breached - Regulation makes sure lending processes are at norm
Money at a floating rate for a secured purchase	- Less liquid than credit card debits, due to the time of liquidating underlying collateral assets.	- Regulation to disclose loan terms and conditions clearly. - Regulation to prevent lenders from increasing interests excessively.
Money at a fixed rate for a business for a construction loan	- Poor management of periodic cash flows for loans disbursed at different stages of the project - Low liquidity for construction projects that demand high capital requirements. - Lenders might seek credit enhancement schemes (such as Project completion insurance & letter of credit) to mitigate the impact of the borrower's probability of default. This, in turn, could increase operational costs. - Operational cost incurred from project monitoring, investigations, etc.	- Regulations that impose capital adequacy and liquidity coverage ratios, among other things, may limit the lender's capacity to control liquidity. - Compliance risks of the construction projects with statutory requirements and delay or halt completion of project, consequently affecting loan refinancing.
Publicly traded equity	- Borrowers' intermittent cash flow in the stock market can cause cash flow variability that can	- SEC regulations may pose compliance risks for the borrower. - Unknown customer

	influence the lender's liquidity. - Credit rating downgrades for the borrower influence their financial viability and competitiveness in the capital markets. This influences potential returns and liquidity for the lender.	protection laws: a breach in the data privacy of the customer can result in a penalty for the lender.
Publicly traded bond	- Corporate bonds are usually less liquid than treasury bonds. - Large bid-ask spreads affect demand and supply in the bond market, which in turn affect liquidity. - Ubiquity of different types of derivative contracts (such as advanced options and interest swaps) in the market influences market liquidity.	- Unexpected market events or regulatory changes can have a significant impact on bond markets and cause abrupt fluctuations in bond prices. - Regulatory settings and ensure compliance with foreign laws while engaging in cross-border bond transactions, as these transactions may be subject to regulatory frameworks in several jurisdictions.
An illiquid security	- Wide bid-ask spreads and limited market depth pose liquidity challenges for these securities. - Low liquidity of these securities poses difficulties for the borrower to sell in the event of an economic downturn. refinancing ability is therefore affected. - Maintenance costs for these increased operational costs, affect the market valuation of the securities - making it even less affordable.	- Tax regulations of such securities, especially for international transactions. - Compliance with environmental regulations and standards can affect market access, and long-term sustainability of investments. - Trading margin restrictions may/may not benefit investors/borrowers.

Step 3

Money at a fixed rate for an unsecured purchase:

1. Data type: Consumer credit data, economic data
2. Data processing: Delinquency rates data, raw balances data, charge-off data
3. Data frequency: Monthly data, quarterly data
4. Data class: Credit data
5. Data source: Federal reserve, credit reporting agencies
6. Data variety: Actual data, observed data, unadjusted data

Money at a floating rate for a secured purchase:

1. Data type: Assets data, economic data
2. Data processing: Raw home, auto loans balance data
3. Data frequency: Monthly data, quarterly data
4. Data class: Real estate data, fixed income data, credit data
5. Data source: Federal reserve, Mortgage Bankers Association, auto finance reports
6. Data variety: Actual data, observed data, unadjusted data

Money at a fixed rate for a business for a construction loan:

1. Data type: economic and accounting
2. Data processing: Construction index data, Accounting (credit and debt), default rates. levels, categories
3. Data frequency: quarterly or yearly
4. Data class:Credit, real estate
5. Data source:financial vendors, construction data providers, regulatory bodies
6. Data variety: observed data, actual data

Publicly traded equity:

1. Data type: Asset, Accounting, Regulatory
2. Data processing: raw prices, returns, volatilities, categories
3. Data frequency: Daily, quarterly
4. Data class:Equity data
5. Data source:Exchanges, financial statements, regulatory bodies
6. Data variety: Unadjusted vs Adjusted Data, observed and normalized data

Publicly traded bond:

1. Data type: Asset, Credit
2. Data processing: prices, yields, levels
3. Data frequency: daily
4. Data class: Fixed income, credit
5. Data source:exchanges, credit rating agencies
6. Data variety:actual, observed and estimated data

An illiquid security:

1. Data type:Asset, economic
2. Data processing: Prices, volumes, volatility, debt ratios
3. Data frequency: daily
4. Data class: equity
5. Data source: exchanges
6. Data variety: actual, and normalized data

Step 4

Money at a fixed rate for an unsecured purchase

In this scenario, we collect total consumer credit owned and securitized to analyze the consumer credit growth trend over the years, credit cards delinquency rates (same data used in GWP1) data and FED funds effective rate data. All 3 pieces of data are sourced from the Federal Reserve:

- Total Consumer Credit Owned and Securitized (Board of Governors of the Federal Reserve System (US), 2024a)
- Delinquency Rate on Credit Card Loans, All Commercial Banks (Board of Governors of the Federal Reserve System (US), 2024b)
- Federal Funds Effective Rate (Board of Governors of the Federal Reserve System (US), 2024c)

Money at a floating rate for a secured purchase

In this scenario, we collect new privately-owned housing units started data, 30-year fixed rate conforming mortgage index: loan-to-value greater than 80, FICO score less than 680, mortgage delinquency rate and FED funds effective rate. The data is retrieved from the Federal Reserve:

- 30-Year Fixed Rate Conforming Mortgage Index: Loan-to-Value Greater Than 80, FICO Score Less Than 680 (Optimal Blue, 2024)
- New Privately-Owned Housing Units Started: Total Units (U.S. Census Bureau and U.S. Department of Housing and Urban Development, 2024)
- Federal Funds Effective Rate (Board of Governors of the Federal Reserve System (US), 2024c)
- Delinquency Rate on Single-Family Residential Mortgages, Booked in Domestic Offices, All Commercial Banks (Board of Governors of the Federal Reserve System (US), 2024d)

Money at a fixed rate for a business for a construction loan

In this scenario, we want to collect financial and economic data of the construction/real estate firms in the US. The data was sourced from official financial institutions like the Federal Reserve, and news platforms like Yahoo Finance.

