PORTFOLIO MANAGEMENT PRAXIS UNDER
REAL MARKET CONSTRAINTS (APS1051)

Important Notice:

Be advised that, due to the circumstances surrounding this edition of the course, ALL of the following administrative and academic guidelines are subject to adjustments and/or changes

Lectures:

Mondays / 3:00 PM to 6:00 PM / May 27 to Aug 29 / 2020.

Instructors:

Sabatino Costanzo & Loren Trigo

Office Hours:

Every week on the day of the class we'll be available 'live' during 6 hours answering questions in 'Piazza' (from noon time to 6:00 PM). We <u>may</u> open another channel (conversation-oriented technology still to be selected) for less technical and/or less formal questions. Private and/or administrative questions will be handled through a dedicated email that will be provided on the first day of class.

Communication:

- The class slides and the careful transcription of the instructor's detailed comments on the slides (as well as the corresponding optional voice-over) will be uploaded to Quercus on the day of the class, at the time the class starts
- Technical questions will be addressed via 'Piazza'.
- Administrative issues of a more private nature will be addressed via a dedicated email address that will be provided by the instructors during the first class.
- General administrative questions may be addressed via an interactive 'voice' technology, still to be selected.

References:

The main literature will be comprised by the lecture slides and the meticulous transcriptions of the accompanying explanatory comments made by the instructors during previous live editions of this course. If needed, these transcriptions can be 'listened-to' via the 'text-to-voice' option uploaded with the written course material. In short, there are no required textbooks for this course; the slides and the transcriptions of the slides' comments will suffice as such, and a bibliography will be provided.

Grading Scheme:

- Weekly Homeworks (Cumulative): 40%
- In-class Summary Exercises (Cumulative): 10%
- Final Project Deliverables: 50%

Homework:

- We will have homework assignments on most weeks.
- Homeworks will usually drill the techniques learned during the week in which the homework was assigned.
- You can work by yourself or as part of a team.
- Homeworks are very important because they give you the opportunity to apply the theory you've learned.

Teams:

We'll start the course with a survey that will allow us to build (and suggest to you) possible 'skill-balanced' teams, but you'll always have the option of working as an individual or coming-up with your own.

Attendance & In-Class Summary Exercises:

- We'll consider that you have "attended" the 'nth' class, as far as you can show that you have gone through the session corresponding to week 'n', and this is how you are expected to do it:
- We'll upload the 'nth session' of this course to Quercus on the day and at the time at which the session starts. Therefore, from that moment on you'll have available: (i) An extensive presentation of the topic planned for that week (ii) The transcripts of the comments we used to make in class on each one of the slides (iii) The option of activating a voice-over to read the explanatory text for you while you go through the slides making notes.
- As you go through the nth class (Slides & Text), once every few slides you'll be asked (in the text) to summarize in your own words (and to jot them down in word-pad or a similar text file), the main take away idea(s) presented so far and the main question(s) --if any-- that you may like to ask later in 'Piazza'.
- Once the class is over and you have completed the summary exercises corresponding to that class (each exercise should take about 10 minutes to complete), **you'll have until midnight of the next day** to upload them (all together in a single document or txt file) to Quercus.
- Uploading **all** of the summary exercises you did on that day 'on time' (**i.e., before midnight of the next day**), guarantees to us that: (i) You went through the whole class attentively (ii) You stopped, reflected and wrote down periodically your insights and your questions at the crucial moments of the class.
- Typically, there will be 3 to 5 of those summary exercises per class, and their total cumulative value will constitute 10% of your final grade.
- To make sure that everything goes smoothly on the day of the class, we'll be present, answering questions 'live' in 'Piazza', from noon to 6:00 PM.

- At a certain point we were considering teaching this class 'live' online in order to maximize its 'interactive nature', but after testing the technology available we felt that giving a 'recitation' lecture through an imperfect audio system, an often unstable connection and having as an illustration resource a lagging computer screen, could hardly become a positive interactive experience.
- So we thought that it would be much more effective (and efficient) to provide an exhaustive account of [the best content from our class slides] + [the notes of our explanations & comments about those slides, meticulously collected along many editions of this course], and make the package available to you (the slides, the comments and a voice-over of those comments), so that you could control the speed of the information flow--, while, at the same time, on the day of the class, we made ourselves available 'live' for 6 straight hours to give support and answer questions about the content.

