

# I&PE

INVESTMENT & PENSIONS EUROPE

AUTUMN 2011

# EDHEC-Risk Institute Research Insights

10  
Years  
2001-2011



**EDHEC-RISK**  
Institute



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Years  
2001-2011



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## Introduction Noël Amenc

I am very pleased to introduce this special issue of the EDHEC-Risk Institute Research Insights supplement to Investment & Pensions Europe.

EDHEC-Risk Institute is celebrating its 10th anniversary in 2011. Since it was founded in 2001, the institute has endeavoured to remain faithful to its "research for business" approach, by providing research that is both academically excellent and relevant and useful for the industry. In the present supplement, we look at the industry-sponsored research that has been developed at EDHEC-Risk Institute over the past 10 years. The success of the institute over the past 10 years would not have been possible without the support of the investment management industry, so it is especially pleasing to be able to summarise all the important research work that we have been able to carry out thanks to our partners.

EDHEC-Risk Institute was set up to conduct world-class academic research and highlight its applications to the industry. In keeping with this mission, the institute systematically seeks to validate the academic quality of its research through publications in leading scholarly journals, implements a multifaceted communications policy to inform investors and asset managers on state-of-the-art concepts and techniques, and develops business partnerships to launch innovative products.

The results of the research work performed by the centre have been published by such foremost specialised scientific publications as the *Journal of Economic Literature*, *Journal of Financial Economics*, *Management Science*, the *Review of Financial Studies*, the *Journal of Portfolio Management* and the *Financial Analysts Journal*.

Recognition of the academic quality and professional relevance of the centre's output is also evidenced by the integration of a number of articles into the required readings of professional designations, invitations to participate in curriculum design or authoring of programme material, and the decision by CFA Institute to designate EDHEC as an Approved Provider under the CFA Institute Continuing Education (CE) Programme.

To maximise exchanges between the academic and business worlds, EDHEC-Risk maintains a website devoted to asset and risk management research for the industry: [www.edhec-risk.com](http://www.edhec-risk.com), circulates a monthly newsletter to nearly 1,000,000 practitioners, conducts regular industry surveys and

### EDHEC-Risk Institute, Key Figures

#### 2010-11

<b>Number of:</b>	
Permanent staff:	66
Research associates:	18
Affiliate professors:	6
<b>Overall budget:</b>	€9,600,000
<b>External financing:</b>	€6,345,000

#### 2001-11

<b>Number of:</b>	
Conference delegates/participants at seminars:	23,000
Monthly recipients, electronic newsletter:	950,000
Articles in academic journals:	107
Books or chapters in books:	72
Position papers:	43
EDHEC-Risk publications:	50
Mentions in worldwide trade publications:	36,500
Business partners:	225

consultations, and organises annual conferences for the benefit of institutional investors and asset managers.

EDHEC-Risk Institute has adopted a strict corporate governance structure and rigorous processes which guarantee both the scientific quality and the operational relevance of its activities. The institute's dual management and its international advisory board enforce strict validation and evaluation processes to ensure that all efforts remain focused on issues which are central to the development of the profession.

The present supplement is divided into three main sections that we think accurately reflect the research centre's activities since 2001: Ten Years of Research Supported by the Financial Industry; 10 Years of Applied Research; and 10 Years of Speaking Up on Important Issues for the Financial Industry.

We extend particular thanks to IPE for their ongoing support and we look forward to another 10 years of providing information on research-based solutions to the key challenges facing institutional investors.

*Noël Amenc, Professor of Finance, EDHEC Business School, and Director, EDHEC-Risk Institute*

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## EDHEC-Risk Institute, 2001–11, Key Dates

### 2001

**August 1:** The EDHEC Risk and Asset Management Research Centre is officially set up within EDHEC Business School with the support of the Misys Group.

### 2002

**November 4:** The first Asset Management Awards (Grands Prix de la Gestion d'Actifs) presented in Paris by the financial daily L'Agefi on the basis of a methodology created by the research centre in partnership with Europerformance.

### 2003

**March 6:** Official launch of the EDHEC Alternative Indexes, with the support of Alteram.

### 2004

**May 13:** The first EDHEC Hedge Fund Day Conference in London, attended by over 400 senior professionals from 20 countries. This event was renamed the EDHEC-Risk Alternative Investment Days in 2007 in order to cover all investment issues in alternative asset classes.

