FULL LEGAL NAME	LOCATION (COUNTRY)	EMAIL ADDRESS	MARK X FOR ANY NON-CONTRIBUTING MEMBER
Chiransh Gulati	US	gulatichiransh@gmail.com	
Harshil Sumra	India	harshilsumra1997@gmail.com	
Pritam Biswaranjan Datta	India	pritamdattaedu@gmail.com	

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).

Team member 1	Chiransh Gulati
Team member 2	Harshil Sumra
Team member 3	Pritam Biswaranjan Datta

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

In our group:

Chiransh Gulati – Student A

Harshil Sumra – Student B

Pritam Biswaranjan Datta – Student C

1. Chiransh interviews Harshil on the topic of "Regularization"

Chiransh: Today we have with us a portfolio manager, Pritam. Thank you for coming.

Harshil: My pleasure, looking forward to it.

Chiransh: **Q1 Can you tell me about topic regularization is in the context of portfolio management?**

Harshil: Sure. Topic regularization is a technique used in portfolio management to reduce the risk of over-exposure to a particular topic or theme. It is done by adding a penalty to the portfolio's return when it is too heavily invested in a particular topic. This penalty can be in the form of a lower expected return or a higher risk.
Regularization is a powerful tool that can be used to improve the risk-adjusted returns of a portfolio. However, it is important to use regularization carefully, as it can also reduce the portfolio's returns.

Chiransh: Q2 Why is topic regularization used in Portfolio Management?

Harshil: There are a few reasons why topic regularization is used. First, it can help to reduce the risk of a portfolio. If a portfolio is too heavily invested in a particular topic, it could be vulnerable to a downturn in that topic. Topic regularization can help to spread the risk across a wider range of topics, making the portfolio more resilient to shocks.
Second, topic regularization can help to improve the performance of a portfolio. By reducing the risk of over-exposure to a particular topic, topic regularization can free up resources to invest in other topics that may be offering better opportunities. This can lead to higher returns for the portfolio.

Chiransh: Q3 How does topic regularization interact with other portfolio management techniques, such as risk parity and factor investing?

Harshil: regularization can interact with other portfolio management techniques in a number of ways. For example, it can be used to:

Reduce the risk of factor investing. Factor investing is a technique that involves investing in assets that are expected to outperform the market based on certain factors, such as value or momentum. However, factor investing can also be risky if an investor is too heavily invested in a particular factor. Topic regularization can help to reduce this risk by spreading the risk across a wider range of topics.

Increase the diversification of risk parity portfolios. Risk parity is a technique that involves allocating assets in a portfolio in such a way that the risk of the portfolio is evenly distributed across different asset classes. However, risk parity portfolios can still be concentrated in a

particular topic, such as technology or healthcare. Topic regularization can help to increase the diversification of risk parity portfolios by reducing the concentration in any particular topic.
Improve the performance of thematic portfolios. Thematic portfolios are portfolios that are invested in assets that are related to a particular theme, such as artificial intelligence or climate change. However, thematic portfolios can be risky if they are too heavily invested in a particular theme. Topic regularization can help to improve the performance of thematic portfolios by reducing the risk of over-exposure to a particular theme.

Chiransh: Q4 How is topic regularization used while building Portfolio?

Harshil: There are a few different ways to implement topic regularization. One way is to use a factor model. A factor model is a statistical model that identifies the different factors that drive returns in a market. Topic regularization can be implemented by adding a penalty to the portfolio's return when it is too heavily invested in a particular factor.

Another way to implement topic regularization is to use a machine learning algorithm. A machine learning algorithm can be trained to identify the different topics that are present in a portfolio. The algorithm can then be used to penalize the portfolio's return when it is too heavily invested in a particular topic.

Chiransh: Q5 What are the benefits of regularization in finance?

Harshil: The benefits of topic regularization include:
Reduced risk: Topic regularization can help to reduce the risk of a portfolio by spreading the risk across a wider range of topics.

Improved performance: Topic regularization can help to improve the performance of a portfolio by freeing up resources to invest in other topics that may be offering better opportunities.
Increased diversification: Topic regularization can help to increase the diversification of a portfolio by reducing the concentration in any particular topic.

Chiransh: Q6 What are the drawbacks of topic regularization in portfolio management?