Final Project:

- The Final Project is definitely the highest point of the course.
- As soon as the theoretical bases have been covered in the first 6 or 7 class sessions and the basic practical experience has been acquired by doing the first 6 or 7 homeworks, the student will be ready to start deciding the subject of their Final Project.
- In due time we'll provide a vast, detailed list of possible projects to choose from, but we'll be always be open to listen to and to evaluate the viability of a student's own proposed project.
- Details about the expected deliverables regarding those projects will also be provided in due time.

--COURSE LAYOUT--

MODULE 1 (FINANCE REVIEW A)

- The course starts with Portfolio & Manager Basic Evaluation. We'll go from these basic evaluation techniques (Sharpe's, Treynor's, Jensen's)…
- …to the more advanced 'Performance Attribution Analysis'
- We'll learn how to compute all these by hand and using a handy spreadsheet

MODULE 2 (FINANCE REVIEW B)

- Talking about Portfolio Evaluation takes us to Portfolio Construction
- Portfolio Construction opens the discussion on Risk vs Return
- Risk vs Return takes us to the review of the Market Line Theory, the CAPM model and the Markowitz Modern Portfolio Theory, which, along with Black & Scholes, are the pillars of modern finance.

MODULE 3

- The validity of Markowitz theory, dismissed by supposed "experts" due to its supposed "anachronism", gets reivindicated by a price-winning paper where the authors show that the theory wasn't only not flawed but had been grossly misinterpreted by its users for decades.
- The paper will be analyzed in detail as a homework
  --
- The paper's proposed solution (shorter look-back periods & no short-selling), even when tested on a simple portfolio example, gives excellent results in terms of returns and volatility
- 3 computer programs developed by the instructors to use these novel techniques directly on capital markets real time data, will be shared with the participants at this point

MODULE 4

- The contrast between: (i) methodologies aimed to generating profitable portfolios using Markowitz MP Theory in an assumed perfectly efficient market without arbitrages and (ii) methodologies aimed to detect and profit from market arbitrage opportunities, will be duly emphasized at this point in order to introduce….
- …the "masters of this trade" (at least for few years): the founders of LTCM (Long Term Capital Management), an "all-stars" team whose main members were the Nobel-laureate authors of the Black & Scholes formula, masterfully exposed in the 'nova' movie that we'll share with the class
- The "Pros & Cons" of LTCM ill-fated exploits were later emulated by Jim Simons and his still successful medallion fund

MODULE 5

- We'll see in the analysis of this unforgettable LTCM case, **on the bright side**: how the managers exploited the [Futures Convergence (Statistical) Arbitrage] based on "Mean Reversion" (a principle that we would re-visit and use again and again from here-on)
- While **on the dark side**, we'll see how their lack of risk-management previsions exposed them to the "Leverage-Trap" and the "Liquidity Trap" posed by derivative products (paradoxically created to control risk)

- So, the LTCM case hopefully will consolidate the two main ideas behind this course:
    a. Concept: exploiting Statistical Arbitrage through Mean Reversion is mathematically justified
    b. Concept: Risk Management is of the essence when managing portfolios
- With these conclusions we'll get ready to look at the practical problem of how to manage a basic portfolio of stocks.
  --
- For managing a portfolio of stocks, at a basic level we'll combine the statistical arbitrage principle (b. Concept) with a simple yet powerful risk management principle based on the idea of "market regime" (a. Concept)
- To this end, the technique of [trading stocks according to the "regression channel"] is introduced, and the [regime risk management principle] explained, so that the setup is almost complete.
- We say "almost" because here a natural question pops-out: which of the innumerable stocks available are the best to be traded?

MODULE 6

- During the early 50's an answer was given --initially by Graham, and followed by Greenblatt and Buffet, two of his students--, and it was: "look at the stock's value", where the value definition was Graham's own
  --
- Nothing wrong with it, but for us traders and portfolio managers, detecting value in stocks had to be simplified so that we could trade them effectively, and the optimal solution for us (the instructors) happened to be our own combination of "scores" (Piotroski, Altman & Beneish) that, based on data from the companies accounting books, reflected "value" in a superlative way.
  --
- Then the Piotroski, Altman and Beneish scores are introduced here to guarantee respectively: growth potential, low bankruptcy probability and "un-cooked" accounting books, plus large capitalization and a consistent growth of their Cashflow from Operations.
- A set of computer programs developed by the instructors to use these techniques on capital markets real time data, will be shared with the participants at this point
- A homework will be assigned aimed to practice this [stocks portfolio management technique], to be successfully completed by the class.