- Balance Sheet: Total Assets on Loans Secured by Real Estate: Construction and Development [QBPBSTASLNREALCONDEV], retrieved from FRED, Federal Reserve Bank of St. Louis (Federal Deposit Insurance Corporation) , June 27, 2024
- Delinquency Rate on Loans Secured by Real Estate, All Commercial Banks [DRSREACBS], retrieved from FRED, Federal Reserve Bank of St. Louis (Board of Governors of the Federal Reserve System (US), 2024d)
- Original Back-End Debt-to-Income (DTI): 50th Percentile (RCMFLOBEDTIPCT50), Large Bank Consumer Mortgage Originations, Federal Reserve Bank of Philadelphia, retrieved from FRED, Federal Reserve Bank of St. Louis; June 28, 2024.
- Large Bank Consumer Mortgage Originations: Original Loan-to-Value (LTV): 50th Percentile (RCMFLOLTVPCT50): LTV ratio
- Mortgage Rates Forecast For 2024: Experts Predict How Much Rates Will Drop Forecast
- Balance Sheet: Total Assets: Securities: Mortgage-Backed Securities (QBPBSTASSCMRTSEC): MBS

- U.S. Bureau of Labour Statistics, Producer Price Index by Commodity: Construction (Partial): New Nonresidential Building Construction [WPU801], retrieved from FRED, Federal Reserve Bank of St. Louis; June 23, 2024: (U.S. Bureau of Labor Statistics, 2024a)
- Central Bank of Nigeria (CBN) New Minimum Capital Requirements for Banks, Templars Law Nigeria-Ghana, 2 April 2024.

Publicly traded equity

In this scenario, we want to collect stock data and income data for a common stock like HDFC Bank Limited in India. The data was sourced from official financial institutions like the Federal Reserve, and news platforms like Yahoo Finance and CBS news

- HDFC Bank Limited (HDFCBANK.NS), Finance Quote, Yahoo Finance.
- Amazon.com, Inc. (AMZN), Finance Quote, Yahoo Finance.
- U.S. Tech Dividend Stocks lists, retrieved from Simply Wall St.: US Tech Dividend Stocks.
- Interest rates cuts (CBS, 2024) CBS NEWS

Publicly traded bond

In this scenario we want to collect the price and yield data of treasury or corporate bonds. We want to analyze the non linear relationship between bond price and yields for different maturities. We get the data of yields from exchanges (using Yahoo Finance). And as the bond price is not so trivial to find, we use the formula to calculate bond prices from the available yield data.

- Treasury Yield 5 Years (^FVX) - Yahoo Finance
- CBOE Interest Rate 10 Year T No (^TNX) - Yahoo Finance
- Treasury Yield 30 Years (^TYX) - Yahoo Finance

An illiquid security

Here, we would collect data for Large cap (indicative of liquid stock) and small cap (indicative of relatively illiquid) companies and look at the debt ratio, volumes and check if it has a play on the volatility of the stock.

- Dow Jones Industrial Average - Wikipedia
- Russell 2000 Index - Wikipedia
- Yahoo finance for daily returns
- Debt ratios from Playground - Financial Modeling Prep API | FMP

Step 5

Money at a fixed rate for an unsecured purchase

After importing the required data from step 4 into the notebook, we perform some exploratory data analysis. First we cleanup the data: we retrieve quarterly data instead of monthly to make sure it is aligned with the quarterly Delinquency Rate on Credit Card Loans dataset. Calculating the percentage change for Total Consumer Credit Owned and Securitized and Delinquency Rate on Credit Card Loans, and plotting the data on a line chart, we get the below Figure 1:

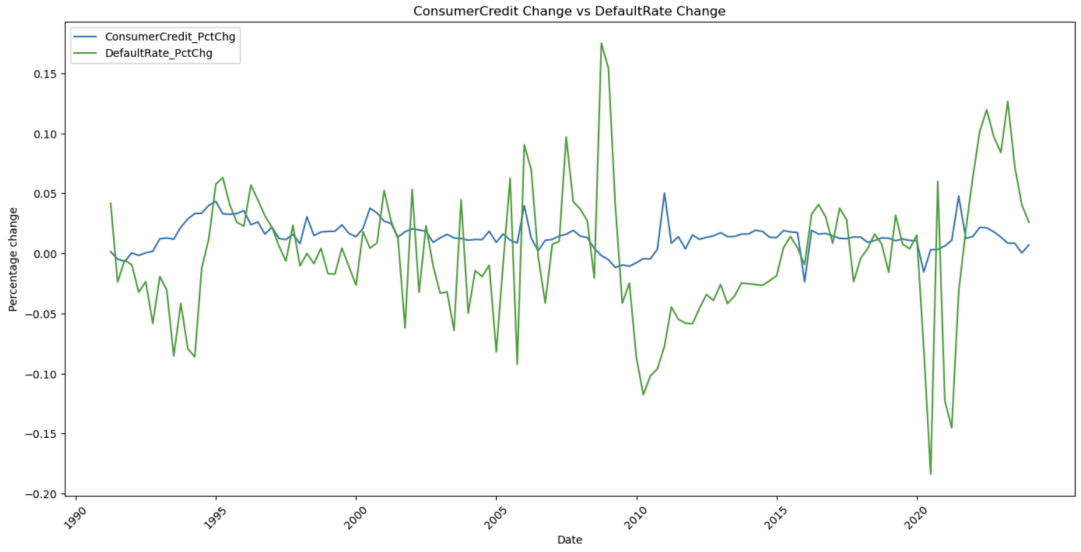

Figure 1: Consumer credit owned percentage change vs Default rate percentage change

From the figure 1, there is no clear correlation between consumer credit owned growth and the default rate. While the consumer credit owned data has a more steady growth the default rate shows a far more volatile change. The default rate growth is more related to periods where market stresses are high instead of the volume of credit cards debt.

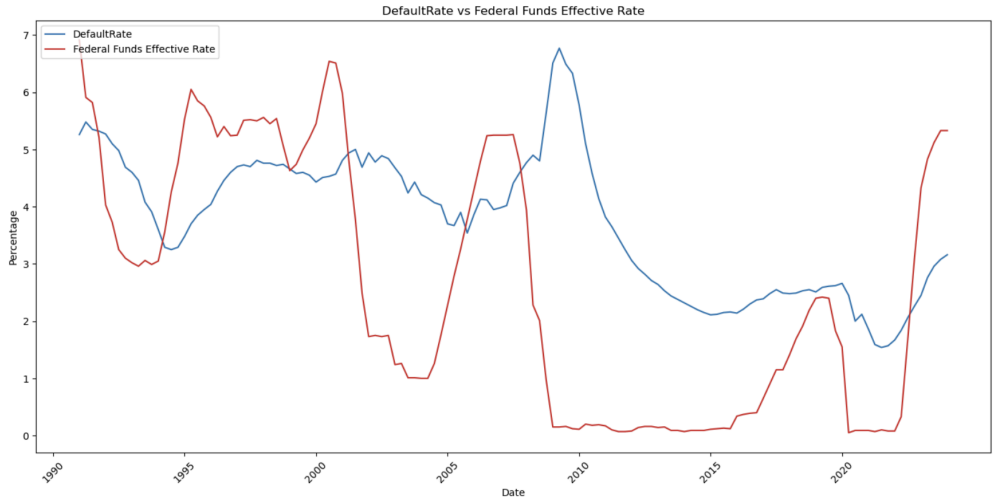

Figure 2: Default rate vs Federal funds effective rate

In Figure 2, we illustrate the credit card default rate over the Federal funds effective rate. It is clear to see that the FED rate does influence in a deferred way the default rate for credit card loans. However, the impact is not that evident, except for the 2007-2008 financial crisis period, where even though the rates got cut to almost 0, the default rates spiked to almost 7%.

