2021

QARM II

Projects: guidelines and topics

Outline

- Guidelines
  1. Report
  2. Code
  3. Presentation
- Topics

Guidelines

- Three parts to return:
  1. Report
  2. Presentation
  3. Code
- Groups of 3-4 students.
- Presentations will take place in the last two weeks of the semester:
  - Tuesday 21 Dec 2021
  - One more session at a date to be defined
- Submit full package (final report, code, presentation) by Thursday 23 Dec, 12pm.
- Retake exam: resubmit revised report and new presentation.

Guidelines
Report

- Length: 8-10 pages of written text.
- Put figures and tables at the end, eventually in appendix for the less relevant ones.
- Report should include at least the following sections:
  1. Abstract / Executive summary
  2. Introduction
  3. Review of literature
  4. Data description and analysis
  5. Methodology
  6. Results
  7. Robustness checks and sensitivity analysis
  8. Conclusion

Guidelines
Presentation

- Sessions of 30 minutes for each topic.
- Plan 20-25 minutes presentations, leaving 5-10 minutes for Q&A.
- Speaking time to be equally weighted among the members of the group.
- You are in front of the client. There must be quality in both slides and oral presentation.
- Presentations to be structured in the same way as the report.

Guidelines
Code

- We should be able to run it. Please include all relevant elements, including data, programs, functions. Eventually some help to run it.
- We should be able to read the code easily. Make sure:
  - To comment your code as often as necessary.
  - Do not hard code the parameters, so we can play with them easily.
  - To use functions.
  - To structure the code in clearly defined sections:
    - Data loading and manipulations
    - Settings for parameters
    - Running of the strategy
    - Plot and display of results
- A nice, even simple, Graphical User Interface (GUI), is a plus.

Guidelines
Topics

- Topics are all related to practical concerns observed in the industry.
- Procedure to follow. Send an e-mail to TA and Prof. with :
  - Group members
  - Express your choice with a list of 5 topics in order of interest
- Topics will be attributed to groups in the following days.
- We'll try to accomodate your choices, but no guarantee.
- Regular meetings will be held with the groups. Slots will be made available on Moodle.
- Some material will be provided to start with:
  - Related papers
  - Data in some cases
- Do not replicate only, be creative.

Topic #1
Fundamental weighting for the Swiss market

- **Objective**
  - Our client is a Swiss investor that firmly believes in value investing. He would like to give a mandate for Swiss equities value on a long-only basis.
  - He has heard about the new SWX value index, but also read that there are plenty of different ways to get exposure to value. He is not really sure about the most efficient way to get that exposure and about what these differences make on the Swiss market.
  - Moreover, having the SPI as a benchmark, he is concerned about the particular structure of the Swiss market, the tracking error that the strategy might generate and the low liquidity of some stocks.
  - He read as well about fundamental indexing as an interesting way to get value exposure but has not seen any related product for the Swiss market.

- **Data**
  - Swiss equity market daily prices for single stocks. Fundamental information necessary to build a value portfolio. Information on volumes traded might be useful.

Topic #2
Risk parity asset allocation for a Swiss private foundation

- **Objective**
  - Our client is a Swiss private foundation that has a global balanced portfolio. Its allocation is currently close to a 50/50 bonds and equities.
  - They are considering giving a mandate for managing part of its portfolio according to a different weighting scheme. In particular, they have heard about the benefits of risk parity at the asset allocation level.
  - However, they have not really seen at this stage any historical evidence for a typical Swiss investor.
  - Moreover, the client is quite concerned about the large weight a risk parity approach might attribute to the bond portfolio at a time where rates are rock-bottom low.
  - Leveraging somewhat its portfolio is an open option if that could lead to improved risk-adjusted returns.

- **Data**
  - Monthly historical prices on asset classes included in a typical balanced pension fund portfolio, typically LPP 40. Eventually break down the asset classes into sub-categories, say equities by geography.