MODULE 7

- Now that "mean reversion" (the basis of statistical arbitrage) and "value" have been introduced, a third famous "market anomaly" (see Fama & French) has to be presented.
- The third anomaly is "momentum", which was briefly introduced in the first sessions by the authors of the paper on Markowitz.
  --
- Momentum can't be used to trade individual stocks as effectively as families of stocks (isolated stocks exhibit much higher cross-auto-correlation than auto-correlation)
- Therefore, a protocol for ETF trading using momentum will be introduced at this point.
  --
- A technique to harness "Rotational Relative Momentum" will be presented, and several ways to modify it to reduce volatility will be explained…
- …as well as the methodology to generate portfolios of diverse risk profiles

- A selected, highly efficient list of ETFS representing industrial sectors used by the instructors in their professional practice will be revealed to the audience…
- …and its back-testing will be presented, with no negative years, and a CAGR close to 12% per year since 2003.
  --
- A program developed by the instructors, able to detect optimal look-back and optimal holding period, will be distributed
- A program able to indicate if a "momentuous" ETF was starting a trend or nearing its end (Hurst Exponent) developed by the instructors will be also distributed.
  --
- A complex and flexible program developed by the instructors, able to back-test any rotational momentum trading technique (i.e., using any re-balancing periodicity on any set of ETFS based on any weighted score of Returns and Volatility), will be shared with the audience
- A homework aimed to practice these techniques will be assigned to be completed by the class.

MODULE 8

- By now: Value, Momentum and Mean Reversion have been discussed…
- …And the main techniques for profiting from the arbitrages they generate have been drilled…
- So, the natural thing to do now will be to learn ways to test the validity of the trading systems based on these three anomalies.
  --
- Testing the validity of a trading system amounts to determine if good results (high returns and low volatility) of the system are due to chance or are statistically significant.
  --
- Out there, there are many (more or less sophisticated, more or less complex and more or less effective) testing systems; we'll share the ones that we prefer to use.
- These are "Pesaran-Timmerman", "Anatolyev-Gerko", and, best of all, "White's Reality Check".
- The White Reality Check is introduced and explained
- A program that computes the white's reality check developed by the instructors will be presented to the audience at this point
  --
- We'll teach how to use the techniques, the test's software will be distributed and a homework to practice [how to distinguish "good-looking by chance" trading systems from "statistically sound" (sustainable) trading systems], will be assigned to be completed by the class.

MODULE 9

- The questions regarding the "statistical soundness" of the results of a trading system are usually settled in terms of hypothesis testing…
- …But the sole fact that **a trader** is using a trading system with some success, reveals that **he is assuming**: (i) that there are arbitrages to be found (some of those were found by him); (ii) that markets are not efficient (iii) that markets are not random walks.
  --
- In other words, the trader is asking if he got the arbitrages by chance or not, not if the arbitrages exist or not (he assumes they exist)…
  --

- …But, what if the market is in fact a random walk?

- We definitely have to answer this question before continuing, and for that we rely on a respected statistical tool called "the v-ratio"
- The v ratio has been used to prove in several occasions that the Capital Markets are not random walks.
- In fact, last time it was done, in 2016, 21 out of 50 market indexes analized showed unequivocal signs of not being random walks.
  --
- The v-ratio test is not only useful because it tells us that the efficient market hypothesis is not true, but because it can be proactively used to indicate how strongly auto-correlated a time series is.
  --
- Strong auto-correlation could be of two types: strong-persistent-autocorrelation or strong-antipersistent-autocorrelation.
- Both of them are clearly indicated by the v-ratio (less ambiguously than other indicators)
  --
- This has an obvious use in trading that goes far beyond the indication that arbitrage indeed exists.
- It can tell you whether or not the trend is stable, or if it is about to change.
  --
- Two softwares developed by the instructors that compute the v-test will be provided: one in python and one in matlab. The second presents a vector form of the v-ratio that is excelent for using in trading due to its unambiguity.
- Together with these programs comes a bonus: a piece of software (oct2py) that can be run from python and that is able to run the matlab programs and pull their results and translate them into python!