**September 3:** The EDHEC Risk and Asset Management Research Centre enters into an agreement with the Chartered Alternative Investment Analyst Association<sup>SM</sup> to become its exclusive official provider of CAIA<sup>SM</sup> exam preparatory courses for Europe. EDHEC conducted CAIA<sup>SM</sup> preparatory programmes until September 2009.

### 2005

**April 21–22:** The first EDHEC Asset Management Days conference in Geneva, with the participation of around 600 European asset managers and private bankers. The event was repeated in March 2007 with more than 700 participants.

### 2006

**November 21–22:** The first EDHEC Institutional Days ran in Paris and were attended by over 800 senior industry professionals.

### 2007

**October 8:** In partnership with BNP Paribas Asset Management, the EDHEC Risk and Asset Management Research Centre sets up its first research chair, in Asset-Liability Management and Institutional Investment Management.

**March 17–19:** The first Advances in Asset Allocation Seminar organised in London in partnership with CFA Institute. The EDHEC Risk and Asset Management Research Centre becomes a member of the exclusive club of academic institutions chosen for its expertise in finance to co-organise professional development courses for CFA members with CFA Institute (other institutions include Harvard Business School, London Business School, Oxford University, the Wharton School of the University of Pennsylvania and INSEAD).

**June 12–13:** Merger of the EDHEC Asset Management Days and EDHEC Institutional Days into a new edition of the EDHEC Institutional Days, held in Paris.

**October 15:** Inaugural class of the PhD in Finance programme, with the creation of a residential track to enable the best young talent in finance worldwide to participate in EDHEC-Risk's research programmes. The inaugural class includes 17 doctoral students from 14 countries.

### 2010

**January 6:** In order to take account of its extended range of activities, notably in the area of executive education, the EDHEC Risk and Asset Management Research Centre is officially renamed EDHEC-Risk Institute.

**January 18:** Launch of the FTSE EDHEC-Risk Efficient Indices, testimony to EDHEC-Risk Institute's ambitions in transferring knowledge to the industry.

**April 27:** Introduction of EDHEC Risk Institute-Asia, set up in Singapore with the support of the Monetary Authority of Singapore (MAS), at a seminar entitled "The Future of Investment Management".

### 2011

**March 7:** Creation of EDHEC-Risk Indices & Benchmarks, which, in addition to its presence in London, Nice and Singapore, anticipates the arrival of EDHEC-Risk Institute in the United States by opening an office in New York.

**April 6:** Grand opening of EDHEC Risk Institute-Europe in the heart of the City of London.

# The choice of asset allocation and risk management

**Lionel Martellini**, Professor of Finance, EDHEC Business School and Scientific Director, EDHEC-Risk Institute

Asset management is justified as an industry by the capacity of adding value through the design of investment solutions that match investors' needs. For more than 50 years, the industry has in fact focused mostly on security selection as a single source of added value. This focus has somewhat distracted the industry from another key source of added value, namely, portfolio construction and asset allocation decisions. In the face of recent crises, and given the intrinsic difficulty of delivering added value through security selection decisions alone, the relevance of the old paradigm has been questioned with heightened intensity, and a new paradigm is starting to emerge.

In a nutshell, the new paradigm recognises that the art and science of portfolio management consists of constructing dedicated portfolio solutions, as opposed to one-size-fits-all investment products, so as to reach the return objectives defined by the investor, while respecting the investor's constraints expressed in terms of (absolute or relative) risk budgets. In this broader context, asset allocation and portfolio construction decisions appear as the main source of added value by the investment industry, with security selection being a third-order problem.

Academic research has provided very useful guidance to the ways asset allocation and portfolio construction decisions should be analysed so as to best improve investors' welfare.

In brief, the "fund separation theorems" that lie at the core of modern portfolio theory advocate separate management of performance and risk-control objectives. In the context of asset allocation decisions with consumption/liability objectives, it can be shown that the suitable expression of the fund separation theorem provides rational support for liability-driven investment (LDI) techniques that have recently been promoted by a number of investment banks and asset management firms. These solutions involve, on the one hand, the design of a customised liability-hedging portfolio (LHP), the sole purpose of which is to hedge away as effectively as possible the impact of unexpected changes in risk factors affecting liability values (most notably interest rate and inflation risks), and, on the other hand, the design of a performance-seeking portfolio (PSP), whose *raison d'être* is to provide investors with an optimal risk/return trade-off.