Harshil: The drawbacks of topic regularization include:
Reduced returns: Topic regularization can reduce the returns of a portfolio by penalizing the portfolio's return when it is too heavily invested in a particular topic.
Increased complexity: Topic regularization can add complexity to the portfolio management process.
Increased costs: Topic regularization can increase the costs of portfolio management by requiring the use of more sophisticated tools and techniques.

Chiransh: Thank you for your time. I appreciate your insights on topic regularization.
Harshil: You're welcome. I'm glad I could be of help.

2. Chiransh interviews Pritam on the topic of "Rebalancing"

Chiransh: Thanks for your time for this interview !

Pritam: My pleasure, looking forward to it.

Chiransh: I want to discuss on "Rebalancing Portfolio".

Q1: Can you explain your strategy for rebalancing your portfolios? How do you decide when to rebalance?

Pritam: Good topic ! We typically establish a strategic asset allocation for each client based on their risk tolerance, investment goals, and investment horizon. This strategic allocation serves as a benchmark that we aim to adhere to over the long term.

Rebalancing is triggered by two main factors: deviation and time. Deviation refers to when the weight of an asset in a portfolio deviates significantly from its target weight due to changes in market values. A common rule of thumb is to rebalance when an asset's actual weight deviates by more than 5% from its target weight.

Time, on the other hand, involves rebalancing at regular intervals, such as quarterly or annually. This systematic approach ensures we stay aligned with the client's long-term goals irrespective of market volatility.

However, the associated transaction costs, tax implications, and market conditions are taken into consideration. There are cases if the expected benefits of rebalancing do not outweigh these costs, rebalancing may be delayed.

Rebalancing is not about chasing returns, but about maintaining a level of risk that is consistent with the investor's financial goals and risk tolerance. It's a disciplined approach that can help investors stay on track towards their long-term financial goals.

Chiransh: Q.2. How does market volatility impact your rebalancing decisions?

Pritam: Markets are always volatile ! Do you mean highly-volatile market ?

Chiransh: Yes, let us assume that the market is highly volatile.

Pritam: There are 3 aspects to portfolio and volatility. First, a well balanced portfolio will factor in some measure of volatile market behaviour, if the volatility is beyond the degree factored in then a short term rebalance may be required.

This leads to the second aspects. We must understand the reson for the volatility. Example in COVID the markets were extremely volatile all over the world, but it would have been imprudent to rebalance any portfolio at that time as evident by how the markets bounced back to stability.

The third aspect is about fundamentals, not only about the assets but also the market fundamentals invested in. A transparent market and resilient economy will always follow prudent economic principles however volatile the market be. The test of a good portfolio is during uncertain market conditions, so if done well, there should be no reason to worry !

Chiransh: Q.3. What are some of the measures you use to track the health of the portfolio you manage ? Could you explain them in brief ?

Pritam: Several of them, Return on Investment (ROI) measures the gain or loss made on the portfolio relative to the amount of money invested. It's a universal measure of profitability.

Alpha measures the excess return of the portfolio relative to the return of the benchmark index. A positive alpha is a sign of good portfolio health. Beta measures the portfolio's sensitivity to market movements. Beta of 1 means the portfolio moves with the market. A beta less than 1 means portfolio is less volatile than the market, while a beta greater than 1 indicates the portfolio is more volatile.

Sharpe Ratio measures risk-adjusted performance calculated as the average return earned in excess of the risk-free rate per unit of volatility or total risk. A higher Sharpe ratio is better as it represents a higher return for a given level of risk.

Drawdown measures the decline from a portfolio's peak value to its lowest point over a specified period of time. It provides an indication of downside risk over a specified time period.

By tracking these measures, we can get a comprehensive view of the portfolio's health and make informed decisions.

Chiransh: Q.4. What about ratios like Treynor etc ? Could you mention some of these ?

Pritam: Absolutely, there are several other metrics used to evaluate portfolio performance and health:

Treynor Ratiois similar to the Sharpe ratio. It measures the risk-adjusted performance of a portfolio. While the Sharpe ratio uses total portfolio risk (standard deviation of portfolio returns) in the denominator, the Treynor ratio uses systematic risk otherwise known as beta A higher Treynor ratio indicates better performance for a given level of systematic risk.

Sortino Ratio is another variation of the Sharpe ratio, but it only considers downside risk, or the risk of negative returns. This can be more insightful for investors who are more concerned about potential losses than overall volatility.