MODULE 10

- Finally, we'll introduce the topic of trading with neural networks by explaining step by step the optimization (weight-adjusting) process that takes place in a multi-layer back-propagation neural network.
- This topic, just touched here, is exhaustively covered in our course A.I. in finance
  --
- This kind of NNs, even though not as advanced as the newer, memory-enabled LSTMS (long-short term memory NNs), are still capable of feats as complex as identifying human handwriting and doing decently in the trading of some markets.
  --
- One of them, programmed by us in python and distributed to the class, will be shown in action trading a stock and obtaining good results, even without much training and/or optimization.
  --
- Another one (a commercial NN programmed in EXCEL that offers a free trial), will also be presented as a demo in a later class.
  --
- Up to here we would have developed a multi-layered (deep learning) nn with memory that is much more efficient trading the markets than the one we distributed in class. We will present and show how to manipulate this program in the course "a.i. in finance".

MODULE 11

- Finally, we'll go into one of the most important markets of today's financial world: the options and derivative markets.
  --
- We'll start introducing options and derivatives with a set of analogies to explain the ideas behind the structure of a put and a call contract.
- And we'll bring these metaphors further on to the point of being able to explain the structure of two financially engineered products called: 'bull put credit spread' and 'bear call credit spread'.
- Later-on, based on those two structures, we'll describe the composite of both: the so called iron condor.
  --
- After introducing these technical concepts we'll review the ways we use to hedge portfolios in order to explain the role options play in that regard (paradoxically) as risk management tools:
- The first is a quite simple [market regime based] risk-management technique explained in an earlier class
- The second is a quite complex risk management technique based in the concept of market entropy
- The third, and most important for us now, is a sensible risk management technique based in [hedging the stock-portfolio risk using put options on the S&P 500, the NYSE 100 and the RUSSELL 2000], which will be explained in full detail

MODULE 12

- Now let's get away from hedging and into speculative trading:
- Besides hedging with options and capitalizing on the motivating examples on insurance discussed before, a second options strategy will be explained that allows us to trade the "big boys" by selling credit spreads (bull puts and bear calls) on these stocks.
  --
- Another trading technique, a third options strategy, will be discussed also in detail, explaining how to trade weekly options in general
  --
- A fourth options strategy will be discussed next explaining how to trade weekly options specifically on the S&P 500.
  --
- A fifth, quite profitable and simple options strategy will be explained that allows the safe trading of the FOMC news using straddles and strangles on the treasuries ETF "TLT"

SOME RELEVANT LITERATURE

Short Case Studies provided by the Instructors by request:

- "Benjamin Graham and Joel Greenblatt: Value Investing and The Magic Formula"
- "Warren Buffet: Improving on Graham through Common Sense"
- "Phil Fischer And T. Rowe Price: Distinguishing Growth From Value"
- "Harry Markowitz: Modern Portfolio Theory"
- "John Bogle: Vanguard and the Invention of the Index Fund"
- "Peter Lynch: Fidelity and the Saga of the Magellan Fund"

- "Bill Gross and Jeffrey Gundlag: The Bond Masters"
- "A. W. Jones: The First Hedge Fund"
- "Jesse Livermore And James Chanos: The profitable art of predicting Market Crashes"
- "Paul Tudor Jones: Futures Trader extraordinaire"
- "James Simmons: Math, Cryptography and the legendary Renaissance Fund"
- "Robert Merton and Miron Scholes: LTCM, The Nobel Laureates Trillion Dollar Bet"

Course Bibliography:

- Measuring Portfolio Performance: Sharpe, Alpha, or the Geometric Mean? Moshe Levy, Hebrew University of Jerusalem - Jerusalem School of Business Administration, September 2016
- US Sector Rotation with Five-Factor Fama-French Alphas, G Sarwar University of Greenwich - Business School, Cesario Mateus, University of Greenwich Business School, Natasa Todorovic, City University London - Sir John Cass Business School, November 2016
- On the Holy Grail of 'Upside Participation and Downside Protection', Edward E. Qian, PanAgora Asset Management, December 2014
- How Do Short Selling Costs and Restrictions Affect the Profitability of Stock Anomalies? Filip Bekjarovski, Amundi Asset Management; November 2017
- The Trinity Portfolio: A Long-Term Investing Framework Engineered for Simplicity, Safety, and Outperformance, *CQR, Issue 9, June 2016*, Mebane Faber, Cambria Investment Management
- Risk Parity, Momentum and Trend Following in Global Asset Allocation, Aug 2012, Andrew Clare, City University London - Sir John Cass Business School, James Seaton, City University London - Sir John Cass Business School, Peter N. Smith, University of York - Department of Economics and Related Studies; Australian National University (ANU) - Centre for Applied Macroeconomic Analysis (CAMA), Steve Thomas, City University London - Sir John Cass Business School.
- A Quantitative Approach to Tactical Asset Allocation, *The Journal of Wealth Management, Spring 2007, Mebane Faber,* Cambria Investment Management.
- Generalized Momentum and Flexible Asset Allocation (FAA): A Heuristic Approach, Dec 2012, Wouter Keller, VU University Amsterdam, Hugo van Putten, Flex Capital BV.
- Dias, Alexandra, The Economic Value of Controlling for Large Losses in Portfolio Selection (January 12, 2011). Available at SSRN: https://ssrn.com/abstract=1749360 or http://dx.doi.org/10.2139/ssrn.1749360
- Homescu, Cristian, Many Risks, One (Optimal?) Portfolio (July 28, 2014). Available at SSRN: https://ssrn.com/abstract=2473776 or http://dx.doi.org/10.2139/ssrn.2473776
- Butler, Adam and Philbrick, Mike and Gordillo, Rodrigo and Varadi, David, Adaptive Asset Allocation: A Primer (May 31, 2012). Available at SSRN: https://ssrn.com/abstract=2328254 or http://dx.doi.org/10.2139/ssrn.2328254
- Bhattacharya , Utpal and Galpin, Neal, The Global Rise of the Value-Weighted Portfolio (March 2007). AFA 2007 Chicago Meetings Paper. Available at SSRN: https://ssrn.com/abstract=849627 or http://dx.doi.org/10.2139/ssrn.849627
- Keller, Wouter and Butler, Adam and Kipnis, Ilya, Momentum and Markowitz: A Golden Combination (May 16, 2015). Available at SSRN: https://ssrn.com/abstract=2606884 or http://dx.doi.org/10.2139/ssrn.2606884
- Keller, Wouter, Momentum, Markowitz, and Smart Beta: A Tactical, Analytical and Practical Look at Modern Portfolio Theory (June 13, 2014). Available at SSRN: https://ssrn.com/abstract=2450017or http://dx.doi.org/10.2139/ssrn.2450017

