Investment Letter

German Lillevali
President & Chairman
of GL Financial Group

I am pleased to announce the launch of our newly designed Investment Letter. The editorial team have worked hard to deliver this first edition on the views and opinions of the GL Asset Management Portfolio Managers. Frequently our clients have asked us about our markets' views, insights or our understanding of various new research ideas and investment technologies.

This Investment Letter addresses that wish by highlighting a number of newsworthy topics such as new global investment trends, the unique approach of our Statistical Arbitrage and L/S Equity strategies, or the dynamics of the commodity markets. They will decipher for you Artificial Intelligence, Deep Learning, and also Neural Networks. No significant breakthrough has ever been made without a critical review of established knowledge and thought patterns. The combination of an advance knowledge in Artificial Intelligence with the human element (fundamentals) illustrates perfectly the type of evolution the Finance industry is currently undergoing.

Early on, when we established our strategies, we recognised immediately the importance of stability, consistency and not to be at the mercy of markets' mood swings. In order to achieve that goal, it was essential to move away from traditional asset management and to develop our own methods through algorithms, technical & statistical analysis, and AI. Innovative and forward thinking became the corner stone of our approach alongside fundamentals enabling our trusted clients to preserve and create wealth at the same time.

With this Investment Letter, we are sharing with you some of our insights and views; please actively participate or interact with our PMs if you wish.

I am confident you will find the Investment Letter insightful and valuable when it comes to making investment decisions for the rest of 2017 and beyond.

I wish you a successful and prosperous year!

The Quants. Statistical Arbitrage.

Petar Bozhinov, Ph.D.
Portfolio Manager

Algorithmic trading and quant traders who use statistical and mathematical approached are taking over the asset management industry. Traditional investment strategies as «buy and hold», balance sheets analysis, corporate access and talking to companies' customers are losing their ground. The demand and trend for hiring successful quant teams is strengthening. In 2016 Swiss-based GAM announced the acquisition of Cantab Capital Partners for $217mio cash, an industry-leading, multi-strategy systematic manager based in Cambridge, UK. Cantab manages USD $4.0bn in assets for institutional clients worldwide.

Quant hedge funds are now responsible for 27% of all US stock trades by investors, according to the Tabb Group. As WSJ noted, at the end of the first quarter of 2017 quant-focused hedge funds held $932bn of investments as compared with 2009 ($408bn). The computers are outperforming humans at picking investments. In the past five years,

quant-focused hedge funds gained about 5.1% a year on average. Quants are different from HFT, who tend to focus on very short-term trades. I am responsible for managing equity portfolios with focus on market neutral statistical arbitrage and systematic trading across US equities. With over a decade of experience developing, implementing and trading complex risk-averse quant strategies at Credit Suisse and Tibra Capital London I am sure that GL Stat Arb strategies may bring a stable performance at low risk. At GL Asset Management, we apply different approaches while managing assets, including quantitative analysis and multi-factor models. Statistical Arbitrage is not just a single trading strategy. As things stand today, it is an umbrella term used for a broad range of quantitative trading strategies that use sophisticated statistical and mathematical models to analyze price differences and price patterns between securities to generate a higher than average profit. The genesis of Stat Arb can be traced from a quantitative trading strategy «pairs trading». And 25 years after its birth, this strategy, which exploits price discrepancies and correlation between a pair of stocks to buy and sell them and make money, still lies at the heart of Statistical Arbitrage.