Money at a floating rate for a secured purchase

Importing data from the previous step, we first perform EDA and cleanup data. The first issue to be noted is the 30-year fixed rate conforming mortgage index datasets starting in 2017 compared to the rest of the datasets starting at 1990 which may limit our analysis accuracy. Plotting first the mortgage default rate with the housing starts dataset in Figure 3:

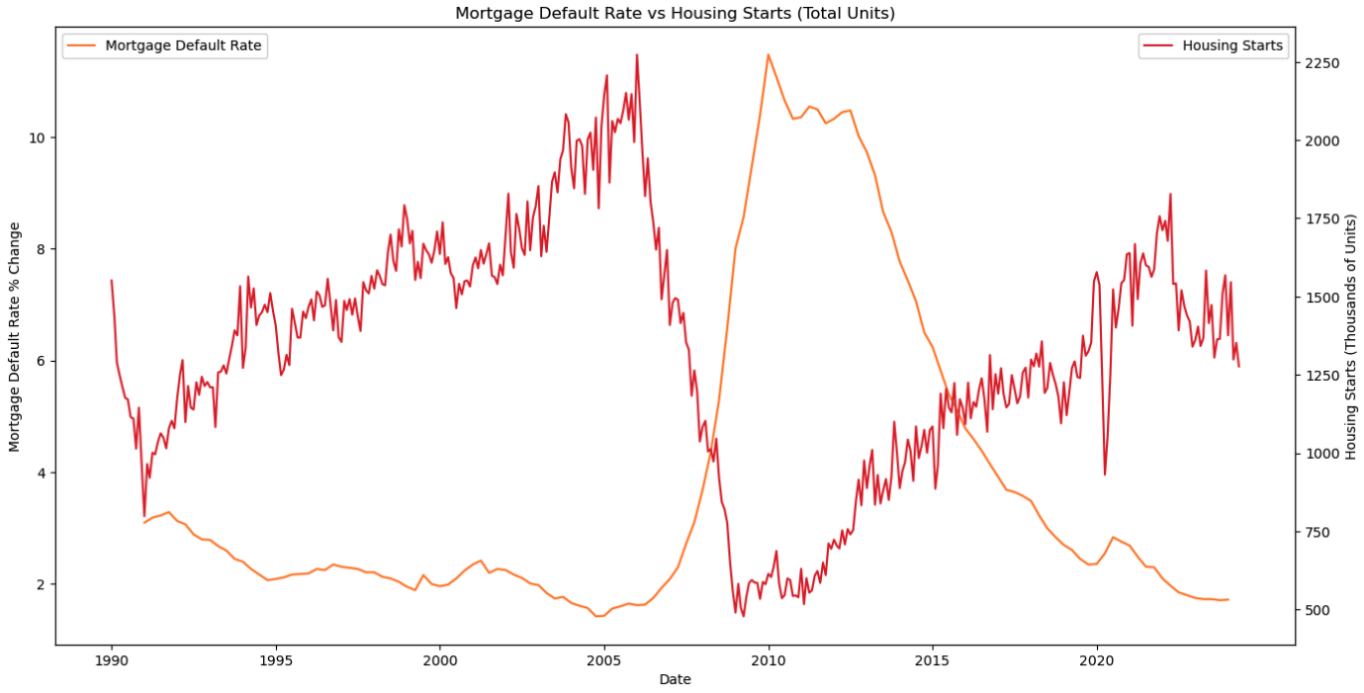

Figure 3: Mortgage default rate vs Housing starts (Total Units)

From Figure 3, it is clearly visible the inverse relationship between the mortgage default rate and the housing starts units: when housing starts units grow, default rates decrease and vice versa. This insight aligns from our perception, new houses start to be developed in a good economic environment with low default rates, and house development industry stalls during economic downturns with high default rates. This scenario is especially noticeable after the 2007-2008 financial crisis period, where we observe a spike in default rates and a collapse in housing starts.