One of the implications of this LDI paradigm is that one should distinguish two different levels of asset allocation decisions: allocation decisions involved in the design of the performance-seeking or the liability-

hedging portfolio (design of better building blocks, or BBBs), and asset allocation decisions involved in the optimal split between the PSP and the LHP (design of advanced asset allocation decisions, or AAAs). Each level of analysis involves its own challenges and difficulties and, while the LDI paradigm is now widely adopted in the institutional world, very few market participants adopt an implementation approach of the paradigm that is fully consistent with the state of the art in academic research.

Asset allocation and portfolio construction decisions are intimately related to risk management. In the end, the quintessence of investment management is essentially about finding optimal ways to spend risk budgets that investors are reluctantly willing to set, with a focus on allowing the greatest possible access to performance potential while respecting such risk budgets. Risk diversification (a key ingredient in the design of better benchmarks for performance-seeking portfolios), risk hedging (a key ingredient in the design of better benchmarks for hedging portfolios), and risk insurance (a key ingredient in the design of better dynamic asset allocation benchmarks for long-term investors facing short-term constraints) are shown to be three useful approaches to optimal spending of investors' risk budgets, each of which represents a hitherto largely unexplored potential source of added value for the asset management industry.

Risk management is often mistaken for risk measurement. This is a problem since the ability to measure risk properly is at best a necessary but not sufficient condition to ensure proper risk management. Another misconception is that risk management is about risk reduction. In fact, it is at least as much about return enhancement as it is about risk reduction. Indeed, risk management is about maximising the probability of achieving investors' long-term objectives while respecting the short-term constraints they face.

In the end, the traditional (asset management or asset-liability management) static strategies without a dynamic risk-controlled ingredient inevitably lead to underspending investors' risk budgets in normal market conditions (with a high opportunity cost), and overspending their risk budgets in extreme market conditions. This idea was intuitively discussed in Bernstein (1996): "The word risk derives from the Latin *risicare*, which means to dare. In this sense, risk is a choice rather than a fate. The actions we dare to take, which depend on how free we are to make choices, are what the story of risk is all about."

# Ten years of research supported by the financial industry

**Noël Amenc**, Professor of Finance, EDHEC Business School, Director, EDHEC-Risk Institute



**E**DHEC-Risk Institute's six research programmes – on asset allocation and alternative diversification; style and performance analysis; indices and benchmarking; operational risks and performance; asset allocation and derivative instruments; and ALM and asset management – explore interrelated aspects of asset allocation and risk management to advance the frontiers of knowledge and foster industry innovation.

These programmes receive the support of many international financial companies. In addition, EDHEC-Risk has developed a close partnership with a small number of sponsors within the framework of research chairs.

## Research chairs

The EDHEC-Risk Institute research chairs involve a close partnership with a sponsor and a commitment from EDHEC-Risk over three years leading to international academic publications and position papers aimed at professionals, institutional investors and regulators. The philosophy of the institute is to validate its research work by publication in international academic journals, but also to make the research available to the financial sector through its position papers, published studies and conferences.

In the following pages we shall briefly present each of the research chairs at EDHEC-Risk Institute and give examples of the research that has furthered knowledge in each of the fields.

## Core-satellite and ETF investment

### in partnership with Amundi ETF

**E**TFs (exchange-traded funds) have largely contributed to the implementation of more dynamic asset management, whether it involves tactical investment management, or, more recently, taking risk-controlled investing-type approaches into account. The chair analyses the developments in the use of exchange-traded funds as part of the asset allocation process and looks at advanced forms of risk budgeting within the framework of a core-satellite approach.

#### *The EDHEC European ETF Survey 2010*

May 2010  
Felix Goltz, Adina Grigoriu, Lin Tang

#### *EDHEC-Risk European ETF Survey 2009*

May 2009  
Noël Amenc, Felix Goltz, Adina Grigoriu, David Schröder

This annual survey analyses the possible uses of ETFs in investment management and gives a detailed account of current perceptions and practices of European investors in ETFs. ETFs have experienced tremendous growth in the past decade: the first European ETF was launched in 2000, and by late 2009 there were 829 ETFs in Europe and ETF assets under management amounted to around €227bn (Fuhr and Kelly 2009). An oft-mentioned advantage of ETFs is their liquidity. This attribute can be exploited in dynamic asset allocation strategies that use frequent changes in portfolio weights to keep risk under control.

The survey describes in detail how ETFs are designed and how they may be used for such dynamic risk-budgeting techniques. Our aim is to provide investors with useful background information on ETFs and with conceptual and methodo-

logical ideas on how ETFs may be used to their full advantage in asset allocation decisions.