NET FLOW INTO HEDGE FUNDS
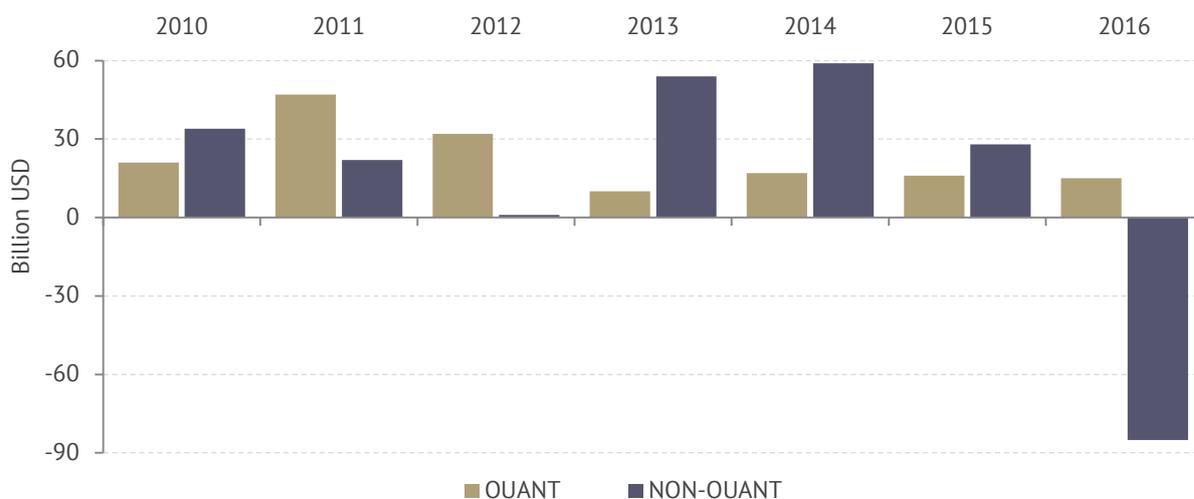
Source: HFR

Market neutral strategies. Innovations and advancements.

Statistical Arbitrage and Mean Reversion Models. US Equity Markets.

Andrey Nefedov
Portfolio Manager

Investment Objective

The objective of the market-neutral strategy is to protect clients' capital while generating stable returns irrespective of market conditions. The strategy captures mispricing anomalies, relative strength or fundamental differences between numbers of stocks within the same sector. The opportunities to capitalize on such market inefficiencies are identified by using sophisticated models and computer systems to perform extensive statistical, fundamental and technical analysis.

The capital is invested exclusively in US stocks with a market capitalization in excess of $3.00bn and the portfolio is broadly diversified to secure liquidity and stability of the investment strategy with a view to achieve low-volatility returns.

Investment Philosophy

The investment philosophy is based on the assumption is that the abnormal market movements in the price of securities are driven by market inefficiencies, and the price of these securities will reverse over time to its mean-level or back to normal. In order to achieve balanced exposure, a combination of two or more equities and equity-related cash-neutral instruments is used to create a synthetic pair with long and short exposure. An in-depth quantitative and computational approaches of selection the investment instruments for a pair is utilized. Pair trading is a highly technical investment strategy and based on mean-reversion models. The investment universe for the strategy includes equities and ADRs listed in the US with market capitalization of at least $3.00bn.

Investment Process

The investment strategy is market neutral and does not depend on the short-term market conditions. A potential fall in the stock market makes "short positions" profitable; when stock market grows, the profit is generated from the "long positions". The portfolio manager identifies the time (or the price level of the pair), in which the profit for the long position will exceed loss on the short position (or vice versa), with the greatest probability. In addition, this strategy allows us to hold positions enough time, earning on small fluctuations between two stocks in the pair.

The US stock market has a large number of companies that are suitable for this type of strategy. investors should be exposed to lesser risk: trading turnover and liquidity significantly reduce risks of manipulation; corporate information is available for the public, the selected companies publish their corporate earnings regularly, insiders and related to them transactions are subject to the disclosure to the public.

There are more than 800 combinations (pairs) of liquid shares, the capitalization of which is higher than $3.00bn threshold. A wide choice of tools allows us to make decisions quickly and provides excellent opportunities for the portfolio diversification.

The investment strategy splits positions between different sectors, the marginal limit of the position in one industry is restricted to 20% of the total portfolio assets. Due to the diversification between sectors and the combination of pairs, average daily volatility of the portfolio has small fluctuations in the range of (-0.30%; +0.30%).

Stat Arb Model

The Stat Arb strategy strives to achieve its investment objective following the investment process of continuous Model Generation, Screening, Pair/Portfolio construction and Risk Management.