Information Ratio: This ratio measures the portfolio's excess return relative to a benchmark, divided by the the standard deviation of the difference between the returns of the portfolio and its benchmark. A higher value suggests that the portfolio manager has generated more return relative to the amount of risk taken, relative to the benchmark.

Chiransh: Q.4. How does rebalancing fit into your broader risk management strategy?

Pritam: It helps maintain target risk level. Each client's portfolio has a target asset allocation that reflects their risk tolerance, investment goals, and time horizon. Rebalancing ensures the portfolio stays in line with this target allocation. If we didn't rebalance, market movements could cause the portfolio's risk level to drift away from the target.

It helps control systematic risk. By regularly rebalancing, we ensure that no particular asset class or security dominates the portfolio due to its appreciating value, which in turn reduces the portfolio's exposure to a single source of risk.

It mitigates emotional bias. Rebalancing encourages selling high and buying low — a discipline that can be tough to maintain when left to human emotion and over-reaction to trends

It helps to mitigate concentration risk. Over time, some assets may outperform and become a larger portion of the portfolio, causing a concentration risk.

Chiransh: Q.5. What role does rebalancing play in maintaining the alignment of the portfolios with the investment goals and risk tolerance of your clients?

Pritam: That is the first and the most primary goal. Each client has a unique risk profile and investment goals, which determines their optimal asset allocation. Regular rebalancing ensures that the portfolio does not drift away from this optimal allocation due to market fluctuations. This ensures that the

portfolio stays within the client's comfort zone for risk and doesn't become overly aggressive or conservative due to market movements.

Each client has different investment goals, be it retirement planning, wealth accumulation, or saving for a large purchase like a home. The portfolio is initially designed to meet these goals within the stipulated timeline. Regular rebalancing helps keep the portfolio on track to meet these goals by maintaining the originally planned asset allocation.

By periodically rebalancing a portfolio, we adhere to a long-term investment strategy designed around a client's specific needs and goals. Regular rebalancing helps avoid straying from this strategy due to short-term market noise.

We can sell off assets that have performed well and are likely overvalued, and buy assets that have underperformed and are likely undervalued. This could potentially enhance the returns of the portfolio while keeping it aligned with the client's risk tolerance and investment goals.

Regular rebalancing ensures the portfolio remains diversified and aligned with the client's investment goals and risk tolerance.

Thus by ensuring the portfolio stays aligned with the client's risk tolerance and investment goals, rebalancing plays a critical role in successful portfolio management.

Chiransh: Q.6. Finally what is your personal philosophy towards rebalancing?

As with anything general in life. Don’t fix something which is working ! Regular health-checkup and maintenance, no tinkering !

3. Harshil Interviews Chiransh on the subject of "Constraints"

Harshil: Hi Chiransh, I would like to focus on the questions about "Constraints" with respect to their impact on the financial models.

Chiransh: Sure, shoot away.

Harshil: Q.1.In layman's terms, what do you understand by the term "Constraints" in modelling perspective? Are these "Constraints" necessary for creating am effective model model?

Chiransh: In simple words, "Constraints" are basically restrictions. It can be applied through model definition itself or even via the choice of our dataset, like while doing time series analysis it would be what time frame of data we utilize for modelling. In terms of model definition, it could include both the choice of our environment variable and the relationship between them.

Even in the most basic of financial models, like Linear regression, the model can only give out meaningful results if several conditions like no Autocorrelation and no Heteroscedasticity of error terms and multicollinearity among independent variable are required to hold true or the model outputs will be flawed. So, effectively "Constraints" do restrict our financial model such that it does not always holds true but if utilized properly it allows the model to focus on certain aspect or financial phenomenon in the market. A very good example of this is application of 'technical analysis' in financial markets. One can consider each technical indicator as a different graphical model which only holds true when certain conditions on price and volume movement are met.

So "Yes", the "Constraints" are very important to make good, targeted models which at the very least answer questions about one aspect of the market as there is no such thing as "One model being applicable in all market conditions".

Harshil: Q.2. How are "Constraints" utilized in case of portfolio structuring and optimization?

Chiransh: First, I wish to reiterate that all financial models, even portfolio structuring and optimization models, that we study have well defined constraints. All of them can fail if market conditions go awry.