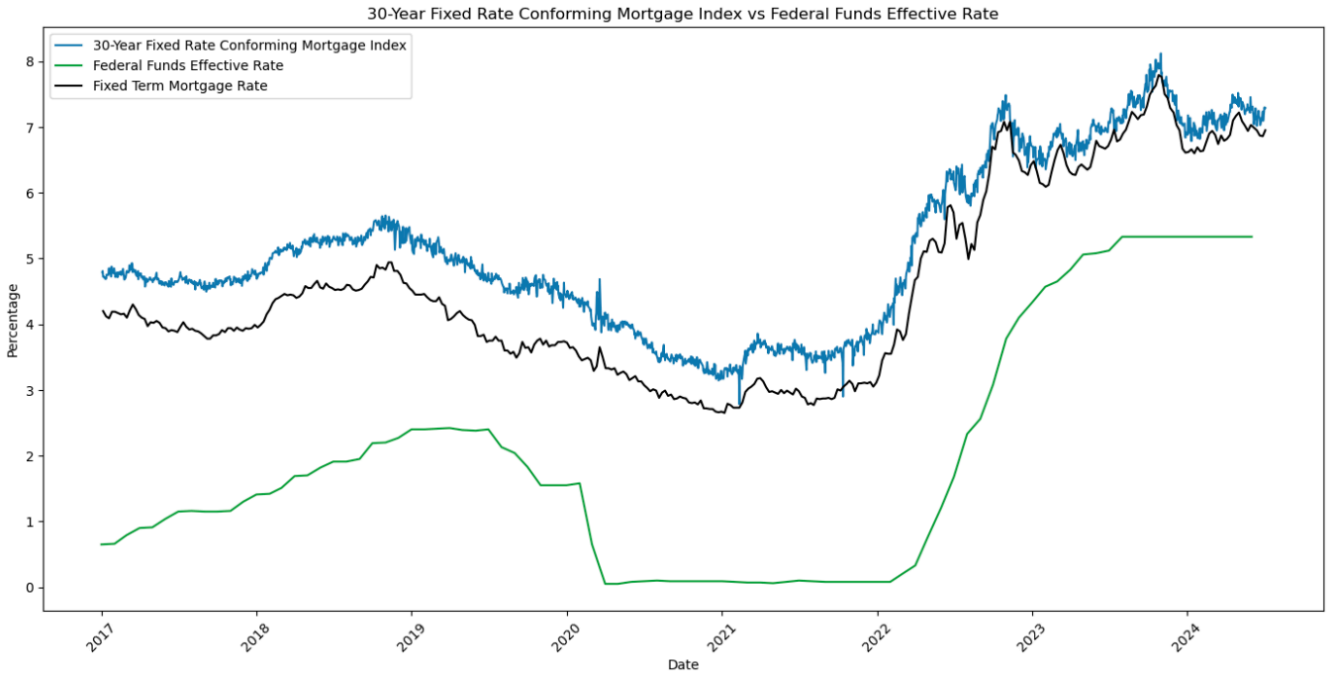

Figure 4: 30-Year Fixed Rate Conforming Mortgage Index (LTV>80, FICO<680) vs Federal Funds Effective Rate

With restricted data, we plot 30-Year fixed rate conforming mortgage Index against Federal funds effective rate and we add the Fixed term mortgage rate dataset as a benchmark. The chart clearly shows a correlation between mortgage rates and fed funds rates. Moreover, it is observable that the offset between the fixed term mortgage rate and the conforming mortgage rate index has been reducing post covid pandemic. This result may be associated with the FED purchasing MBS post covid period to restore the market function (Smith and Johnson, 2020).

Money at a fixed rate for a business for a construction loan

To implement the exploratory statistics for this scenario, we aim to pull out 10-year data for the financial statements of Loan-securing Real estate companies: Financial Asset value from their balanced sheet, as well as the Debt-To_Income (DTI) and Loan-To-Value (LTV) ratios of banks. The financial statements portrays the financial health of the real estate companies, which in turn indicates the credit worthiness of the borrower in servicing their debts/repaying loans over the 10-year period.

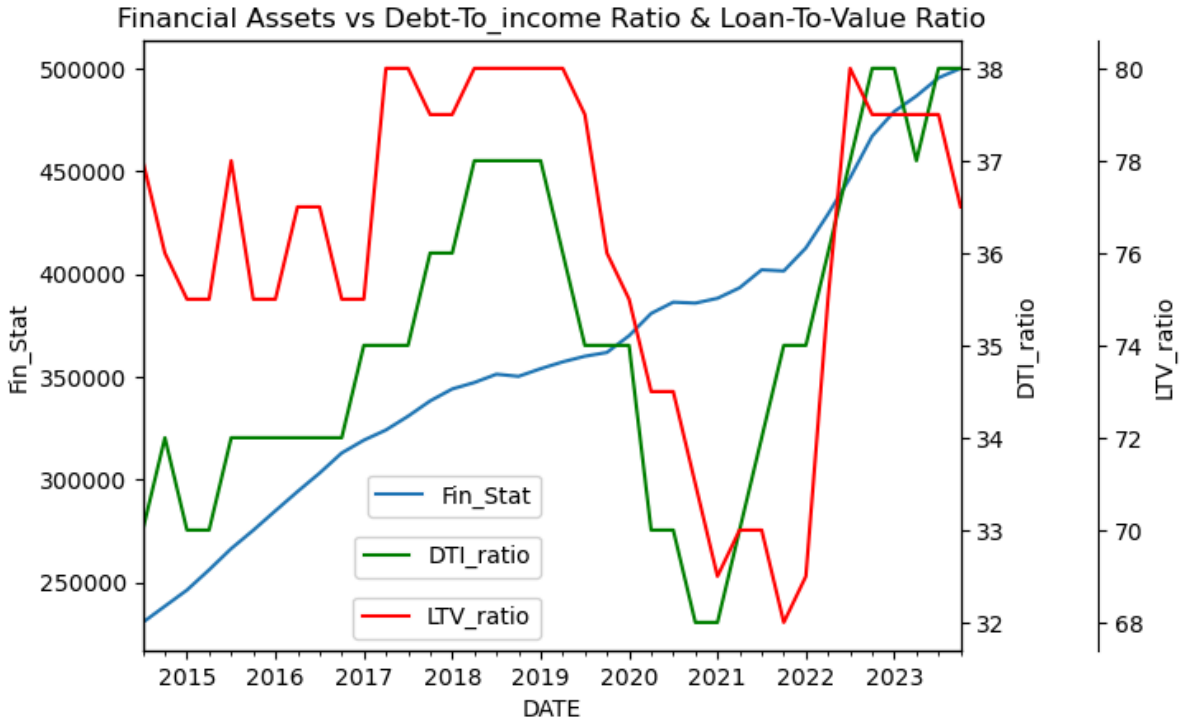

Figure 5: Comparison between Financial Asset Value and Debt Service Ratios

The figure above depicts that the financial value of real estate companies is on an upward trend regardless of the economic condition of the country (from 2014 to date). On the other hand, DTI and LTV ratios are somewhat similar; they both dipped after 2020 but later spiked in 2021 and 2022. For clarity, we intend to explore some of the possible strategies these companies leverage to overcome the economic downturn and high inflation rates. So we decided to introduce the mortgaged-backed securities asset value for the same period, and to compare it with the Producer Price Index of a Building construction (representative of the inflation in the prices of buildings over time).