Topic #3
Optimal rebalancing for a Swiss pension fund global portfolio

- **Objective**
  - Our client is a Swiss pension fund, who wants to remain passive on his asset allocation. He has chosen the LPP 40 index as a benchmark.
  - He would like to give a mandate to an asset manager, paying particular attention to the rebalancing process. He is aware that being passive implies rebalancing periodically his portfolio.
  - Drifts in its allocation will lead to increasing tracking error, which he would like to minimize.
  - However, he is concerned as well by the timing of the rebalancing and about the trading costs induced by rebalancing too frequently.
  - He has heard about optimal rebalancing taking into account drifts, tracking error and market conditions but is not completely clear about how to address this issue.

- **Data**
  - Monthly historical prices on asset classes included in a typical balanced pension fund portfolio, typically LPP 40. Eventually break down the asset classes into sub-categories, say equities by geography.

Topic #4
Improving momentum strategies on Swiss equities

- **Objective**
  - Our client is a Swiss investor that firmly believes in momentum investing. He would like to give a mandate for Swiss equities momentum on a long-only basis.
  - He has heard about the new SWX momentum index, but also read that there plenty of different ways to get exposure to momentum. He is not really sure about the most efficient way to get that exposure and about these differences make on the Swiss market.
  - Moreover, having the SPI as a benchmark, he is concerned about the particular structure of the Swiss market, the tracking error that the strategy might generate and the low liquidity of some stocks.

- **Data**
  - Swiss equity market daily prices for single stocks. Information on volumes traded might be useful.

Topic #5
ESG stars on the US market

- **Objective**
  - Our client is an asset manager who is currently hearing about all the hype on ESG investing. He sees a great opportunity to propose on the market a thematic portfolio on that issue for US equities.
  - Despite reading various articles on the issue, he is not really sure about what to expect in terms or risk and performance profile from a reasonably concentrated portfolio (say about 50 stocks) of highly socially responsible companies. He doesn't even know which dimension of ESG really matters and how they differ from each other.
  - Our client also has some previous experience in bringing smart beta products on the market. He thought that perhaps combining ESG with some smart beta / factors would be a great idea.
  - He is giving us an advisory mandate to help him devise an ESG portfolio that might be attractive for his clients.

- **Data**
  - Monthly ESG grades on US companies included in the MSCI US index. Monthly prices and other data needed to work on factors or smart beta constructions.

Topic #6
A fully conservative strategy on European equities

- **Objective**

  - Our client is a European public pension fund. Being public, he has a specific bias toward limiting the risks of its portfolio and is therefore quite keen on using low risk type of strategies on the equity market.
  - Recently, pressure from authorities has intensified on public investors to integrate the socially responsible dimension of their investments. They need to go from theory to concrete steps to add that dimension.
  - For this particular investor, taking ESG factors into consideration makes considerable sense as this would mean integrating another type of risk, which was not part of the equation before. He sees that as a good complement to his low risk approach, but does need some further evidence to confirm his view.
  - He gives you a mandate to assess how ESG criteria could complement his existing low risk approach and to devise a portfolio of European equities that would build on low volatility, high dividends and ESG criteria.

- **Data**

  - Monthly ESG grades on European companies included in the MSCI Europe index. Monthly prices and other data needed to work on factors or smart beta constructions based on low vol and high dividend.

Topic #7
Smart beta in commodities

- **Objective**

  - Our client is large pension fund who is particularly concerned with inflation risks in the near future. One of the alternatives he is considering for positioning his portfolio in this respect is to build his exposure to commodities.
  - However, having had a look at current products, he is not fully convinced by the portfolios he has seen. He has heard a lot about alternative weighting schemes in equities, and has even invested in some of those, but has not seen real equivalents on the commodity markets.
  - He is giving you a mandate to explore and propose some alternative weighting schemes in commodities.
  - From his previous experience, he is concerned about avoiding unbalanced portfolios (too much weight in a given sector), keeping a low correlation to other asset classes and maintaining the inflation hedge included in this portfolio.