Now, we'll discuss portfolio specific constraints. When we talk about any portfolio, we need to understand that the portfolio is designed to cater to the investor needs and risk appetite. Another more specific example would be when the portfolio manager needs to endure that the portfolio does not get concentrated in a particular asset to ensure diversification. In such a situation, the portfolio manager end up utilizing models such as Lasso and Ridge regression, which would implement penalty on our loss function if weights of our assets grow too large. Such a model would ensure lower returns with less variability.[1]. Basically, in order to do optimal portfolio selection there has to be a selection criterion and this selection criterion itself is a constraint. For example, should the criterion be to maximise return or to minimise variance. The former will mostly be good in case of an expanding/bullish economy while the latter is necessary in case of bearish economy.

Now, the trick here is to understand the nature and flows of beast like chaotic market. That's where the "Art" of successful investing of portfolio optimization comes into picture and great portfolio managers excel at looking beyond the model, which are narrow in nature as they are constrained.

Harshil: Q.3. A small follow up question, with growth of Ml/AI applications, there are even algorithms that do study on qualitative stuff such as market sentiment. Won't that allow everybody to become good portfolio managers?

Chiransh: That's quite a naïve way to put it. Yes, these sentiment analysis models do add value but the question here is whose sentiment is in focus here.

Is it the "market sentiment"? But that would just tell us what the average belief of the whole market which is quite skewed in nature as there are always few extremely rich players who have enough capital to represent a chunk of market share and then there are those who are barely investing in penny stocks based on intuition or random tips.

Or is it the sentiment/belief of the portfolio manager? But then it again boils down to the art of portfolio allocation and investing. For your, one such model is Black-Litterman model which combines the markets analytical data with portfolio managers sentiment.[2]

I would summarize by stating that the field of AI/ML is a tool which has applications across all fields, but we should understand the human intuition and experience should be centrepiece of development in all fields as only that would allow us to utilize these tools most effectively.

Harshil: Q4 Can you shed some light on some "constraints" based on the difference between the real world and the idealistic model.

Chiransh: Sure, Common examples of such constraints can be Regulatory constraints, Transaction cost constraints or even liquidity constraints.

Regulatory constraints: - These are due to the regulations implemented by law to ensure stable and fair market conditions, like:

1.None or limited short selling- in this case, the weights in case of portfolio allocation can either not be negative or there is a limit on how negative they can be.

2.While investing across Regulatory jurisdictions to diversify the portfolio, the portfolio manager allocation design must adhere to constraints based on standards set by all respective Regulatory bodies.

Transaction Cost Constraints: - Every single trade/transaction has an associated transaction cost. So, a portfolio manager must keep them in mind while rebalancing the portfolio. Basically, these costs must be part of the optimal model selection equation.

Liquidity Constraints: - is very important as a high value portfolio with no associated liquidity in the market is basically a 'no value' portfolio. Therefore, it is crucial for a portfolio manager to ensure that their fund is sufficiently liquid to allow for good flexibility in case of market turmoil or even change in investor preferences.

Harshil: Q.5.In terms of lack of constraints, what do you think about the "Cryptocurrency" market as being free of constraints.

Chiransh: In all honesty, Cryptocurrency markets, have opened new avenues of investing the market is still not free of them. There are associated transaction costs there too. Also, many governments have slowly and steadily started regulating them. Furthermore, even if these constraints are not there, but still any model we use to study market in any form is always a constrained model.

Therefore, the cryptocurrency market is like any other market functioning on basic demand and supply model with much higher volatility due to ease of access and lack on monitoring.

Harshil: Q6 As a concluding question, I would like to ask for your opinion on the growth of technological development in the field to AI/ML on financial modelling and markets.

Chiransh: I have already spoken a bit on this previously, so, I'll add to that only. These developments are a boon in the field of academic research for sure. But when we move towards application, we must take caution because the theory is much farther from the cruel hand of reality. In financial markets, the ease of trading and that too at very high volume and frequency, that our current technology allows, makes the financial market very susceptible to instability. Take the case of Knight capital, a small flaw in trading software cost the firm $440 million.[3]

In conclusion, these development in technologies are only a boon if utilized properly with great caution else they are a crisis waiting to happen.

4. Harshil Interviews Pritam on the subject of "Predictability and Interpretability"

Harshil: Hi, I wanted to discuss on the subject of Predictability vs Interpretability.