As the ETF market has gotten bigger and more sophisticated, it is essential for ETF investors to be informed of the views and practices of their peers. Our document focuses on the results of a survey of European ETF users, who provided us with information on their current use of ETFs and their views of various issues with ETFs and competing indexing products.

To summarise the main findings of the study, we first look into dynamic risk-budgeting techniques using ETFs and highlight specific examples. We then provide an overview of the main survey results for current and future uses of ETFs in Europe.

#### *Risk Control through Dynamic Core-Satellite Portfolios of ETFs: Applications to Absolute Return Funds and Tactical Asset Allocation*

January 2010  
Noël Amenc, Felix Goltz, Adina Grigoriu

A revisited version of this paper was published in the Fall 2010 issue of the *Journal of Alternative Investments*.

The growing market for ETFs provides asset managers with practical asset allocation tools, but currently ETFs are mainly used as buy-and-hold instruments in static asset allocation. This seems surprising as one of the main advantages investors see in ETFs is their liquidity, which remains largely unused in static asset allocation. A way of using ETFs to their full potential is to implement dynamic allocation strategies which require frequent rebalancing of asset class exposures. The main focus of EDHEC-Risk's research in this area has been on risk-controlled investing (RCI). Rather than considering risk only at a fixed horizon, RCI takes into account investors' aversion to intra-horizon risk. After all, investors are averse not just to end-of-horizon

risk but also to negative outcomes within the investment period.

Absolute return strategies based on ETFs can give investors access to the upside potential of the stock market while protecting them from the downside. Such strategies dynamically adjust allocations between low-risk government bond ETFs as a core portfolio and riskier equity ETFs as a satellite portfolio. The idea is to manage risk by respecting a risk budget relative to a floor level of wealth. Floor levels can be defined flexibly to protect fixed levels of wealth, rolling period returns, or to limit maximum drawdown. With the floor, the investment in the equity ETFs depends not only on the investor's risk-aversion, but also on the current risk budget. When the risk budget is spent, there is no more margin for error and one moves away from the risky equity ETFs into the low-risk bond ETFs.

RCI makes it possible to avoid a main shortcoming of static asset allocation, the reliance on diversification between stocks and bonds. Diversification alone is of limited use in providing "absolute returns" since it typically fails when most needed. In the worst market conditions, correlations between asset classes tend to increase, thus limiting any diversification benefits. In contrast, RCI allows drawdowns to be limited through the focus on respecting the risk budget.

Such risk control does not generate value through risk reduction alone. Pure risk reduction would be possible by simply staying away from any equity allocation. While the focus of RCI is on limiting drawdowns when the risk budget is low, it also allows more risk to be taken on when the risk budget is high, thus providing a source for performance generation. In particular, the pre-commitment to risk management allows one to take on higher exposure to equity ETFs at the initial stage compared to a static allocation strategy. Backtesting shows that, relative to the defensive bond core portfolio, risk-controlled exposure to equity ETFs generates outperformance above 2.5% per year, without increasing maximum drawdown levels.

A main advantage of the dynamic risk control approach is that no forecasts are

required to make allocation decisions. The risk budget alone determines how much weight is given to stocks versus bonds. However, asset managers often spend significant effort and resources on generating forecasts of outperformance or underperformance of stocks versus bonds, and they naturally wish to benefit from such forecasts through their investment strategies. They typically try to exploit forecasts through tactical asset allocation strategies which simply over- or underweight stocks according to the manager's current views. The problem with such strategies is that even good managers make forecasting errors. The errors can be costly if the wrong prediction comes when performance differences between stocks and bonds are pronounced. A manager who is right most of the time can still incur significant drawdowns.

However, forecasts can also be translated into investment strategies differently. RCI can be used to limit the drawdown risk of tactical strategies. Rather than considering the forecast alone when deciding on asset class weights, the current risk budget will also be considered. If the margin for error has declined through past errors, forecasts will be used more prudently, and vice-versa. Compared to standard tactical asset allocation, this approach yields comparable returns while reducing the size of drawdowns significantly. Extensive backtesting shows that risk-controlled use of monthly timing decisions of stocks versus bonds reduces maximum drawdown by 34% compared to a naive tactical strategy using the same forecasts. Obviously, the better the forecasts the lower the effect of risk control, but even for managers who are right 80% of the time, risk control adds considerable value.