- Arnott, Robert D. and Hsu, Jason C. and Liu, Jun and Markowitz, Harry, Can Noise Create Size and Value Effects? (October 24, 2011). AFA 2008 New Orleans Meetings Paper. Available at SSRN: https://ssrn.com/abstract=936272 or http://dx.doi.org/10.2139/ssrn.936272
- Sarwar, G and Mateus, Cesario and Todorovic, Natasa, US Sector Rotation with Five-Factor Fama-French Alphas (June 16, 2017). Available at SSRN: https://ssrn.com/abstract=2987819
- Roncalli, Thierry, Keep Up the Momentum (December 7, 2017). Available at SSRN: https://ssrn.com/abstract=3083921
- Jusselin, Paul and Lezmi, Edmond and Malongo, Hassan and Masselin, Côme and Roncalli, Thierry and Dao, Tung-Lam, Understanding the Momentum Risk Premium: An In-Depth Journey Through Trend-Following Strategies (September 24, 2017). Available at SSRN: https://ssrn.com/abstract=3042173 or http://dx.doi.org/10.2139/ssrn.3042173
- Hurst, Brian and Ooi, Yao Hua and Pedersen, Lasse Heje, A Century of Evidence on Trend-Following Investing (June 27, 2017). Available at SSRN: https://ssrn.com/abstract=2993026 or http://dx.doi.org/10.2139/ssrn.2993026
- Ross, Adrienne and Moskowitz, Tobias J. and Israel, Ronen and Serban, Laura, Implementing Momentum: What Have We Learned? (December 1, 2017). Available at SSRN: https://ssrn.com/abstract=3081165 or http://dx.doi.org/10.2139/ssrn.3081165
- Mohanram, Partha S., Separating Winners from Losers Among Low Book-to-Market Stocks Using Financial Statement Analysis (April 2004). Available at SSRN: https://ssrn.com/abstract=403180 or http://dx.doi.org/10.2139/ssrn.403180
- Beneish, Messod Daniel and Nichols, Craig and Lee, Charles M.C., To Catch a Thief: Can Forensic Accounting Help Predict Stock Returns? (July 27, 2011). Available at SSRN: https://ssrn.com/abstract=1903593 or http://dx.doi.org/10.2139/ssrn.1903593
- Bond University ePublications@bond Information Technology papers Bond Business School 10-28-2004 Applying Fundamental Analysis and Neural Networks in the Australian Stockmarket Bruce J. Vanstone Bond University, bruce_vanstone@bond.edu.au Gavin Finnie Bond University, Gavin_Finnie@bond.edu.au Clarence Tan Bond University, Clarence_Tan@bond.edu.au
- Till, Hilary and Eagleeye, Joseph, Commodity Futures Trading Strategies: Trend-Following and Calendar Spreads (January 17, 2017). Available at SSRN: https://ssrn.com/abstract=2942340 or http://dx.doi.org/10.2139/ssrn.2942340
- Ahmerkamp, Jan Danilo and Grant, James, The Returns to Carry and Momentum Strategies (April 7, 2013). Available at SSRN: https://ssrn.com/abstract=2227387 or http://dx.doi.org/10.2139/ssrn.2227387
- Baltas, Nick, Optimising Cross-Asset Carry (May 15, 2017). "Factor Investing", Elsevier & ISTE Press, 2017 (Forthcoming). Available at SSRN: https://ssrn.com/abstract=2968677
- Li, Xin and Shawky, Hany A., The Market Timing Skills of Long/Short Equity Hedge Fund Managers (July 23, 2013). Available at SSRN: https://ssrn.com/abstract=2221479 or http://dx.doi.org/10.2139/ssrn.2221479
- Lu, Chensheng and Hwang, Soosung, Cross-Sectional Stock Returns in the UK Market: The Role of Liquidity Risk. Available at SSRN: https://ssrn.com/abstract=969809
- Li, Junye, Option-Implied Volatility Factors and the Cross-Section of Market Risk Premia (May 12, 2011). Available at SSRN: https://ssrn.com/abstract=1539357 or http://dx.doi.org/10.2139/ssrn.1539357
- Keller, Wouter and Keuning, Jan Willem, Breadth Momentum and Vigilant Asset Allocation (VAA): Winning More by Losing Less (July 14, 2017). Available at SSRN: https://ssrn.com/abstract=3002624

- Fang, Jiali and Qin, Yafeng and Jacobsen, Ben, Technical Market Indicators: An Overview (June 12, 2014). Available at SSRN: https://ssrn.com/abstract=2449344 or http://dx.doi.org/10.2139/ssrn.2449344

- Do, Binh Huu and Faff, Robert W., Cointegration and Relative Value Arbitrage (August 19, 2016). Available at SSRN: https://ssrn.com/abstract=2785045

- Jacobs, Heiko and Weber, Martin, On the Determinants of Pairs Trading Profitability (December 22, 2014). Journal of Financial Markets, Forthcoming. Available at SSRN: https://ssrn.com/abstract=2545440

- Rad, Hossein and Low, Rand Kwong Yew and Faff, Robert W., The Profitability of Pairs Trading Strategies: Distance, Cointegration, and Copula Methods (June 3, 2015). Rad, Hossein, Low, Rand Kwong Yew and Faff, Robert W., The Profitability of Pairs Trading Strategies: Distance, Cointegration, and Copula Methods, Quantitative Finance, DOI: org/10.1080/14697688.2016.1164337. Available at SSRN: https://ssrn.com/abstract=2614233 or http://dx.doi.org/10.2139/ssrn.2614233

- Chordia, Tarun and Kurov, Alexander and Muravyev, Dmitriy and Subrahmanyam, Avanidhar, The Informational Role of Index Option Trading (June 19, 2017). Available at SSRN: https://ssrn.com/abstract=2798390 or http://dx.doi.org/10.2139/ssrn.2798390