1. Model Generation.

For all the investment instruments within the preselected universe a number of statistical tests are usually run individually with different time frequencies in order to establish the existence of stationarity of a random process.

A brute force analysis should be performed for all the investment instruments within the preselected universe possible by utilizing Correlation, Cointegration, Causality and Normality of the future pair composition. The process is computationally intensive and has a weekly basis. Only the pairs with statistically significant results are considered for calibration on historical in-sample data and as a result optimal risk/ return ratio is achieved within a pair. →

The process must be repeated with a rolling window on out-of-sample data to present day. Only the pairs with consistent performance and desired correlation should be selected for live screening. The above procedure is fully automated via Matlab.

2. Screening.
Utilizing mean reversion techniques and various algorithmic models, we analyze sophisticated pairs to identify the foreseeable direction that each trading pair will do.

3. Entry point.
The screened pairs are calibrated on daily basis and loaded into a proprietary system with live data feed which monitors and alerts when the predetermined entry points for pairs are reached.

4. Portfolio Construction
Before we add a pair into portfolio, a CVAR portfolio optimization is carried out for the current live portfolio and if the net industry exposure is okay, then the optimal allocation capital for the new pair is calculated.

5. Holding period.
We hold the position between 3 days and up to 6 weeks depending on the target level of profit and volatility of each pair.

6. Risk Management
A robust risk framework is applied. All the pairs are actively managed during the trading day and have strictly predetermined profit taking and stop loses levels.

Primary risk management tools that we use for our portfolio construction process include valuation, capitalization, volatility, momentum, liquidity and expected maximum directional exposure versus likelihood of instrument price reversion.

Correlation vs. Cointegration. Statistical Arbitrage.

Alexey Smyvin, CQF, Ph.D.
Portfolio Manager

Statistical Arbitrage is a trading strategy based on different statistical patterns. If such patterns are estimated for subtraction between two assets (for example, share prices) then this type of StatArb can be considered as a Pair Trading strategy. Moreover, it is a big question as how to calculate the stability of pairs.

The greatest example of StatArb Fund is Renaissance Technology – the fund that uses all the mathematical tools in order to generate profit over the last thirty years. And while the stakes are high, the price of a mistake is also a huge. Long Term Capital Management (LTCM), the largest fund in the history, ended up with more than 1 trillion dollars loss in 1998 because of mathematical inaccuracy. So what is the difference between math reliability and illusion?

Let's have a look at two non-stationary time series $X(t)=I(1)$ and $Y(t)=I(1)$ and the question of whether any interdependences between them. For example, let us suppose we have two independent price-time-series $X(t)$ and $Y(t)$:
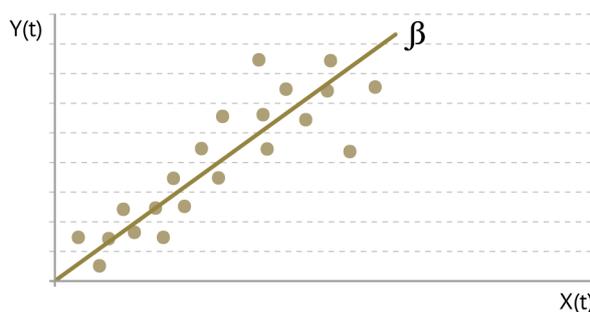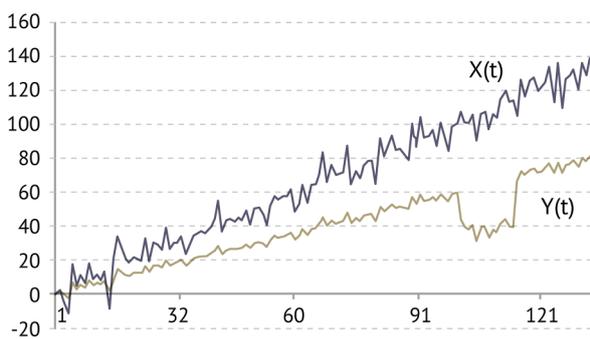
If we try to calculate the regression between share X and share Y, we can find them to be highly correlated. In our case they are positively correlated. It looks like this estimation has an essential statistical significance. The problem here is that company X and company Y might have nothing in common, for instance, they can be from different economical sectors. It means that in statistical arbitrage where the core is the filtration of stable pairs from the "general population" the usage of correlation become pointless.

