

Institution: Imperial College London Business School

Unit of Assessment: C17 Business and Management Studies

Title of case study: Risk Measurement and Portfolio Construction: The Creation of New Financial Products and Trading Strategies

Period when the underpinning research was undertaken: 2007-2020

Details of staff conducting the underpinning research from the submitting unit:

Name(s):	Role(s) (e.g. job title):	Period(s) employed by submitting HEI:
Andrea Buraschi	Chair in Finance	09/2005 to present.
Walter Distaso	Professor of Financial Econometrics	09/2006 to present.
Robert Kosowski	Professor of Finance	09/2006 to present.

Period when the claimed impact occurred: 2018 to present

Is this case study continued from a case study submitted in 2014? ${\sf N}$

1. Summary of the impact (indicative maximum 100 words)

Imperial research on the measurement of risk and on portfolio construction has led to the launch of successful new financial products and trading strategies. Barclays have introduced a new investable index for the Commodity Traders Advisers (CTA) industry segment, for use by a variety of asset managers, pension funds, sovereign wealth funds, endowment funds and retail investors. Fideuram Asset Management has launched a \$100m mutual fund for retail investors, with risk diversification based on factor allocation, creating an opportunity previously unavailable to small investors. Unigestion changed the design of a systematic trading strategy, improving performance for its institutional investors. The research has also informed the conceptual thinking – and subsequent policy advice – of the International Monetary Fund (IMF).

2. Underpinning research (indicative maximum 500 words)

The three components of this case are the outcome of extensive scientific research collaboration between Buraschi, Distaso and Kosowski. This has been under way since the authors became colleagues at Imperial College Business School in 2006. The underpinning common research theme for the three components lies at the intersection of studies on time-varying risk premia, asset price predictability, financial econometrics, and behavioural finance. The common key motivation for the authors' collaborative activity is to understand the relationship between asset portfolio returns and risks. The three components, as a result of this collaboration, share similar objectives and apply innovations to related asset classes. The focus of all three is to improve the risk management of investor's portfolios by better modelling trends and the dependence of assets over time. Two of these elements introduce several innovations to the class of trend-following strategies. These fulfil a risk reduction function in investors' portfolios since they tend to benefit from both upward and downward trends in markets. Buraschi and Kosowski have co-authored two articles published in top finance journals on closely related topics (**Refs 3 and 7**). The third article, by Distaso (**Ref 6**), innovates in the area of modelling time-varying correlations, which have been a topic of extensive research discussion among the three team members.

The "Buraschi-Barclays Index" is the outcome of a partnership between Professor Buraschi and Barclays (further details of the product are discussed in Section 4, and Source 5.1), it makes a significant advance in the field by using a novel adaptive trend detection model, called the multi-frequency optimal signal extraction (MOSE) method, which aims to determine an optimal trend signal using both high (HF) and low frequency (LF) information using their statistical relevance to

Impact case study (REF3)



predict the direction of subsequent returns. It draws from a large body of research conducted by Andrea Buraschi and colleagues over the years 2007 to 2014 on these topics (**Refs 1-5**). The LFsignals strategy is designed to generate positive long-run returns; the HF-signals component with a short look-back window allows for significantly higher (positive) skewness, which generates better returns during crisis periods. They are combined in a Bayesian framework to provide a balanced return profile which delivers both rich long-run returns as well as good hedging short-term properties during crisis periods. Buraschi's research shows that this is an ideal solution for defensive investors concerned about short-run drawdowns.

Econometric risk estimates depend on the matrix of variances in cross-asset returns, and a new method to estimate these developed by Distaso (**Ref 6**) exploits the spectral decomposition of a square matrix. It gives a well-conditioned and precise estimator, even when the number of assets in a portfolio is larger than the number of available observations. This is particularly appealing to big asset managers running portfolios consisting of a large number of different positions that need to be frequently rebalanced in response to changing market conditions. The method is design-free, in the sense that no assumptions are made on the mechanism that generates the data and therefore is very general. Second, it always delivers non-singular well-conditioned estimators, hence remaining precise when further operations (such as inversions) are required. It is also simple and quick to apply.

The importance of this is that correlations can unexpectedly increase in times of crisis, causing large losses. Buraschi, Kosowski and Trojani **(Ref 7)** show that previous academic literature and industry practice had underappreciated the risks in alternative investment funds, such as hedge funds. The first use of data on correlation swaps (a then-new kind of derivative), linked to the net long/short exposure of hedge funds allowed estimates of the level of risk involved.