Compared to strategies that are based purely on diversification or tactical bets, risk-controlled ETF investing offers attractive risk/return tradeoffs over horizons of a few years and limited maximum drawdown over any monthly period. Rather than just relying on the long horizon effects of diversification or on the average long-term quality of return forecasts to obtain satisfying results in the long run, combining the liquidity of ETFs with dynamic asset allocation also allows short-term risks to be controlled.

#### *Capturing the Market, Value, or Momentum Premium with Downside Risk Control: Dynamic Allocation Strategies with Exchange-Traded Funds*

July 2011

Elie Charbit, Jean-René Giraud, Felix Goltz, Lin Tang

There is extensive evidence that investment strategies based on momentum and value are attractive for portfolio managers who seek higher performances. Momentum and value are among the most robust return drivers in the cross section of expected returns. Dynamic risk budgeting methodologies such as Dynamic Core Satellite strategies (DCS) are used to provide risk-controlled exposure to different asset classes. We examine how to exploit the value and momentum anomalies using a DCS investment model. This paper shows that the DCS approach can boost portfolio returns while keeping downside risk under control. The implementation of the portfolio strategies is enabled by exchange-traded funds which are natural investment vehicles since they offer a broad exposure to the markets and provide the necessary liquidity to the frequent rebalancing of the DCS model.

## Regulation and institutional investment in partnership with AXA Investment Managers

This chair investigates the interaction between regulation and institutional investment management and highlights the challenges of regulatory developments for institutional investment managers.

#### *Impact of Regulations on the ALM of European Pension Funds*

January 2009

Noël Amenc, Lionel Martellini, Samuel Sender

This study analyses the impact of prudential and accounting constraints on the asset-liability management (ALM) of European pension funds in the Netherlands, the UK, Germany, and Switzerland.

The study affirms that the retirement system would be more stable if regulators were more willing to tolerate short-term risk. The challenge for the regulator is to take a long-term approach to regulation because specific attention should be paid to the long-term nature of pension funds. Traditional pension liabilities have low short-term replicability, and risk-free long-term strategies involve short-term risk. As a consequence, and because of their role in providing very long-term benefits, the increasing focus on the short term is worrying for pension funds.

Pension funds should build internal models for their risk management strategies. The idea that risk management is best reflected in an internal model is especially relevant for pension funds; after all, no standard formula can capture the diversity of the pension landscape and the variety of protection mechanisms.

In a context in which accounting standards and prudential regulations are tightening, requiring greater attention to the volatility of the surplus and less tolerance of underfunding, our report calls for an improvement in ALM strategies and the use of state-of-the-art models – such as dynamic liability-driven investments – for the design of these strategies.

#### *The European Pension Fund Industry Again Beseet by Deficits*

April 2009

Samuel Sender

In 2003, the pension fund industry was severely affected by the steep fall in equity prices and the fall in interest rates. This fall and its consequences led to broad regulatory changes and spurred work on asset and liability management theory and techniques. But it seems that these new regulations and techniques have not enabled the pension fund industry to weather the current return of the perfect storm. We go over recent publications and look into the reasons for the fall in funding ratios.

#### *Reactions to an EDHEC Study on the Impact of Regulatory Constraints on the ALM of Pension Funds*

October 2009

Samuel Sender

EDHEC surveyed pension funds, their advisers, their regulators, their fiduciary managers, and their asset managers for their reactions to an

EDHEC study entitled “Impact of regulations on the ALM of European pension funds”. The call for reaction elicited 142 non-blank responses and is the first international survey in which both regulatory constraints and the means of managing them – modern ALM techniques – are assessed jointly. 93.7% of respondents (95.3% of those from pension funds) report that they are somewhat or very familiar with accounting and/or prudential constraints for pension funds; the results of the call for reaction are very much aligned with EDHEC's views that modern ALM techniques are instrumental in managing minimum funding constraints and that short-termism is counterproductive for pension funds. In addition, the respondents believe that risk management is more instrumental in protecting minimum funding ratios than high initial funding ratios; the implications are that regulations should provide incentives to build internal models.

#### *EDHEC Survey of the Asset and Liability Management Practices of European Pension Funds*

June 2010

Samuel Sender

News of huge pension deficits and closures of defined-benefit pension funds would seem to suggest that risk management by pension funds may not be entirely up to scratch. To examine the issue of risk management practices, EDHEC-Risk carried out a survey of pension funds, their advisers, regulators, and fund managers. 129 asset-liability management professionals, representing assets under management of around €3trn, responded to the survey.