In order to find a stationary time-series among different classes of assets the cointegration has to be calculated.
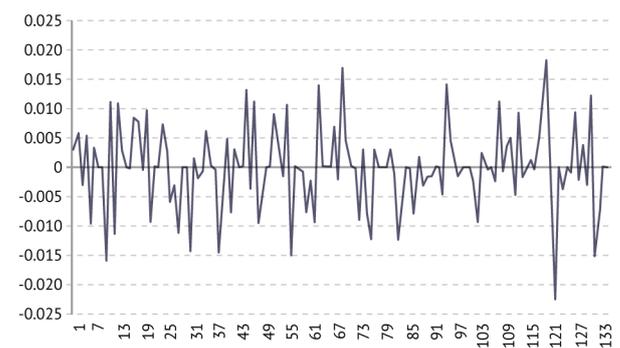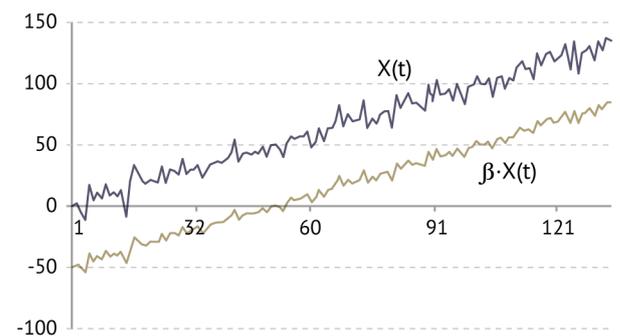
If two series are cointegrated it means that (with coefficient β) the difference between two price-series is predicted to remain steady. This is exactly what we need to move from a trend-following approach to countertrended algorithms for stable pairs.

New trends in Asset Management.

Robust betas in Asset Management.[1]

Heiko Bailer, Ph.D.
Portfolio Manager

Despite known shortcomings of the well-known Capital Asset Pricing Model (CAPM), the CAPM remains at the core of risk and asset management. It has become standard practice of asset managers and financial data providers to compute beta estimates as the slope coefficient of the classical Ordinary Least Squares (OLS) fit of the market model to stock and market returns. Unfortunately, one or more outliers (such as erroneous data, unusual returns) in stock returns can have a substantial influence on the value of the OLS beta, leading to faulty assessment of the market risk premium[2].

This flaw of the classical OLS beta can be overcome by the use of a Robust beta estimate that is not much influenced by outliers as shown in **Figure 1**. This comparison of OLS and Robust betas for the US stock EDS (now EDSFF) shows three outliers, one on top and two on the lower left that significantly influence the OLS beta, lifting it to 2.03 – in contrast to the Robust beta of 1.4. Essentially, EDS appears to have a higher market risk than it actually has.

In a nutshell, Robust beta estimates are computed by first down-weighting outliers before the final linear regression.

Figure 2 compares the pairwise difference between the OLS and Robust betas for all US stocks with weekly returns in a given two-year interval from 1964-2009 (CRSP database), split by market capitalization (SIZE). The differences are largest for smaller stocks and increase during market sell-offs though persist across.