Trend-following strategies have traditionally relied on so-called volatility scaling that ignores correlations between assets. However, Baltas and Kosowski **(Ref 8)** show how sensitive these strategies are to changes in pairwise correlations – when they increase, the benefits of diversification can fall. The research presented a novel correlation-scaling portfolio construction methodology and showed it increased the risk-adjusted performance of trend-following strategies, especially after the global financial crisis when asset correlations increased.

3. References to the research (indicative maximum of six references)

- Beber, Alessandro, Francis Breedon, and Andrea Buraschi. "Differences in beliefs and currency risk premiums." Journal of Financial Economics (2010): 415-438. DOI 10.1016/j.jfineco.2010.07.001
- Buraschi, Andrea, and Alexei Jiltsov. "Habit formation and macroeconomic models of the term structure of interest rates." The Journal of Finance (2007): 3009-3063. DOI 10.1111/j.1540-6261.2007.01299.x
- Buraschi, Andrea, Robert Kosowski, and Worrawat Sritrakul. "Incentives and endogenous risk taking: A structural view on hedge fund alphas." The Journal of Finance (2014): 2819-2870. DOI 10.1111/jofi.12167
- 4. Buraschi, Andrea, Paolo Porchia, and Fabio Trojani. "Correlation risk and optimal portfolio choice." The Journal of Finance (2010): 393-420. DOI 10.1111/j.1540-6261.2009.01533.x
- Buraschi, Andrea, Fabio Trojani, and Andrea Vedolin. "When uncertainty blows in the orchard: Comovement and equilibrium volatility risk premia." The Journal of Finance (2014): 101-137. DOI doi.org/10.1111/jofi.12095
- 6. Abadir, K.M., W. Distaso and F. Žikeš (2014). Design-free estimation of variance matrices, Journal of Econometrics 181, 165-180, 2014. DOI 10.1016/j.jeconom.2014.03.010
- Buraschi, Andrea, Robert Kosowski, and Fabio Trojani. "When there is no place to hide: Correlation risk and the cross-section of hedge fund returns." The Review of Financial Studies (2013): 581-616. DOI 10.1093/rfs/hht070
- Baltas, N and R. Kosowski (2012) Demystifying Time-Series Momentum Strategies: Volatility Estimators, Trading Rules and Pairwise Correlations, working paper available on SSRN <u>https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2140091</u>, and published in in



2020 in "Market Momentum: Theory and Practice", Wiley

This research has been published in the most highly ranked finance journals.

4. Details of the impact (indicative maximum 750 words)

This research has directly led to the introduction of new financial products and trading strategies by important financial institutions in the UK, Switzerland, and Italy, with significant impact and reach in the global asset management market. Beneficiaries of the impact are the companies introducing the new products and strategies and, ultimately, the multiple classes of investors affected by their availability. This includes private individuals and commercial investors, as well as pension funds and other major institutional investors.

Barclays' flagship trend-following index

"Buraschi-Barclays Trend Indexes" have been launched by Barclays to provide cost-effective hedge-fund like returns to pension and endowment funds that wished to invest in the Commodity Traders Advisers (CTA) segment (with industry-wide assets of around \$355bn in 2018). These indexes provide exposure to 78 underlying assets (commodities, equities, foreign exchange and bond & money markets). Products derived from the indexes provide high performance returns, which are de-correlated from the equity market, with a good return profile (especially during crisis periods). Moreover, these products are transparent, ruled-based, and cost-effective, in contrast to alternative "hedge-fund like" investment solutions that are traditionally opaque and expensive. To quote Farouk Jivrai, Director of Barclays QIS: "Over the last three years, the Barclays QIS Team has worked with Professor Buraschi in an industry-academia partnership to design and develop what we consider to be the most innovative, transparent and cost-effective Trend-Following strategy for our clients. This strategic academic partnership has allowed us to continue to push the frontier of our business and be a genuine partner for our clients" [...] "the partnership has proven to be very successful" (Source 1).

