QTS

Final Exam Review

Topics to review for final examination

Topic	Class	Notes (slide #s are with reference to a specific class listed in middle column)
What are market anomalies versus CAPM	1	E.g. slide 10, market anomalies are returns above and beyond that predicted by CAPM
Differences between discretionary and systematic strategies, categories of systematic strategies	1	Slides 19 to 24 May be tested in MCQ
What is dollar and beta neutral	1	Slides 26 to 33, especially how to mathematically convert any portfolio weight vector to dollar and industry neutral You need to know the mathematical process well and precisely. **May be a short answer question, you could need to perform it from memory**
Economic intuition for pairs trading	1	#36
Mechanics of short selling	1	#42
Why is pairs trading solely on correlation bad? [just qualitative intuition enough]	1	#53 - #55
Use of cointegration in pairs trading	1	#58, #62, #73, #75 For this item and the one above, I may give some python output of estimations with some numbers highlighted, and ask what those numbers mean [e.g. is that the hedge ratio, etc]
High level view of implementational details for pairs trading [qualitative discussion only]	1	#96, #97

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Relevance of clustering to pairs trading	1	#99, #100
What is technical analysis and what is the most common objection to it?	2	Slide #13 + class discussion
Qualitative overview of the 2 categories of TA indicators, what are formula based versus visual pattern based indicators	2	Short answer / qualitative answer type questions. Do not need to memorize any formulas
Qualitative overview of why we need to systematize visual pattern recognition	2	Short answer / qualitative answer type questions
Qualitative discussion of the use of kernel regression and SVM in pattern recognition and backtesting	2	You may be given questions that, given a number of 'building blocks steps', requires you to rearrange them in correct order to backtest a chart pattern
Economic intuition of seasonality, asset expansion, ARM and PEAD strategies	3	How to study these strategies: 1. Most likely, questions will be (i) of the form "can you give an example of a quant equity strategy exploiting corporate financial data", or (ii) it may be MCQ questions 2. **For short answer questions, you need to know broadly (i) the economic intuition behind the strategy (be able to summarize in say, 50 words, each strategy) and (ii) simple steps to execute it. There may be more than 1 correct answer for the latter. Minor variation in details are okay. E.g. I am fine if you say "10-1" portfolio or "sort and trade top half versus bottom half". Both will work in live trading anyway** 3. No need to know specifically the message of each table etc by heart. 4. Good to know specific case studies [e.g. AMZN, AAPL, MSFT] that are discussed in the slides 5. Fairly important to know the timeframes / rebalancing frequency for each strategy and why some strategies **need** to be rebalanced faster while others can wait. E.g. for seasonality, it would be monthly [why can't it be slower rebalancing?] and for ARM, it works with both slower and faster rebalancing.

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Trading costs (general)	4	**Be able to specify the 5 components of trading costs (slide #2)**
Trading costs – commissions	4	Provide concrete reasonable numbers for commissions in equities [0.2 cents/share for US, 2 to 3bps for EUR/JPY/AUD]
Trading costs – short borrow	4	**Slide #4. Memorize the number for general collateral (35 bps – it's been roughly the same for the last 5 to 10 years). Don't need to memorize rest of numbers on this slide. Do you remember what "general collateral" means?**
Trading costs – financing rates	4	**Slide #5. There may be a question on why dollar neutral strategies (long and short sides of equal sizes) are immune to changes in overall level of interest rates. [Why?]**
Trading costs – market impact	4	Slide #6 – what is market impact, how to measure it with 1DR, simplified formula on slide #8 (assume c = 1)
Behavioral finance: Of the 4 biases mentioned, just focus on **anchoring**. If you are short of time, you can (just for the final) ignore the others	4	#13 - #21. Be clear on the chain of logic. Anchoring -> prospect theory utility function (utility relative to a reference point) -> investor underreaction (in both long and short cases)-> long term momentum