This demonstrates a systematic bias that the use of OLS beta introduces in risk and asset management and also how a routine use of Robust betas can easily mitigate this flaw.
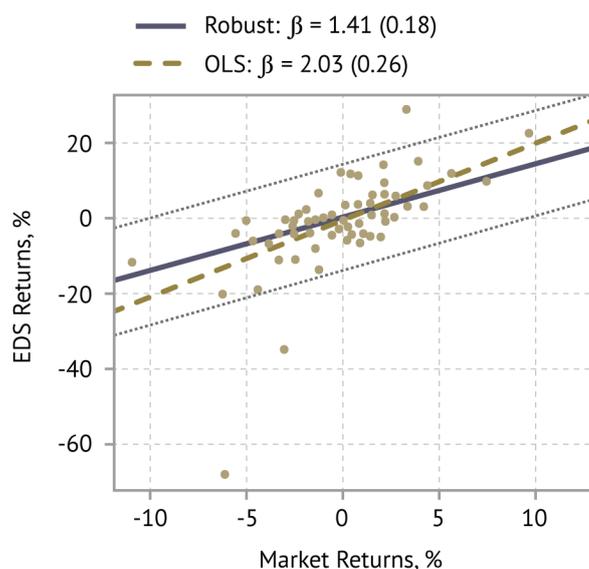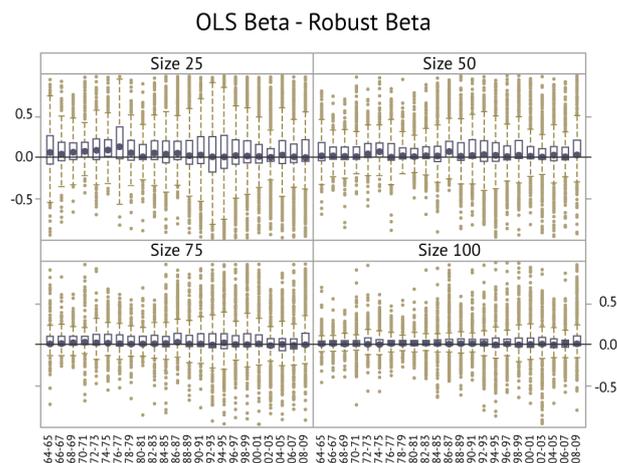
Figure 1

Figure 2

References:

1. Bailer, H., Maravina, T. A. & Martin D. R. (Hardback, December 2011): Cross-sections of Least Squares and Robust Betas. The [Oxford] Handbook of Quantitative Asset Management, edited by Bernd Scherer and Kenneth Winston

2. Bailer, H. & Martin R. D. (2007), Fama MacBeth 1973: Reproduction, Extension, Robustification. Journal of Economic and Social Measurement, 32, 1

New trends in Asset Management.

Convolutional (CNN) and Recurrent (RNN) Neural Networks.

Bogdan Zgersky
Portfolio Manager

The fundamentals of investment management is to predict the future financial inputs. However, to make a correct forecast is not so easy task as it seemed to be.

The reason why it is complicated to make an accurate forecast is the same as why money does not grow on trees. In order to beat direct competitors new models and methods should be developed on regular basis. Those key players with proper background and brand new methods of data mining will boost rate of return as other competitors will start to lose market share.

For the last ten years we observed a steady growth of investment fashion for indicative technical analysis – a range of empirical rules based on different kind of indicators and statistical linear dependences. Linear modelling was the primary tool for the most areas of research and analysis as procedures of accurate optimization have been developed for this type of modelling successfully. However, for goals, where linear approximation is poor, linear models may work poor too. That is why because of exponential growth the computation capacities we observe the significant demand for neural networks. Since their origination is not linear, neural networks started to apply for modelling as a powerful tool. At the same time neural networks may reproduce complicated dependences keeping in mind that data for analysis requires other kind of structuring.

To be sure, that implementing of neural networks could provide a high output, it is necessary to understand correctly the structure and morphology of input data analysis as correct architecture of neural networks should be based on proper data structuring. Applying such a simple neural network as multilayer perceptron may not provide a positive feedback for time series prices forecast. For instance, inputting price series, network will searching for a dependence in data as if prices would not depend on each other or current prices would not depend on prices of past periods or possible peaks.

It is similar to the fact, if we could consider each price as a single parameter in a group of parameters, which do not influence on each other as a color of eyes, height, age and a sex of a human, looking for a common dependences and its influence on a future price. If we assume, that there is a dependence between prices of our time series, we must use strict architectures that allow working us with such possible dependences as applying architecture of convolutional and recurrent neural networks.

If our research has a goal to search for patterns to forecast prices, we can use convolutional neural networks, which apply for recognizing images. Thereby we assume that a chart consists of many patterns and many of them we could possibly find and based on such patterns we may forecast the changing of a price in according to one or another pattern. However, in this case we cannot keep in mind the influence of patterns to each other. It means we need to analyze produced patterns with the help of another network or the network with another architecture, for example, applying recurrent neural network.