- Goodman, Theodore H. and Neamtiu, Monica and Zhang, Frank, Fundamental Analysis and Option Returns (January 3, 2013). Available at SSRN: https://ssrn.com/abstract=1974753 or http://dx.doi.org/10.2139/ssrn.1974753

- Tosi, Adriano and Ziegler, Alexandre, The Timing of Option Returns (March 16, 2017). Available at SSRN: https://ssrn.com/abstract=2909163 or http://dx.doi.org/10.2139/ssrn.2909163

- The Determinants of Credit Spread Changes Pierre Collin-Dufresne; Robert S. Goldstein; J. Spencer Martin The Journal of Finance, Vol. 56, No. 6. (Dec., 2001), pp. 2177-2207. Stable URL: http://links.jstor.org/sici?sici=0022-1082%28200112%2956%3A6%3C2177%3ATDOCSC%3E2.0.CO%3B2-K The Journal of Finance is currently published by American Finance Association.

- IOSR Journal of Business and Management (IOSR JBM) ISSN: 2278 487X, p ISSN: 2319 7668. PP 72 80 www.iosrjournals.org 8th International Business Research Conference 72 | Page IES Management College and Research Centre, Mumbai, India A Study on back testing of Bull Call Debit spread strategy on Nifty Index Options. Chirag Babulal Shah PhD (Pursuing), M.M.S., B.B.A., D.B.M., P.G.D.F.T., D.M.T.T. Assistant Professor at Indian Education Society's Management College and Research Centre

- Zaremba, Adam, The January Seasonality and the Performance of Country-Level Value and Momentum Strategies (June 25, 2015). Copernican Journal of Finance & Accounting, volume 4, issue 2, pp.195-209, 2015. Available at SSRN: https://ssrn.com/abstract=2778055

- Fisher, Gregg S. and Shah, Ronnie and Titman, Sheridan, Combining Value and Momentum (March 23, 2015). Journal of Investment Management, Forthcoming. Available at SSRN: https://ssrn.com/abstract=2472936 or http://dx.doi.org/10.2139/ssrn.2472936

- Asness, Clifford S. and Moskowitz, Tobias J. and Pedersen, Lasse Heje, Value and Momentum Everywhere (March 6, 2009). AFA 2010 Atlanta Meetings Paper. Available at SSRN: https://ssrn.com/abstract=1363476 or http://dx.doi.org/10.2139/ssrn.1363476

- Cakici, Nusret and Tan, Sinan, Size, Value, and Momentum in Developed Country Equity Returns: Macroeconomic and Liquidity Exposures (November 19, 2013). Available at SSRN: https://ssrn.com/abstract=2362521 or http://dx.doi.org/10.2139/ssrn.2362521

- De Groot, Wilma and Pang, Juan and Swinkels, Laurens, The Cross-Section of Stock Returns in Frontier Emerging Markets (August 1, 2012). Journal of Empirical Finance, Vol. 19, Issue 5, pp. 796-

818.. Available at
SSRN: https://ssrn.com/abstract=1600023 or http://dx.doi.org/10.2139/ssrn.1600023

- Foltice, Bryan and Langer, Thomas, Profitable Momentum Trading Strategies for Individual Investors (January 24, 2015). Foltice, B. & Langer, T. (2015) Profitable momentum trading strategies for individual investors. Financial Markets and Portfolio Management, 29(2), 85-113.. Available at SSRN: https://ssrn.com/abstract=2420743 or http://dx.doi.org/10.2139/ssrn.2420743
- A Trading Approach to Testing for Predictability. Stanislav **Anatolyev**. New Economic School, Moscow, 117418, Russia (sanatoly@nes.ru). Alexander **Gerko**. Deutsche Bank, Moscow, 127051, Russia