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Benefits of running multiple strategies	5	Internal trade crossing and position netting: appreciate preconditions (same universe, low trade and position correlation), and benefits (lower transactions costs and higher returns). **Questions for this topic may be encountered in both MCQ and short answer, and also both qualitative and quantitative type questions. This is a very important (but straightforward) concept.** There may potentially also be worked examples in the questions which are similar to worked examples from the slides, but ask you to fill in some missing numbers / trade / position values
Benefits of running multiple strategies	5	Mathematical diversification based on imperfect daily % pnl correlation. Appreciate that this works in all cases (not just for similar universe / asset class / geography) and appreciate qualitatively that depends on entirely on low daily % pnl correlation, not returns, etc. Also that the main impact is felt on sharpe ratio
How to compute basic quantitative strategies performance statistics	Class code	Know how to compute the following: 1. Sharpe ratio assuming 0% benchmark 2. Max drawdown 3. Cumulative returns (daily returns are over GMV) Look at the code distributed for class to **understand how to compute the first two**, understand industry conventions – Sharpe ratio is always reported on an annualized daily sharpe ratio basis. Some entities have been known to use monthly or weekly sharpe, but those make their sharpe ratio look better than it really is. In practice, always remember to confirm that people are using daily annualized if communicating in a commercial situation – it is the most unforgiving of the 3 (daily /weekly / monthly). There will be computation questions on this in the exam, either MCQ or short answer or both. On max drawdown, I may give you a time series in tabular data format and ask you what the max drawdown is in %. Please know how to do this.

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Fama-Macbeth regression	5	**Good to memorize the algorithm** Questions may take two forms: (i) Qualitative questions on what the purpose of the first step is (what is the 'meaning' of the output) and what purpose of second step is (ii) Quantitative questions on the mechanics of flowing data through both steps. Details such as (a) how many estimations to run, is it 1 per instrument or 1 per time period, (b) what are the independent and dependent variables
Alpha Decay	5	Be able to distinguish between the three different periods of performance evaluation: (i) in sample (ii) out of sample but without live trading (iii) out of sample live traded. (#Slide36) Understand why no alpha decay (at all) may be a bad thing because it indicates that a strategy is (in actuality) a risk factor Appreciate (qualitatively) that sustained "constant" high short interest may be an indicator of quant fund activity in an instrument (not 'spiky' short interest, but steady albeit high level of short interest– why?)
Implications of heterogeneous asset mix for global macro	6	#3, to #5 **PNL diversification and strategy capacity** (indirectly lower alpha decay)

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Trading volatility	6	Understand policy drivers for mean reverting volatility with regards to the Federal Reserve. 1. Open Market operations 2. Discount window 3. Reserve requirements 4. Large scale asset purchases **Good to memorize the above #Slides10 to 17**
VIX	6	Understand qualitatively how the VIX is constructed, and why downside protection (puts) dominates the VIX level, and not calls Also understand how VIX options are European exercise, which may result in interesting behaviour depending on shape of the VIX forward curve
Volatility carry and the VIX gap	6	Be able to describe the **VIX gap as the difference between IV and HV.** Describe qualitatively a volatility carry strategy (i.e. just keep selling options to take advantage of the VIX gap), using either SPX, single name or VIX options Understand the PnL characteristics of such a strategy, including the potential for very large drawdowns

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CTA	6	Understand that CTAs (commodity trading advisors) usually trade futures in physical commodities such as agriculture and energy. **Articulate the reasons for contango and backwardation from an economic structure perspective.** E.g. storage costs (hence upward sloping), hedging needs of industry producers (hence concave), etc **Be able to describe (in words) a futures curve carry strategy**
CTA	7/8	Trend following – describe the 3 simple algorithms overviewed 1. **Buy if rolling window performance +ve, short otherwise** 2. **Moving average crossover** 3. **Channel strategy** Describe qualitatively results from the AQR simulation since 1880, and also appreciate the asset independence (works on anything)
HFT	9	Conceptually understand the **infrastructure and latency sensitivity of HFTs** Understand at a high level the types of HFT strategies: relative value arb, directional prediction and "rebate farming" Discuss qualitatively the impact of HFT participation on market stability.