The "Buraschi-Barclays Adapting Trend Index" is now Barclays' flagship trend-following index. It is commercially distributed in a variety of formats (such as total return swaps and capital protected notes) and quoted by Bloomberg. As Farouk Jivrai explains, the "Buraschi-Barclays Adapting Trend Index" has been taken up by "*institutional clients, such as pension funds, large asset managers, and insurance companies. We have also designed a series of more specialized Buraschi Barclays Adaptive Trend Indices for institutional clients with particular objectives in terms of the defensiveness of their portfolio. These customised versions have different objectives and constraints in terms of volatility, commodity and equity exposure, correlation with the S&P 500 Index, specific drawdown tolerance, and crisis risk, for example" (Source 1).*

The indexes have been adopted by asset managers, pension funds, sovereign wealth funds, and insurance companies. Banca Zarattini & Co. of Switzerland made a careful comparison before concluding that the Buraschi-Barclays Adaptive Trend Index is "*the most innovative, transparent and cost-effective Trend-Following strategy available in the market at the moment*" Leonardo Falconi, Banca Zarattini &Co,Switzerland (Source 2), and he also writes that "*Since we introduced it in our portfolios, we have been impressed by its performance even during a very challenging market period. It has offered stable returns when markets have corrected and, as such, we view it as an excellent risk mitigator for our clients' portfolios*" (Source 2)

A mutual fund for risk-averse investors

Fideuram Asset Management, part of the largest Italian private bank (Intesa Private Banking Division, with over €200bn under management), has launched a new mutual fund aimed at risk-averse retail investors. The asset allocation is based on the measures of risk developed in Distaso et.al (**Ref 6**), allowing for frequent updating. The fund integrates two popular allocation approaches based on risk and on macro-regime, and was designed to offer the cheapest possible risk-management. While the S&P500 index fell 16.3% as Covid lockdowns spread during March 2020, the fund lost only 6.3% of its value; the volatility of its returns is one-quarter that of the S&P500 (Source 3). The fund was launched in September 2019 and has already attracted €100m of investors' funds. The company reports that "it has been of significant advantage to our business"



and that they are "confident that this kind of funds [sic] may be [a] new flagship in the space." Renato Zaffuto, CIO Fideuram asset management (Source 3).

Building on this success, Fideuram have again used Distaso's approach to launch a new internal fund for an insurance unit-linked product (Source 3). Beyond its immediate application in the products referenced above, research by Distaso has enhanced the company's professional understanding of portfolio-management. Luca Simoncelli (Fund Manager at Fideuram) writes the following: Distaso's "contribution in the areas of risk budgeting and portfolio optimization through a risk based approach have been instrumental in building our knowledge and expertise in that area of portfolio management" (Source 4).

Improving a trend-following strategy

Unigestion – a global \$20 billion asset management company headquartered in Switzerland - changed the design of a systematic trading strategy in response to **Ref 7 and Ref 8.** In particular, the trend-following strategy used for \$80m of assets was revised to continuously monitor the pairwise correlations between those assets and respond to these dynamically. This improved performance by 0.43% a year in back-testing, very noticeable in a low-return environment (Source 5). Another way to illustrate this is that the dollar value of the allocation to the trend-following strategy in December 2019 was around \$80 million. This means that the value added in terms of dollars was \$344,000 (0.43 percent multiplied by \$80 million) in 2019. The ultimate beneficiaries are Unigestion's investors, such as pension funds and insurance companies, and the company reports that the "strategy has been performing well compared to its peers since its launch. ... [It] fulfils an important diversifying function", according to Dr J. Teiletche, Managing Director of Unigestion (Source 5).

In addition to this, the research outlined in **Ref 7** and **Ref 8** informed the conceptual thinking – and subsequent policy advice – of the International Monetary Fund (IMF). In 2016 Professor Kosowski was selected to participate in the IMF's technical assistance mission to the Russian Central Bank. Here, he presented research on how correlation risk in hedge funds can be alleviated. As explained by Dr Miguel Segoviano, IMF Mission Chief, "the relevance of this research for IMF member countries lies not only in the role that alternative investment funds play in developed and emerging markets but also in the conceptual understanding of correlation and systematic risk" [...] "this was of relevance to the Russian financial regulator as it contributed to the conceptual thinking on how to develop the Russian investment fund industry" (Source 6). As a result of this, the Russian central bank added fund flow measures - as proposed by Kosowski's research - to the framework that it uses to monitor systematic risks in the economy.

5. Sources to corroborate the impact (indicative maximum of 10 references)

- 1. Supporting letter from Farouk Jivrai, Barclays QIS,
- 2. Supporting letter from Leonardo Falconi, Portfolio Manager, Banca Zarattini &Co,
- 3. Supporting letter from Renato Zaffuto, CIO, Fideuram asset management
- 4. Supporting letter from Luca Simoncelli, Fund Manager, Fideuram asset management
- 5. Supporting letter from Dr J. Teiletche, Managing Director, Unigestion Switzerland
- 6. Supporting letter from Dr Miguel Segoviano, Mission Chief, International Monetary Fund