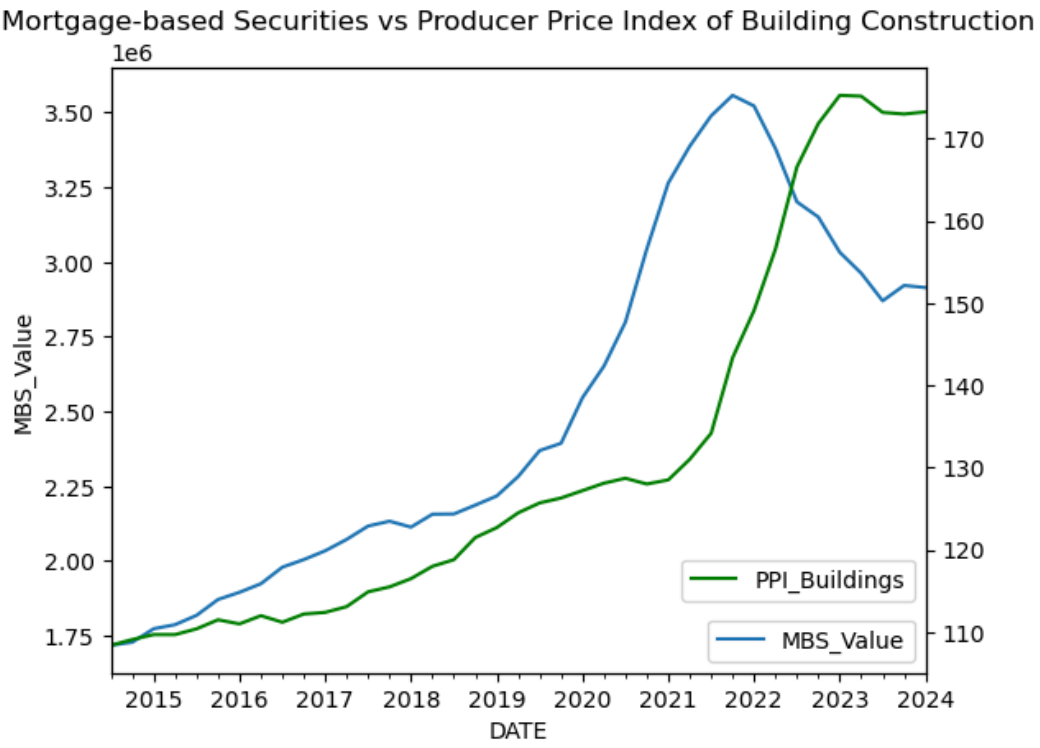

Figure 6: Mortgage Backed Securitization Asset Value vs Producer Price Index of Building Construction

From the figure above, both the MBS and PPI index move in an upward direction. This indicates the fact that lending institutions constantly explore novel credit enhancement schemes to hedge loan credit risk by harnessing Mortgage-Backed Securitization schemes. This is to ensure that there's enough capital to disburse loans and transfer credit risks to third-party investors. Borrowers (construction companies) are constantly hiking the prices of buildings to prevent the risk of default and to overcome the cost of market inflation.

Publicly traded equity

To implement the exploratory statistics for this scenario, we aim to pull out 10-year unadjusted and adjusted stock data for HDFC Bank in India to simply compare the opening and adjusted closing stock trend within this stipulated period. This is to show the stock performance within this period. The unadjusted stock data is represented by the Open, Low and High stock prices while the Adjusted stock data is represented by the Adjusted Closing stock price.

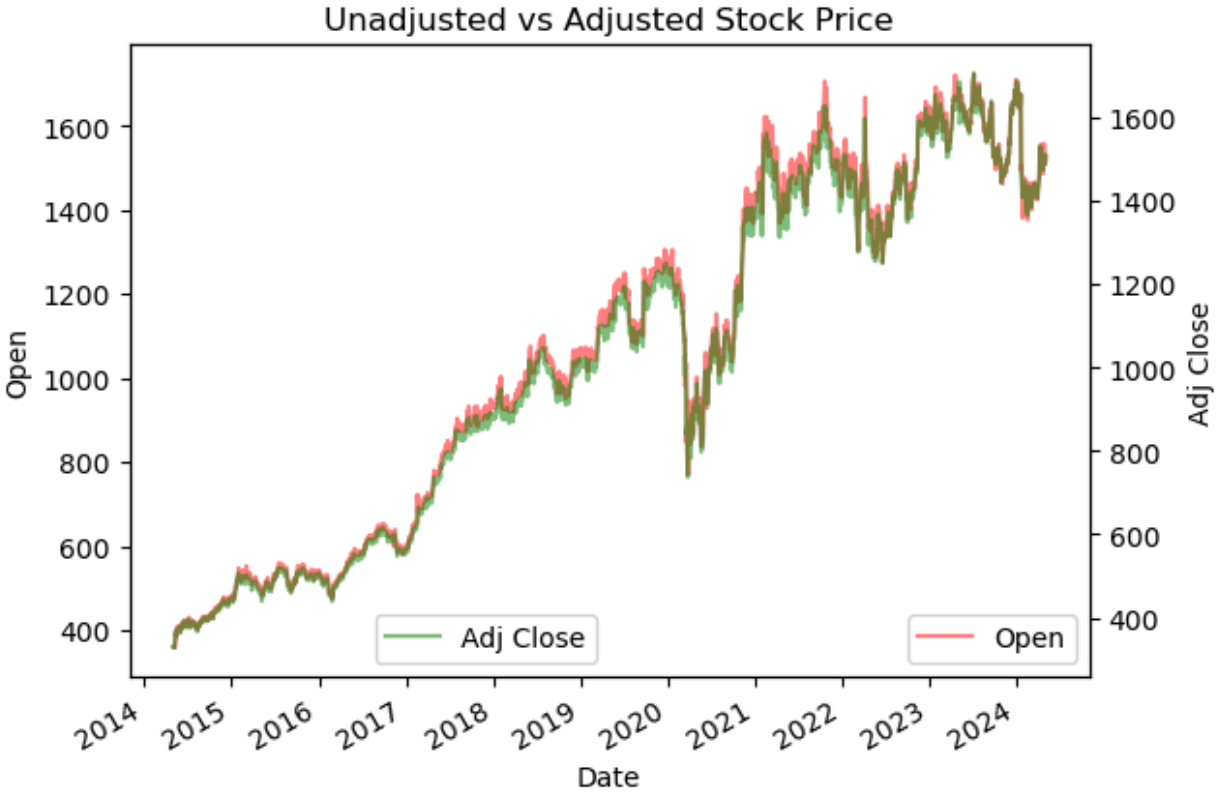

Figure 7: Unadjusted vs Adjusted Stock Price

Figure 7 above shows that from 2014 to about 2020, the HDFC daily closing stock price always trended below the opening price, indicating that going long on the stock on a daily basis will most likely incur losses for the stock trader. However, there was a significant increase in the stock price within this period (2014 -2020). The stock experienced a major dip in 2020 (most likely because of the COVID economic downturn). From then on, the daily trend for closing stock improved.