Q.1. How do you balance the need for accurate predictions with the desire for interpretability in your financial models?

Pritam: This is like the "both-a-science and-art" cliché topic ! We need to clearly define the objectives of the modeling exercise. If the primary aim is to generate the most accurate predictions possible, we might lean towards more complex, potentially less interpretable models. If understanding the underlying relationships is more important, we might prioritize simpler, more interpretable models.

Generally we start with simpler, more interpretable models like linear regression or decision trees. If these provide satisfactory results, there may be no need to move to more complex models. Simpler models are not only easier to understand but also faster to implement and less computationally intensive.

If simple models do not suffice, we could move to complex models like neural networks. While these models may offer better predictive accuracy, they can be more challenging to interpret. We can use tools to improve interpretabilty and even use ensemble methods which combine predictions from multiple models. This can improve prediction accuracy while also providing some level of interpretability by revealing which models in the ensemble are most influential.

Regardless of the complexity of the model, effective communication is key. We aim to convey the strengths and limitations of our models, as well as the assumptions they rely on, in a clear and understandable manner. Finally, both predictive and interpretative models are subject to rigorous validation and testing to assess their predictive accuracy and robustness over time and under different market conditions.

The goal is to strike a balance, maximizing predictive power without completely sacrificing interpretability, so that our models are both effective and trustworthy.

Harshil: Q.2. How does the relative importance of prediction and interpretation change based on different investment strategies or asset classes?

Pritam: The importance of prediction versus interpretation in portfolio management really depends on the strategy and context. Passive strategies, like index investing, lean more on interpreting market dynamics, whereas active strategies need accurate predictions to try and outperform the market.

Similarly, quantitative strategies are prediction-heavy while fundamental strategies emphasize interpretation. The time frame also matters; long-term strategies need deep interpretation, while short-term strategies rely on quick, accurate predictions.

Different asset classes also shift the balance. For instance, in equity investing, understanding a company's structure and industry positioning is as vital as forecasting future prices, whereas in fixed income investing, predicting interest rate movements or default probabilities can be more critical. So, the balance between prediction and interpretation is a dynamic one, shaped by the specific circumstances of the investment strategy and asset class.

Harshil: Q.3. How do you communicate the results of complex, high-performing predictive models to stakeholders who may prefer more interpretable but potentially less accurate models?

Pritam: Promoting understanding, trust, and sound decision-making is pivotal when working with complex AI/ML models.

To help with this, we first aim to simplify the complexity of these models. We break them down into easier-to-understand terms and concepts, explaining the model type, the most influential variables, and the prediction-making process, all in a language that doesn't require a technical background.

Another key approach is to focus on results. Instead of delving deep into the complexities of the model, we highlight what the model can deliver. We talk about its predictive accuracy, how it fares better than simpler models, and what this could mean for investment returns and risk management.

We are also candid about the trade-offs between predictive accuracy and interpretability. We explain why we believe the model we've chosen is best suited for a particular case, despite these trade-offs.

Importantly, we also explain the safeguards we have in place. This includes our validation procedures and ongoing monitoring systems that help ensure the model performs as anticipated and helps us catch any issues early on.

Finally, we try to highlight the model's applications with practical examples or case studies. This demonstrates its real-world benefits and applications.

And needless to say, effective use of visual aids and encouraging open dialogue and questions are crucial tools that enhance the success of the entire exercise.

Harshil: Q.4. What are your thoughts on the recent developments in machine learning aimed at improving model interpretability?

Pritam: There are quite a few exciting trends in making machine learning models more interpretable. Techniques like LIME and SHAP are changing the game by helping us understand complex models better. Similarly, explainable AI or XAI is aiming to keep models transparent and trustworthy, solving the 'black box' problem we often face.

Neural networks, which are infamous for their opacity, are also becoming more interpretable thanks to methods like feature visualization and layer-wise relevance propagation. We're also seeing a growing focus on making sure these models are fair and unbiased, with new tools being developed to detect and mitigate bias.

And with AI becoming more ingrained in decision-making, we're seeing regulators stepping in with guidelines on model interpretability. So, while we've made great strides in this field, there's still a lot to look forward to. The field is buzzing with research, and as machine learning evolves, our ability to understand and explain it will too.