Most survey respondents have a restrictive view of the risks they face: prudential risk (the risk of underfunding) is managed by only 40% of respondents, accounting risk (the volatility from the pension fund in the accounts of the sponsor) by 31%, and sponsor risk (the risk of a bankrupt sponsor leaving a pension fund with deficits) by less than 50%.

A primary challenge for a pension fund is to meet its liabilities by hedging the liability risk away, usually with what is known as a liability-hedging portfolio, the portfolio that best replicates liabilities. Pension funds generally hedge their interest rate and inflation risks. Since it is mandatory to index pension payments to inflation, British pension funds are more likely to use inflation-linked bonds (64% of respondents from the UK have more than 20% of their liability-hedging portfolio in inflation-linked securities).

However, the excessive demand for inflation-linked securities may lead to poor returns on inflation-linked bonds, making the liability-hedging portfolio expensive. For that reason, pension funds may seek to replicate liabilities with assets that can provide better returns, such as real assets. On the other hand, our survey suggests that 45% of pension funds do not fully model the liability-hedging portfolio at all. This turns out to be logical in that 46% of respondents use optimisation techniques such as surplus optimisation or economic capital that do not actually require a liability-hedging portfolio.

A second challenge for pension funds is

to achieve positive returns. This can be done through a performance-seeking portfolio which diversifies market risk in an optimal manner by using a mix of asset classes and an appropriate benchmark for each asset class (we find that 81% of pension stakeholders use sub-optimal market indices as benchmarks for their investment funds).

Equities account on average for 32% of the performance-seeking portfolio, a share which is much larger than that of potentially illiquid assets (hedge funds, private equity, and infrastructure), even though pension funds, as long-term investors with no need to worry about short-term liquidity, are in a good position to invest in these assets and take on liquidity risk.

Pension funds should manage their minimum funding requirements by insuring risks away. Risk-controlled strategies, which insure against a fall in funding ratios below the required minimum, make it possible to forgo some of the upside potential of the performance-seeking portfolio in exchange for downside protection. Curiously, 50% of pension funds are fully aware of these strategies, but only 30% use them. For instance, 28% of respondents use these strategies to manage prudential constraints, whereas 56% use economic/regulatory capital, a static risk-budgeting method that requires the value at risk to be less than the surplus.

Economic capital management relies on a risk budget and a surplus but it involves a discretionary investment strategy and possible delays in implementation. Since the use of economic capital means that a liability-hedging portfolio (the risk-free portfolio in an asset-liability management setting) does not need to be set up, pension funds may find themselves unable to switch their investments quickly to this risk-free portfolio. Unlike this discretionary approach, applying risk-controlled strategies to economic capital creates what might be called rule-based economic capital, a strategy that would compel pension funds to manage economic capital with less discretion and greater adherence to predefined rules. After all, very simple rules similar to those of constant proportion portfolio insurance ensure that risks are covered.

Finally, pension funds generally do not assess the adequacy of their asset-liability management strategies or fail to do so with appropriate metrics: 30% of respondents do not assess the design of the performance-seeking portfolio, and more than 50% use relatively crude outperformance measures. These shortcomings may mean that less than optimal decisions are made on an ongoing basis.

### *The Elephant in the Room: Accounting and Sponsor Risks in Corporate Pension Plans*

March 2011  
Samuel Sender

This survey conducted by EDHEC-Risk looks at how pension funds and corporate sponsors manage the main risks they face and how their investment strategy is influenced by institutional constraints.

Naturally, corporate sponsors of pension funds are concerned primarily about the economic risk of facing higher than expected pension costs – 95% of respondents mention this risk – but the accounting risk, ie, the reported cost of pensions in the sponsor's books and the balance sheet volatility it causes, is mentioned by 93% of respondents. Nonetheless, this accounting measure of the risk supported by the sponsor may also be perceived as an opportunity to manage the pension fund's risks better. The

sponsor may wish to give the pension fund managers an incentive to integrate risks better in their investment management strategy, thereby reducing in time the risk represented by support for a defaulting pension fund.

As such, in looking towards the future, respondents fear regulatory changes, because such changes cannot be hedged. In the debate on IAS 19 (employee benefits), transparency is favoured: 49% of respondents (54% in the UK)

### *“Ultimately, it is more the fears relating to the uncertain application of a new regulatory framework than transparency or financial report volatility constraints that are the source of sponsors’ reluctance to continue defined-benefit schemes”*

think that reporting the market value of the pension liability in the balance sheet, even if it leads to increased volatility in the balance sheet, is a good thing, as it provides “better incentives to manage risk” and “adds necessary transparency”. However, faced with this evolution, the main worry of sponsors is those changes that lead to an increase in the cost of providing pensions. The possible use of a risk-free discount rate to discount liabilities would imply an automatic increase in the pension liability and in reported shortfalls. Ultimately, it is more the fears relating to the uncertain application of a new regulatory framework than transparency or financial report volatility constraints that are the source of sponsors’ reluctance to continue defined-benefit schemes.