To further explain the improvement in the adjusted closing stock price, we went on to analyse the company's financial history. While Dividends data was unavailable for free on Yahoo finance, we decided to explore the Free Cash Flow data and compare its Outstanding debt.

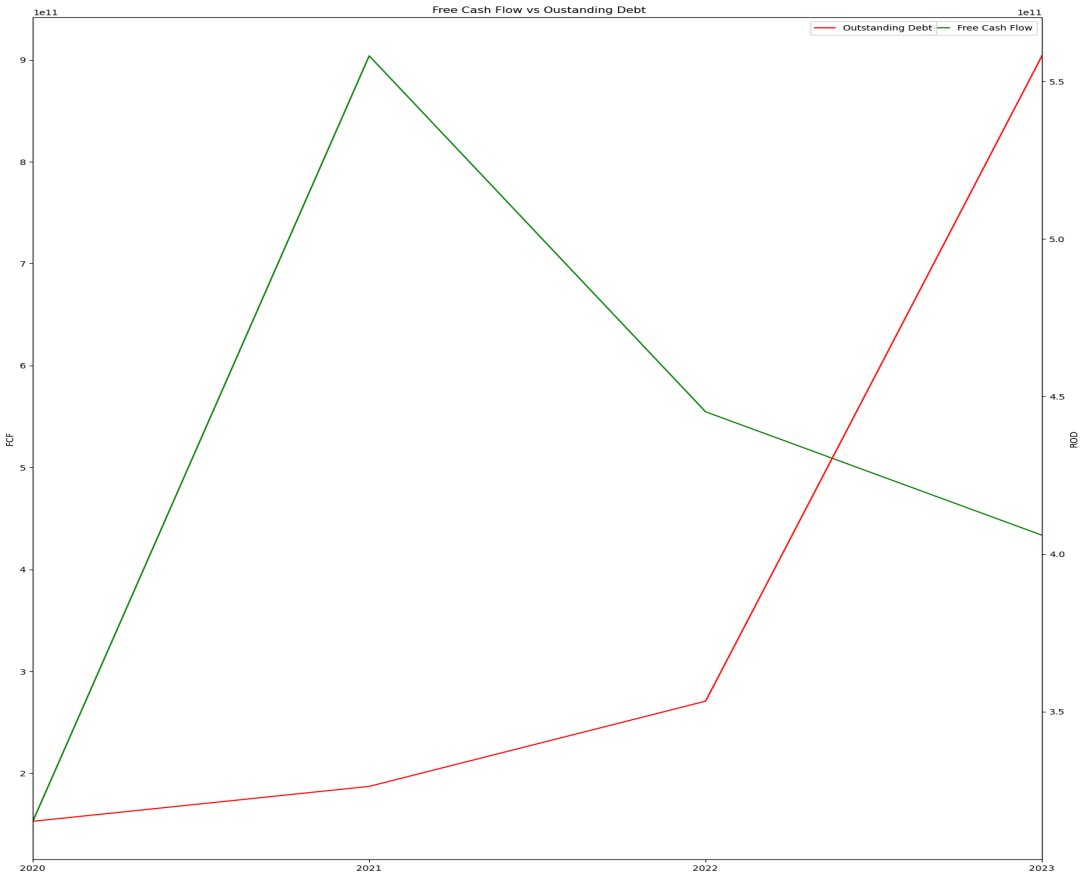

Figure 8: Free Cash flows vs Outstanding Debt

The figure above depicts that the bank began to record significant cash flows in March 2020. In 2021, cash flow dipped while outstanding debt increased a little. The further decline in cash flows was matched with a corresponding increase in outstanding debt. It therefore means that despite the upward movement of adjusted closing stock price after 2020, cashflows were insufficient to meet service debts. Additionally, there is a non-linear relationship between the cash flows and outstanding debt.

Additionally, we decided to compare HDFC bank stock with a US Tech Stock like Amazon over the same 10-year period, as well as find the correlation between the aforementioned assets.

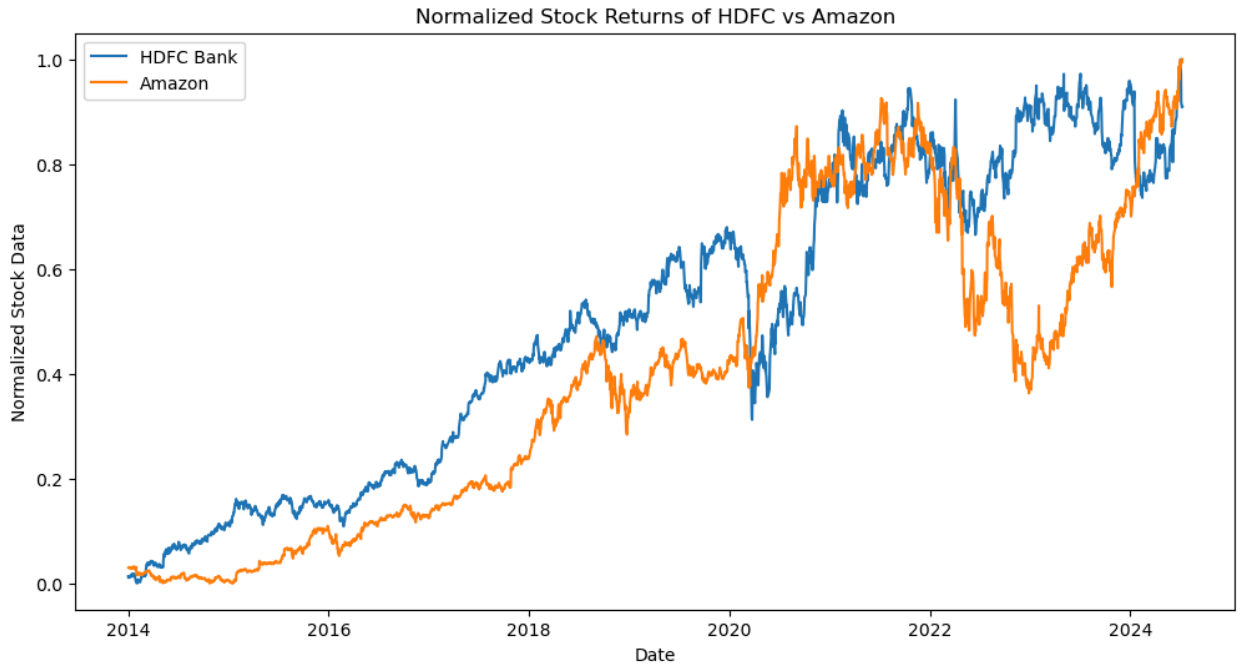

Figure 9: Hedging with US Stocks

The stock returns for HDFC bank are way better than the Amazon stock (as indicated by their mean values). However, a high positive correlation of 0.886 indicates a strong relationship between both assets. The US stock market will most likely influence the stock market in other countries like India.