Harshil: Q.6. How do you ensure that your models, whether focused on prediction or interpretation, remain compliant with regulatory standards?

Pritam: Regulatory compliance is a critical aspect when creating and implementing financial models. It starts with understanding the relevant regulations like those related to data privacy, financial reporting, and anti-money laundering. And we need to stay abreast of any updates to these regulations.

When we design our models, we ensure they align with these regulations. For example, if certain personal information types can't be used due to privacy regulations, we make sure to exclude them.

A key part of our process is rigorous testing, including back-testing against historical data and stress testing under varied scenarios. We keep detailed documentation of our models, from their design to their performance in testing, which helps demonstrate our compliance to regulators.

To make sure we stay compliant, we perform regular audits, both internal and external. Everyone involved in the models, from development to implementation, is properly trained and understands the relevant regulations.

In certain cases, we may even incorporate regulatory constraints directly into our models. For instance, in risk models, we might include constraints related to capital requirements.

All through this process, our legal and compliance teams guide us, making sure our models not only meet regulatory requirements but are also effective for prediction or interpretation. That's our approach to balancing efficacy and compliance in our financial models.

5. Pritam Interviews Chiransh and Harshil on the subject of "Leverage vs Concentration"

Pritam: Hi, Mr C. and Mr H. Thanks for your time. I would like to explore few topics and concepts related to Portfolio management. Can I start ?

Chiransh: Absolutely, we're ready and looking forward to your questions.

Harshil: Yes, please go ahead. We're all ears.

Pritam: Q1 With respect to "Leverage vs Concentration" of a portfolio, how does Regularization impact either ?

Chiransh: Regularization, in the context of portfolio management, is a mathematical technique that adds a penalty term to the objective function to control the complexity of the model. It can impact both leverage and concentration. For leverage, regularization can help to mitigate the risk of overexposure to certain assets by encouraging a more balanced portfolio. If an asset has a high predicted return, a non-regularized model might take an oversized position in it, effectively leveraging the portfolio. Regularization techniques can help limit this by adding a penalty to the size of positions.

Harshil: On the concentration side, regularization can encourage diversification. If not controlled, a portfolio model might overfit to the training data and take concentrated positions in assets that performed well in the past. Regularization can prevent this by adding a penalty to large weights, effectively promoting a more evenly distributed portfolio. Overall, the balance between leverage, concentration, and regularization needs to be carefully managed, and it's an art that comes with experience.

Pritam: Q2 In a post COVID world, what do you think portfolio managers are advising their client ? Leverage or Concentration and why ?

Chiransh: In the wake of the COVID pandemic, many portfolio managers might lean towards advising their clients on concentration. The reason is, with the pandemic-induced volatility and changes in market dynamics, it's more important than ever to understand the businesses you're invested in. A concentrated portfolio of high-quality, resilient businesses that the client understands and believes in could provide more stability and better long-term results.

Harshil: Alternatively, some managers may advise a slight increase in leverage, but in a very calculated manner. This is particularly true if the client's investment horizon is long, and they have the capacity to endure short-term volatility. The disruption brought by COVID-19 has also brought about lower interest rates, making borrowing costs cheaper. With the right risk management in place, a leveraged portfolio could potentially take advantage of this environment and yield attractive returns. However, caution is required as leverage can magnify losses as well.

Pritam: Q3 Ok, interesting. Does Rebalancing impact or have any relation to leverage vs concentration ?

Chiransh: Absolutely. Rebalancing a portfolio is essentially a risk management exercise, and it directly impacts both leverage and concentration. If a certain asset or group of assets has performed exceptionally well, they can end up becoming a larger portion of the portfolio than originally intended, increasing the portfolio's concentration risk. Regular rebalancing helps keep this risk in check by bringing the portfolio back to its original strategic asset allocation.

Harshil: Now, in terms of leverage, let's say you have a leveraged position that's performed well, and it's now making up a larger portion of your portfolio. The risk here is that if the asset's price drops, you could end up with a magnified loss due to the leverage. Rebalancing helps manage this risk by

reducing the position size back to its original proportion, effectively managing the leverage of the portfolio. So, rebalancing is indeed a critical tool in managing both leverage and concentration risks.

Pritam: Q4 What about Constraints? How does it impact ?