Recurrent neural networks may apply for analysis of such data as text or audio files, where data structure suggests the data dependence on values of each other. For instance, depending on context, how the words are filing and commas across the text the sense of sentence may vary. Therefore, neural network may analyze and keep in memory such dependences, trying to keep learning for searching dependences. Consequently, neural networks may be more useful for analyzing price charts.

We should understand, that there is no unique approach for analyzing data with the help of neural networks. In order to build the proper architecture for resolving target tasks and goals, it is necessary to be fully aware about morphology and the data structure and to understand how the data is structured and interconnected. If the data relates to physical parameters or images, where the laws of interconnected data, its structure and morphology are more obvious and if we apply data of such complex systems as text or speech, where relationships are more variable we should build the ensembles of neural networks with specialized architectures in line with exact description of how the nature of analyzed data is constructed.

Investment stories. US Equities.

Bright future for Apple Inc.

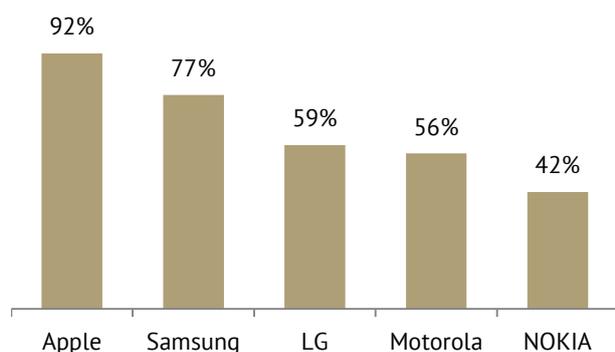**Sergey Vakhrameev, Ph.D.**
Portfolio Manager

We analyzed the Apple business and see a bright future for the multinational technology company.

We underline the key drivers for Apple's growing business:

- **Strong competitive position.** While Apple takes 2nd place and has 15% share in smartphone market by unit shipments (Samsung in the 1st place with share 23%), company took 83% of smartphone profits in 1Q 2017 while Samsung has only 14% share in total sector profits.

- **Consumer loyalty to the iPhone is very high**, the company's revenue is expected to grow by 5% in 2017 despite relatively high average sales price of IPhone ($645 per unit) and Macintosh ($1235 per unit).

MOST IPHONE USERS NEVER LOOK BACK

Smartphone brand retention rates in the United States in 2017*

April 2017 survey of 1,000 U.S. smartphone owners that are "likely" to upgrade in the next 12 months.

∗ Share that intend to replace their current phone with another from the same vendor.

Source: Morgan Stanley via media reports

- **The incremental growth in the service segment is 20%** of the total company sales incremental growth for last 3 years. Apple isn't a hardware company, rather it's a software company that lodges its operating system and products in a high-margin device. To use Apple's iOS, iTunes, App store, and the rest one has to buy an Apple product.

- **High margin and low valuation.** Apple operating margin is 29% which 2 times higher than Samsung's 14.5% margin and remaining companies in the sector have an average negative margin. As it monetizes value through the repeated sales of high-margin software, Apple won't suffer the fate of other hardware producers, or Microsoft for that matter (as its products work on other people's hardware). Apple stock valuation is still low (P/E=16.8 while S&P 500 P/E = 18.9).

- **Apple intends to enter and dominate in two new product categories: television and the automobile market by 2020.**

- **A huge amount of cash on the balance sheet ($257 billion)**, which allows the company to buy back its undervalued shares and pay generous dividends. From the inception of its capital return program in August 2012 through March 2017, Apple has returned over $211 billion to shareholders, including $151 billion in share repurchases. Under the expanded program, Apple plans to spend a cumulative total of $300 billion by the end of March 2019. Recently Apple's Board has approved a 10.5% increase to the company's quarterly dividend, and has declared a dividend of $0.63 per share.

According to our in-house DCF model, the fair value of Apple entire business is $206 per share.

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