- **Data**

  - Monthly (and/or daily) prices on all commodities included in the main commodity indices. Eventually curve data or enhanced indices to play with roll yield.

Topic #8
Factor investing in currencies

- **Objective**
  - Our client is a fundamental currency hedge fund. His approach has always been discretionary.
  - However, given the considerable attention paid to factor investing, he is considering launching a systematic currency strategy based, at least, on the most widely accepted factors in the currency space, i.e. momentum, value and carry.
  - He might be willing to take a larger perspective and include some other risk premia as well like short-volatility or mean-reversion.
  - Being discretionary, he is not equipped for running backtests and simulations. Neither is he really knowledgeable in building a portfolio of strategies.
  - He hires you as an advisor to build a portfolio of currency risk premia with a target volatility of 5%.

- **Data**
  - Currency returns on G10 at least, maybe some EM currencies. Necessary data to build the risk premia strategies, for instance GDP data, interest rates on different parts of the curve.

Topic #9
Smart beta for international country equity indices

- **Objective**

  - Our client is large pension fund who wants to work on its geographic mix of equity markets.
  - Being a large investor, he has allocations worldwide, including all the main countries of the MSCI world and wants potentially to add emerging markets as well.
  - As a long-time believer of the inefficiency of market-cap indices, he has already done the move to allocate to smart beta within the countries. However, he thinks about going one step further and is considering smart beta at country levels.
  - He his giving a mandate to manage a long-only portfolio of country equity indices based on some smart beta techniques.
  - As the MSCI World remains his benchmark, he will pay some attention to tracking error of the approach and might want to control it at reasonable levels.

- **Data**

  - Monthly returns on country equity indices. Any additional data that might be useful for computing factors or smart beta portfolios, like valuation metrics, fundamental data.

Topic #10
Factor timing in a global risk premia portfolio

- **Objective**

  - Our client is a large asset manager who is a firm believer in factor investing across asset classes. He has devised a portfolio of risk premia and is now considering how to put them together in a single global portfolio.
  - Until now, his portfolio allocation has remained largely static. However, he is concerned about the time-varying nature of returns in risk premia and feels like there might be a business cycle component that affects differently every premia.
  - Consequently, he is also wondering whether tilting his portfolio according to business cycle stages or some market variables might make sense.
  - He hires you as an advisor to run some historical simulations to assess the potential for factor timing in his portfolio and how to implement it. His portfolio will target a volatility level of about 5% and be market-neutral.

- **Data**

  - Monthly returns on cross-assets risk premia (can be taken from Kenneth French and AQR websites). Business cycle and market indicators.

Topic #11
Style rotation on Swiss long-only equity factors

- **Objective**

  - Our client is a large Swiss pension fund who has a substantial allocation to Swiss equities. He is a firm believer of risk premia and is fully convinced by the long-term benefits of tilting his portfolio to reap the benefits of well-known risk premia.
  - With no particular view on which risk premia is best suited for him, he wants to go for a diversified approach. He is nevertheless concerned by the time-varying nature of factor returns and fears of being unable to cope with a too long period of underperformance of one given factor.

managing a dynamic long-only portfolio of risk premia on the Swiss market

  - He is therefore thinking about the potentials of adjusting his exposure to the various risk premia over time and make his portfolio more dynamic.
  - He is willing to give a mandate for managing a dynamic long-only portfolio of risk premia on the Swiss market. Tracking error is also a concern for him.

- **Data**

  - Monthly (or daily ?) returns on equities for the Swiss market. Any other data necessary to build the risk premia portfolio (naïve strategies) and to time the styles.