Chiransh: When managing a portfolio, constraints are absolutely crucial. They directly affect both the leverage and the concentration of the portfolio. For instance, a portfolio manager may impose a constraint on leverage to limit risk exposure, thereby ensuring that borrowing doesn't exceed a certain threshold. This can help to maintain a balanced risk profile, even if it could limit potential returns.

Harshil: As for concentration, constraints can be employed to avoid overexposure to a single asset or a particular sector. By setting a maximum limit on the amount that can be invested in any one asset or sector, a portfolio manager can maintain a well-diversified portfolio. This can help reduce the potential impact of any single asset's performance on the overall portfolio. So, constraints essentially act as safety nets, keeping the portfolio within a manageable risk level.

Pritam: Q5 How is AI/ML modeling changing the game when it comes to making a decision about leveraging vs concentrating ? Is interpretability a big issue ? Are your quants able to provide the required level of clarity ?

Chiransh: AI and ML models are indeed becoming more and more popular in portfolio management. They can analyze vast amounts of data, uncover complex patterns, and make predictions far beyond human capacity. For example, these models could help us decide between leveraging and concentrating by predicting the performance of various assets or markets under different scenarios.

However, one of the key challenges with AI and ML models is indeed their interpretability, often referred to as the "black box" problem. The more complex models, like deep neural networks, can make it hard to understand exactly why they're making certain predictions or recommendations, which can be a barrier to their adoption in portfolio management.

Harshil: Yes, you're right. Our quants do strive to bridge this gap between complex models and interpretability. The main way we address this is through a combination of simpler, more interpretable models like linear regression or decision trees, with more complex but less interpretable models like neural networks. The simpler models give us a broad understanding and sanity check, while the complex models provide deeper insights.

Also, it's worth noting that there are ongoing developments in the field of explainable AI or XAI, which aim to make AI decisions more understandable to human users. So while interpretability is indeed a challenge, it's an area that's seeing a lot of innovation and progress.

Pritam: Q6 Great, A last question. Given you job as a portfolio manager, which is that one area that you do with the most care upon which hinges the success of the portfolio. I know and acknowledge that it is an inter-related field and there cannot be one area, however, if I had to press you to say one ! Indulge Me !!

Chiransh: If I had to choose one area, it would be risk management. At the end of the day, portfolio management is as much about managing risk as it is about seeking returns. From setting appropriate asset allocation, to regular rebalancing, to imposing constraints, it all circles back to risk management. Because, no matter how promising an investment looks, we always need to understand the potential downside and ensure it aligns with our client's risk tolerance.

Harshil: Indeed, risk management is crucial, but if I were to name another area, I would say it's maintaining a deep understanding of the assets we're invested in. In a world that's getting more complex and connected, understanding the underlying businesses, their management, their competitive positioning, and their potential risks and opportunities, can really make the difference.

We're not just buying numbers on a screen; we're buying pieces of real businesses. The more we understand them, the better decisions we can make. So for me, this careful analysis and understanding is paramount.

Pritam: Gentlemen, Thanks for your time and sharing your valuable knowledge with us. It was great getting together with both of you.Thank you !

Chiransh: It was our pleasure. We're glad to have the opportunity to share our insights with you. Thanks for having us!

Harshil: Absolutely, we enjoyed the discussion. Thank you for the thoughtful questions! Feel free to reach out if you have more in the future.

Refrences:

1. Bruder, Benjamin and Gaussel, Nicolas and Richard, Jean-Charles and Roncalli, Thierry, Regularization of Portfolio Allocation (June 2013). Available at SSRN: https://ssrn.com/abstract=2767358 or http://dx.doi.org/10.2139/ssrn.2767358
2. Colasanto, Francesco & Grilli, Luca & Santoro, Domenico & Villani, Giovanni. (2022). BERT's sentiment score for portfolio optimization: a fine-tuned view in Black and Litterman model. Neural Computing and Applications. 34. 10.1007/s00521-022-07403-1.SEC Press Release- https://www.sec.gov/news/press-release/2013-222
3. https://www.sofi.com/learn/content/when-to-rebalance-portfolio/
4. https://www.investopedia.com/investing/rebalance-your-portfolio-stay-on-track/
5. https://www.bankrate.com/investing/portfolio-rebalancing/#how-it-works
6. https://www.commonwealth.com/insights/3-rebalancing-strategies-for-reducing-risk