Publicly traded bond

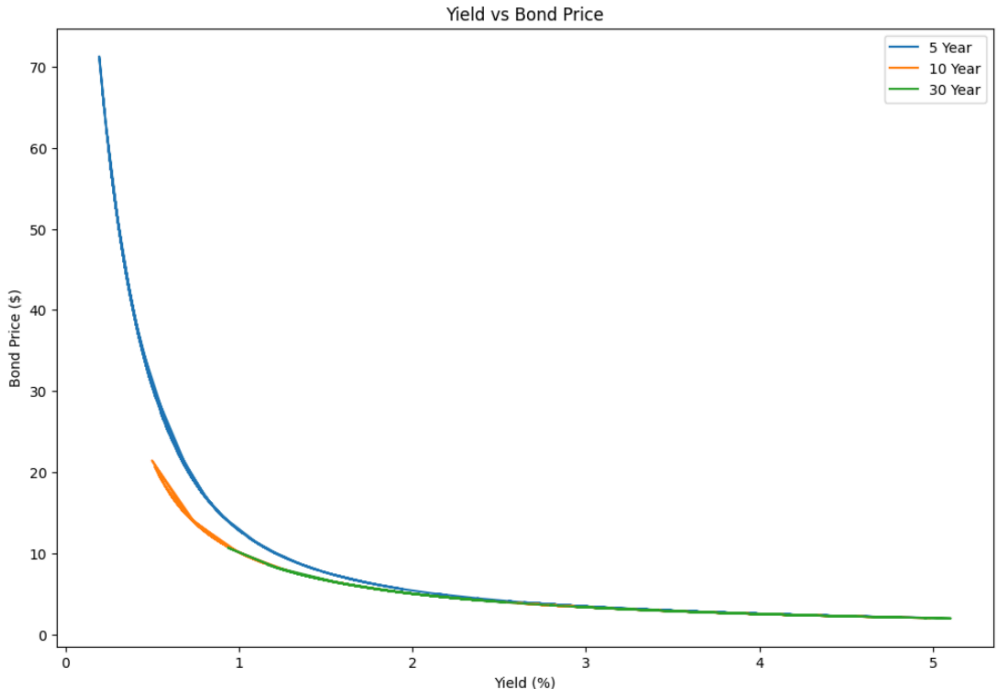

Figure 10: Yields vs bond prices for different maturities

Here we look at the yield data we have for different bonds. And calculate the bond price based on the formula we have. We assume a coupon rate of 5% and a

$$Bond\ Price = \frac{FaceValue}{(1+Yield)^{maturity}} + \sum_{i=1}^{maturity} \frac{coupon\ rate * Face\ Value}{(1+Yield)^{i}}$$

Even though the graph looks linear at places to the naked eye (in high yield areas, it looks like a straight line), when we look at the whole picture, we can see that the relationship between interest rates (yield) and the bond price is non-linear. We also see from the graph that the curvature is very high (the curve is like a hyperbola in 1st quadrant) for longer maturity.

Convexity in the curves show that the bond prices can be extremely sensitive when the yield is small. And this risk is more pronounced for long duration bonds. This can lead to underestimation or overestimation of the price of bond if we pay more attention to duration and less to interest rate movement.

An illiquid security

Here We are establishing a general trend observed in illiquid and highly leveraged assets/portfolios, a high volatility. To do this, we have taken a few highly liquid stocks from Dow Jones Industrial Average. And few stocks from the relatively less liquid small cap index Russell 2000 Index.

large_cap_stocks =['AXP', 'CVX', 'CSCO', 'JNJ', 'JPM', 'MSFT', 'CRM', 'TRV', 'WMT']

small_cap_stocks = ['GTLS', 'LNW', 'TLYS', 'WK']

We look that the average debt ratio is on average high for small caps, and the volume suggests that they are way less liquid than large cap companies. And these two factors in turn drive the volatility of small cap to be higher than that of large cap. This is rather expected as illiquid assets drive the price of the asset up or down easily when someone is on the run to sell or buy. Same is the case with leveraged assets. As they are leveraged, it amplifies the returns and losses and also forces selling large scale quantities in a downturn.

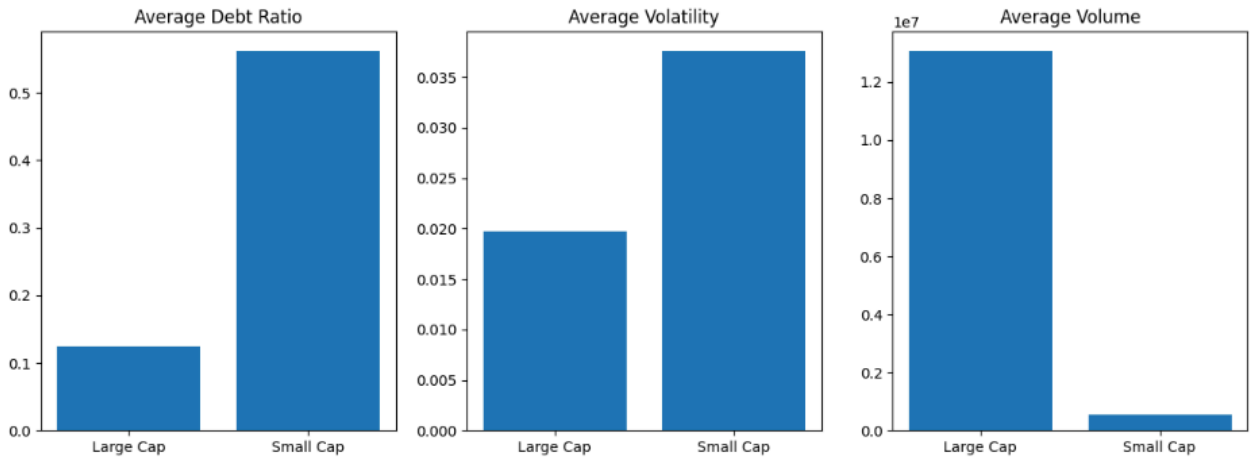

Figure 11: Debt Ratio, Volatility & Volumes

Full data:

Stock	Type	Debt Ratio	Volume	Volatility
AXP	Large Cap	18.8%	3,773,269	2.5%
CVX	Large Cap	8.3%	10,174,696	2.3%
CSCO	Large Cap	8.2%	20,888,162	1.8%
JNJ	Large Cap	17.5%	8,280,545	1.3%
JPM	Large Cap	11.3%	13,590,595	2.1%
MSFT	Large Cap	14.6%	29,519,198	2.0%
CRM	Large Cap	10.0%	6,954,444	2.6%
TRV	Large Cap	6.9%	1,430,365	1.9%
WMT	Large Cap	16.9%	23,088,594	1.4%
GTLS	Small Cap	42.3%	533,747	4.2%
LNW	Small Cap	70.1%	986,928	4.5%
TLYS	Small Cap	47.4%	259,632	3.4%
WK	Small Cap	65.1%	374,352	3.0%

Step 6

Money at a fixed rate for an unsecured purchase

In overall, credit card loans securitization and default rate do not express significant correlation, economic downturns do increase default rates but do not affect credit card loans too much. However, in the previous analysis we were not able to track the liquidity of credit card loans securities on the secondary market once default rates surge, which by intuition, should decrease. From historical data we can conclude that in relatively stable economic environments, FED funds rate rise does slightly increase default rates, however, the default rate reduction influence is not that efficient lowering rates during economic downturns.

Money at a floating rate for a secured purchase

It is clear that during economic downturns, home owners that face their loans deeply underwater, have a higher chance to walk away leaving the mortgage unsettled. In the last GWP, we concluded how the decline of house value will impact on the probability of default, which is even more highlighted in this analysis. The reduction of FED funds rate to try to reinstall liquidity in the market is a clear sign from the central bank of economic stagnation, where mortgage rates are reduced and the development of new house projects paused. This insight highlights the sensitivity between the housing market and the broad economic cycle. Finally, in these situations, the FED intervenes in the MBS market to support and reinstall stability in the housing market.

Money at a fixed rate for a business for a construction loan

The plot of Financial Assets Value vs Debt ratios (Fig 5.) is an indication that construction businesses ensure that they have very good financial statements, debt service ratios and credit score/ratings so as to secure high capital loans from lending institutions. On the other hand, lending institutions utilise credit enhancement schemes (such mortgage-backed securitization) to spread the risk of loan defaults and ensure that they meet loan disbursement regulatory requirements. This is evident in Fig. 6. As the MBS asset value increases year-on-year, construction businesses also seek to hedge risk of default by hiking the selling price of building construction for their consumers.

Therefore, the financial team has no need to be wary of the leverage challenge (such as the debt-servicing potential) of real estate firms, as these firms mitigate the risk of default by selling buildings at higher prices or selling significant amounts of investment shares to the public should the firm suspect the risk of illiquidity of the asset (because of the high prices). However, they need to employ credit enhancement schemes like letter credits, mortgage-backed securities to hedge against credit and liquidity risks and stay afloat in business - they must also be financially capable of providing high capital loans to other businesses (as a means of diversifying their investment portfolio).

They also need to meet the statutory capital requirements to be eligible for recirculation of capital and investments, so they must employ strategies to recover loans from the borrowers while already generating income from other sources. In addition, they must also be mindful of the environmental compliance risks on the construction projects they finance to prevent loss events such as natural disasters, building construction collapses, and potential project delays from governing policies.

Publicly traded equity

While daily time-based spot-trading is inefficient to solve leverage challenges of stock trading, future contracts and options are the most viable solutions to such challenges. Unfortunately, we were unable to get option and dividends data on the HDFC bank stock on Yahoo Finance; hence, we had opted for the analysis of the unadjusted and adjusted stock price in the 10-year period.

Although stock prices are not a true reflection of stock performance, they provide cues on the potential returns of the stock. The cash flow analysis in Fig. 8, shows a nonlinear relationship between the cash flows and the repayment of debt.

Besides option strategy, the financial team could harness buy limits orders on daily stock trading to hedge against losses or analyse the P/E potential of the business to solve potential leverage challenges. Credit ratings and implied probability of default would also be useful to this end - as historical data of the stock could be misleading.

Portfolio diversifications across different asset classes, as shown in the plot of the HDFC stock returns vs. US Tech Stock returns like Amazon, help to hedge against portfolio losses. While the 10-year stock returns for the former are slightly better than the later, recent technology innovation/disruption place tech based stocks ahead of other stocks. Moreover, the high correlation of 0.866 of both assets also indicates that success/failure in US based stocks may influence the other.

As per regulatory requirements, foreign exchange rates and policies may also influence the future of the stock market. For example, the latest news from the Fed Reserve on potential future interest cuts (CBS, 2024) may drive more investments into a diverse portfolio of stocks in the US, which might also influence the stock market in other countries in India.

Publicly traded bond

It is understood that bond prices are sensitive to interest rate changes. Longer the duration, higher the sensitivity and higher the risk/volatility.

Long dated bonds are more sensitive to interest rates, it would pose volatility risk for traders, they might face substantial losses when the interest rate is around the highest convex point on the yield vs price curve.

In case of small interest rate changes, though we can approximate the bond price changes to be linear, we need to be very wary of the impact of making a lot of such approximations which deviate from linear relationships.

One can use following techniques to mitigate this risk:

- Diversified bond portfolio.
- Hedge with derivatives like interest rate swaps
- Hedge with options on bonds
- Active management of bond portfolio with yield curve analysis, forecasting and hypothetical stress testing.

We saw in a previous assignment that interest rates and bond prices are inversely correlated. This analysis equips with the knowledge of bond price sensitivity wrt yields (non linearity) observed. And the techniques to hedge both the risks are fortunately similar however.

An illiquid security

Leveraged illiquid securities are very volatile as leverage amplifies returns and losses. Small changes in asset value can lead to big changes in portfolio value, and in turn affect the decision. This increases the risk of default as well.

We looked at leverage(debt) ratios of liquid and relatively illiquid equities, and we concluded that in general volatility is on the higher side for illiquid and leveraged equities.

This should leave us with the lesson not to be involved in highly leveraged and illiquid securities unless the risks involved are understood and we are being compensated for that in some form, either higher expected returns or a premium when lending/selling the security.

In the previous assignment, we observed that usually illiquid securities have higher volatility than liquid securities, and in this assignment 24we see that leverage adds to the same cause!

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