--COURSE INSTRUCTORS—

Sabatino Costanzo-Alvarez

Sabatino Costanzo-Alvarez holds a Masters in Economics and Finance from Brandeis University as well as a Magister Scientiarum, a Magister Philosopharum and a Ph.D. in Mathematics from Yale University, where in 1990 achieved a significant breakthrough by solving a mathematical conjecture which had remained unsolved for more than 3 decades. Taught Mathematics of Finance at Boston University as an Associated Professor for 5 years and later co-founded the Boston Trading Group LLC, designed the trading systems used in the firm's daily Futures Trading Operations and acted as head trader of the team. Holds the licenses "Registered Representative NYSE/NASDAQ" (Series 7), "Registered Financial Advisor", "Registered Uniform State Law Securities Agent", "Registered Managed Futures Fund Representative" in the U.S. and "Canadian Securities Course" & "Conduct and Practices" in Canada, as well as products training at Morgan Stanley in Boston, and later at Merrill Lynch in New York. Chaired the Advanced Management Program for Senior Executives (PAG), an Executive MBA at the US Accredited IESA Institute in Caracas, where he taught Financial Engineering and Investment Management as an Associate Professor, and tutored over 70 MBA dissertations. Acted as Head of Research at Econo Invest C.A., the largest Investment Firm in Venezuela, leading the Investment Strategy Team in charge of generating and executing the U.S. & E.U. investment strategies for Commodities, Fixed Income Instruments and Equities for the firm (published weekly in Bloomberg), as well as generating and maintaining the Sovereign Fixed Income Indexes of Brazil, Colombia, Mexico, Peru, Chile, Uruguay and Venezuela to be used in the design of international financial products. Acted as an Investment Advisor for the International Wealth Management Groups at Morgan Stanley (Boston), Merrill Lynch (NY) and the Royal Bank of Canada(Toronto), and is now a Senior Partner at the Toronto boutique Investment Firm Inter Alea, where he provides state-of-the-art mathematical modeling solutions to portfolio and risk management problems for a select group of corporate and high net worth private clients, designing and managing their investment portfolios based on their specific risk & return requirements. He teaches Portfolio Management, Statistics & Mathematical Modelling and Business Mathematics Courses at the Pilon School of Business, and is the founder and advisor of the Sheridan Students Trading and Investment Association. He is a Lecturer at the U of T Graduate School, where he is teaching Portfolio Management, Blockchain Technology, Cryptocurrencies and Artificial Intelligence applied to Finance.

Rosario Lorenza Trigo-Ferre

Holder of a B. A. in Philosophy (Magna Cum Laude) from Yale University -where she also received training in Math & Physics-, a Ph.D. in Generative Linguistics from Massachusetts Institute of Technology (MIT) and

a M. Sc. in Management of Information Systems from Boston University ("Beta Gamma Sigma Honors" award), she was a Professor at Boston University for 8 years. While a Programmer Analyst at Boston University, she designed and developed an application for the management of accounts trading stock and currency futures and co-designed financial applications under the direction of Professor Zvie Bodie at B.U. Co-founder and Trader at the Boston Trading Group and Certified Programmer Analyst in e-commerce by the University Computer Careers Program, she generated the trading signals for currencies and metals futures used in the BTG's market operations; developed an application maximizing the efficiency of trading system for currency and metal futures, and designed a client-server application for the management and operation of trading accounts. Has designed and developed many multi- tiered e-commerce applications dynamically generated from databases. Project leader and senior programmer analyst at IngeDigit, designed and developed internet applications for banking accounts management & operation, and for international transactions between banking accounts and credit cards. She was a Professor at the Department of Production and Technical Innovation of the IESA Institute, the top -only US accredited- Venezuelan Business School, where taught courses in Information Systems, Simulation in Finance, Operations and Database Marketing. She is the author of many scientific papers in refereed journals and a Permanent Consultant for an international development bank (C.A.F, The Andean Region Development Bank), where she has designed the financial models used to evaluate the profitability, coverage and socio-economic impact of projects like the inclusion of fiber-optic cable in highways in Colombia and Peru. These models led to the enactment of new laws making such inclusion mandatory in the Andean region. Also designed the financial models used to evaluate the profitability of projects in satellite technology in Argentina (specifically the ARSAT program) by estimating the future regional demand for transponders and the impact of the project in the input-output matrix of the country, and is now a Partner at the boutique Investment Firm InterAlea, where she designs, develops, tests and implements trading and risk management strategies based on the entropy analysis of price signals, executed on stock quote-data processed through SQL-Server. She is a Lecturer at the U of T Graduate School, where she is teaching Portfolio Management, Blockchain Technology, Cryptocurrencies and Artificial Intelligence applied to Finance.