For pension funds themselves (especially traditional defined-benefit ones), the main risk is sponsor default and reduced or curtailed pensions. Respondents rank sponsor risk as the greatest risk in pension funds (77% mention this risk, usually with the highest intensity). As such,

the risk of sponsor default seems today to be more important than the risk of the sponsor's funds being managed badly and the consequent risk of ultimately not being able to make up the liabilities without calling in more contributions from the sponsor (whose default is feared without being managed).

Indeed, in spite of their fears, 84% of pension funds do not manage sponsor risk. The primary reason in Europe for not managing sponsor risk is the presence of pension fund insurance (46% of respondents). In other reasons, 15% of respondents say that the pension fund sponsor is a government or quasi-government entity, and 4% of respondents have purchased protection from sponsor insolvency. As such, even though pension protection or insurance systems only provide partial guarantees, pension funds do not implement genuine protection against the risk of sponsor default.

Overall, the survey finds that adequate pension plan contracts and governance are needed. Indeed, the design of traditional defined-benefit plans seems to offer sub-optimal governance arrangements, because it is the sponsor, not the pension fund, that bears the financial risk involved in the pension fund's investment policy, while at the same time, the pension fund's primary risk is that of bankruptcy of the sponsor, a risk seldom entirely hedged.

In traditional pension plans, employees make fixed contributions (as a percentage of their salaries) and the sponsor has full responsibility for any shortfall. These plans are more frequent in the UK than in continental Europe. Faced with this difficulty, so-called hybrid pension plans have been developed that involve more risk-sharing by employees and sponsors.

All participants should seriously consider hybrid alternatives to traditional defined-benefit plans and formally assess how different liability structures impact the ability to manage risks in pension plans: research should focus both on optimal contract design for pension plans and on solutions to problems of managing pension risk.

## Asset-liability management and institutional investment management

in partnership with BNP Paribas Investment Partners

This chair examines advanced asset-liability management topics such as dynamic allocation strategies, rational pricing of liability schemes, and formulation of an asset-liability management model integrating the financial circumstances of pension plan sponsors.

### *Measuring the Benefits of Dynamic Asset Allocation Strategies in the Presence of Liability Constraints*

March 2009  
Lionel Martellini, Vincent Milhau

Defined-benefit pension funds are currently facing a challenge and a dilemma. The desire to alleviate the burden of contributions leads them to invest significantly in equity markets and other classes that are poorly correlated with liabilities but offer better long-term performance potential. However, stricter regulations and accounting standards give them significant

incentives to invest most of their portfolios in assets that are highly correlated with liabilities. While there is general agreement that some regulatory constraints are needed, there is a fierce debate about whether it makes sense to impose short-term constraints on long-term investors. A number of experts have found that imposing such short-term funding ratio constraints on long-term investors, ie, requiring a certain level of assets in relation to liabilities in the short run, could be counter-productive.

In fact, there are two main (related) arguments that are put forward by advocates of looser regulations on pension funds. The first argument is related to the cost of short-termism. In the presence of short-term funding ratio constraints, the sponsor company is required to make additional contributions so as to bring the funding ratio back to the minimum required value when needed, even though these additional contributions may eventually prove to be unnecessary ex-post in the event of a ▶

market recovery. The second argument is related to contribution irreversibility. While sponsor companies are required to make additional contributions when needed to bring asset value back to minimum regulatory levels, it is typically not possible for them to obtain refunds in those states of the world where funding ratios are very high.

Overall, our research results suggest that it is not so much the presence of short-term funding ratio constraints per se that is costly for pension funds as their reluctance to implement risk-management strategies that are optimal given such regulatory constraints. In essence, our results show that dynamic risk-management strategies can turn irreversible contributions into reversible contributions and short-term constraints into long-term constraints, hence the severe opportunity cost for pension funds that do not follow them.