Topic #12
Portfolios of stocks with sensitivity to oil prices

- **Objective**
  - Our client is an investment bank who proposes some thematic products to its clients. The investment strategy team of the bank believes that, after many years of bear market, the oil market is set to enter a new stage with substantially higher prices.
  - To be in sync with its strategy team, the structuring desk wants to be able to provide solutions to its clients that will benefit from this view.
  - They are looking to build quite concentrated (say between 30 and 50 positions) equity portfolios of US stocks that could profit from rising oil prices.
  - However, they have only a rough idea on how to do both the screening process and the portfolio construction.
  - They are hiring you as an advisor to provide a methodology for this and evidence on how it worked in the past. As they can structure any type of portfolio, they might consider, besides long-only, also long-short portfolios.
- **Data**
  - Monthly (or maybe daily) stock returns on US equities, potentially information on sectors as well. Oil prices. Any other information that might complement the screen.

Topic #13
Equity portfolio carbon footprint

- **Objective**
  - Our client is a foundation who is particularly sensitive to lowering the carbon footprint of its international equity portfolio.
  - He might want to be quite aggressive in achieving this goal, but obviously still need to look for the performance and risk impact of its portfolio. He would therefore like to know how far it can go in achieving its target, without altering too much the performance and taking unreasonable risks.
  - This trade-off is not fully clear for them and they are hiring you to investigate it over the last ten years.
  - They have in mind limiting their tracking error to 4% with respect to the MSCI World. They would also make sure their geographical and sectoral allocations do not move all around the place.

- **Data**
  - Monthly data on carbon efficiency for international equities, monthly historical returns. Sector and country memberships.

Topic #14
Tactical Asset Allocation and trend following

- **Objective**

  - Our client is an entrepreneur who is thinking about launching a robo-advisor company for Swiss private clients.
  - Having been disappointed by asset allocation services provided by traditional asset managers, he thinks there might simple tactical asset allocations strategies, that might be systematically applied and that would provide interesting returns to the clients.
  - In particular, he read some articles on trend following and has thought of applying some of those rules to the asset allocation.
  - He wants to propose a tool that runs a tactical asset allocation based on trend following. Given a choice of asset classes, weighting schemes and perhaps some other parameters, the tool would output some historical simulations as well as a proposal for a today's portfolio.

- **Data**

  - Historical returns on a choice of asset classes available for a Swiss investor. Historical returns on a choice of ETF's replicating those asset classes.

Topic #15
Trend following, momentum crashes and high correlations

- **Objective**
  - Our client is an asset management boutique who is considering the launch of a trend following cross-assets portfolio.
  - They want to offer that portfolio at very low cost and does not want to include neither too many assets, nor too sophisticated trading rules.
  - Our client however has two main concerns about trend following. The first is about the vulnerability of the strategy in momentum reversals. The second is the poor performance that might result from environments where correlation among assets is quite high. He is therefore looking to add some mechanism to deal with those cases.
  - The company gives you a mandate to build a simple cross-assets trend-following system, including some innovative features that might help address the concern of trend reversals and high correlation among assets.
- **Data**
  - Monthly returns on a sample of equity indices, bond indices, commodities and FX pairs. Any other indicator that might help in dealing with the above mentioned issues.

Topic #16
Low beta in crypto-currencies

- **Objective**

  - Our client is a crypto-currency boutique, which has been successful on delivering a nice platform for trading crypto-currencies.
  - They would like to go one step further in their offering by proposing on-the-shelf strategies to trade cryptos.
  - The CIO has a good background in finance and has learnt about the low-beta anomaly and smart-beta risk-based allocations in the equity space. He thinks this could be an interesting idea to develop in the crypto universe.
  - The company gives you a mandate to explore long-only risk-based approaches in the universe of crypto-currencies. To get a good grasp of what's happening in that universe, you should first test for a low-vol / low-beta anomaly. You can then test and adjust various risk-based approaches.

- **Data**

  - Daily / weekly / monthly returns on the largest and longest possible sample of crypto-currencies. Eventually market-caps to build an index.

Topic #17
High dividend yield strategy

- **Objective**

  - As a result of interest rates being so low, many investors are looking for higher yielding alternatives to their fixed income portfolio.
  - Our client, a small asset manager, wants to propose a systematic long-only equity high dividend strategy as an alternative. He thinks this type of strategy brings a good combination of regular yield and defensiveness in situations of turmoil.
  - Yet, the manager is also concerned about the deep underperformance of value stocks over the last 5 years and the under-weighting of traditional high dividend strategies in the technology sector.
  - The client is asking you to develop a systematic high dividend strategy on the US market, which would satisfy the usual yield and defensive characteristics while mitigating the value and technology biases of the recent period.

- **Data**

  - Single equity returns on the US market (mid- to large caps), dividend data, sector classification, any other indicator that could help in adjusting the strategy.

Topic #18
ESG: impact of data supplier

- **Objective**
  - Our client is a bank would want to develop its effort in the ESG field by adjusting all of its current products and potentially launching new ones.
  - In order to do that, the bank needs to have some ESG data and is therefore looking for a provider. It is however aware of the sometimes poor quality of the data. More generally, the managers are concerned about the biases that could be introduced depending on the data provider.
  - The bank gives you a mandate to investigate different providers of ESG data. They want you to develop a screening methodology on the equity market based on ESG criteria and compare the results across different ESG providers.
  - Moreover, following the wisdom of the crowds, they are wondering whether it would make sense to build an aggregated measure across providers.
- **Data**
  - Monthly returns on a worldwide equity markets. ESG data from different providers (MSCI, Asset4, Sustainalytics).

Topic #19
Quality at good price

- **Objective**

  - Our client is a discretionary equity long-short hedge fund. He’s a long-time follower of Benjamin Graham and Warren Buffett and pays particular attention to not over-paying for the stocks he invests in.
  - More recently, as the value style had a difficult period, he has developed the feeling that quality should play an important role in order to avoid value trap stocks.
  - As a benchmark for his holdings, he would like to implement a quality at a good price systematic strategy on the US market. As a hedge fund, it wants to concentrate its bets and the portfolio should not exceed 25 stocks on the long and short sides.
  - He wants you to decompose the performance between the long and the short portfolios. Moreover, he wants to see how the quality dimension is able to enhance the performance of a value portfolio alone.

- **Data**

  - Monthly returns on US equities. Fundamental indicators to build a quality at good price strategy (valuation metrics, profitability, leverage, …).

Topic #20
Gender diversity in equity portfolios

- **Objective**

  - Our client is a foundation who is particularly sensitive to gender diversity and wants to promote it in its international equity portfolio.
  - He might want to be quite aggressive in achieving this goal, but obviously still need to look for the performance and risk impact of its portfolio. He would therefore like to know how far it can go in achieving its target, without altering too much the performance and taking unreasonable risks.
  - This trade-off is not fully clear for them and they are hiring you to investigate it over the last ten years.
  - They have in mind limiting their tracking error to 5% with respect to the MSCI World Developed. They would also make sure their geographical and sectoral allocations do not move all around the place.

- **Data**

  - Monthly data on gender diversity indicators for international equities, monthly historical returns. Sector and country memberships.

Topic #21
Momentum strategies for crypto-currencies

- **Objective**
  - Our client is hedge funds who observes the development of crypto-currencies while wondering whether that could be a new opportunity.
  - Having no expertise in assessing the fundamentals of those markets, he would be keen in going for a trend following approach in this new field.
  - Some questions such as the number of assets in the portfolio or the frequency of the strategy remain open.
  - You're hired as an advisor to develop some simulations of different types of trend following strategies and help the manager decide 1) whether that makes sense and 2) if yes, what could be the format of that strategy.

- **Data**
  - Minutes / hourly / daily price data on a set of eligible cryptocurrencies.