The monetary cost of not following the risk-controlled strategy in the presence of regulatory short-termism and contribution irreversibility can in fact be very significant. While the unconstrained strategy (a strategy that has no requirement on the ratio of assets to liabilities) can generate extremely low funding ratios at the horizon, implementing a risk-controlled strategy with a given lower bound on the funding ratio allows one to cut off the left (negative) side of the terminal funding ratio distribution, thereby limiting the possibility of situations of extreme underfunding occurring. As a result, we obtain that the risk-controlled strategy makes it possible for the pension fund to avoid any regulatory-driven additional contributions from the sponsor company at intermediary dates.

Downside risk protection has a cost, however, in terms of performance. Implementing a risk-controlled strategy, which involves a maximum funding ratio level in addition to the minimum funding ratio level, allows one to decrease the cost of downside protection. Hence, by helping the pension fund to avoid ending up with funding ratios higher than values for which there is little marginal utility, the risk-controlled strategy with lower and upper funding ratio limits leads to a very significant monetary utility gain when contributions are irreversible and it is impossible for the sponsor company to extract surpluses beyond the threshold funding level.

Though this analysis comes with a number of caveats, most notably the fact that we do not account for possible default from the sponsor company, our conclusion is that, contrary to commonly held beliefs, the cost of short-term funding constraints is relatively low for pension funds. What does turn out to be costly, however, especially in the presence of contribution irreversibility, is the lack of dynamic risk management.

### *Capital Structure Choices, Pension Fund Allocation Decisions, and the Rational Pricing of Liability Streams*

November 2010  
Lionel Martellini, Vincent Milhau

Correctly assessing the value of a pension plan in deficit with a weak sponsor company is a real challenge given that no comprehensive model is currently available for the joint quantitative analysis of capital structure choices, pension fund allocation decisions and their impact on rational pricing of liability streams. In fact, international accounting standards SFAS 87.44 and IAS19.78 recommend that pension obligations be valued on the basis of a discount rate equal to the market yield on AA corporate

bonds, the same rate for all firms. While the use of a market rate is arguably preferable to using a constant rate (whether it includes a credit spread component or not) independently of market conditions, the use of the same market rate to discount all pension liabilities regardless of the sponsor credit rating, pension funding situations and asset allocation policy can hardly be justified.

In this research we have attempted to analyse the valuation of pension liabilities regarded as defaultable claims issued by the sponsor company to workers and pensioners in the context of an integrated asset-liability management model.

Under standard assumptions, one can use option pricing theory to find the rational value of the claims held by all stakeholders, including notably shareholders of the sponsor company, bondholders and beneficiaries of the pension fund (workers and pensioners). This allows us to analyse the impact on the value of these claims of funding and leverage decisions at the sponsor company level, as well as asset allocation decisions at the pension fund level. The main ingredients of the model are the size of the pension fund relative to the assets of the sponsor company, the relative size of the pension assets with respect to the pension liabilities (a.k.a. the funding ratio), and the relative size of the outstanding debt of the sponsor company relative to the assets of the sponsor company (a.k.a. the leverage ratio). Other important parameters are those defining the allocation strategy of the pension fund, as well as the correlation between the return on pension assets and the return on the sponsor company assets.

In the realistic situation where the correlation between the value of the firm process and the stock index return process is positive, we find that the fair value of promised payments to bondholders and pensioners is a decreasing function of the allocation to risky assets by the pension fund. This is a clear case of asset substitution, since a higher allocation to risky assets leads to an increase in the total riskiness of the total assets held by the firm (financial assets held off the balance sheet through the

pension funds and real assets directly held on the balance sheet).

Overall, there is in general clear evidence of conflicts of interests between the various stakeholders, and in particular between shareholders and pensioners. Assuming they do not have access to any surplus of the pension fund, risk-taking is detrimental from the pensioners' perspective, because it involves increasing the likelihood of partial recovery of pension claims, while risk-taking allows shareholders to reduce the burden on contributions needed to meet expected pension payments due to exposure to the upside potential of the performance-seeking assets.

These conflicts of interests could be mitigated by granting pensioners some partial access to the surplus (*cf.* conditional indexation rules in the Netherlands), thereby allowing plan beneficiaries to benefit from the improvement in expected performance related to more aggressive investment strategies. More generally, our results have implications in terms of the optimal design of pension plans, since they advocate the emergence of more subtle surplus sharing rules, which could include for example the use of hybrid retirement plans, and/or the use of contribution holidays for defined benefit plans, which would allow equity holders to reduce the burden of contributions while protecting the interests of pensioners. We also find that an effective way to align the incentives of shareholders and pensioners without any complex adjustment to the pension plan structure consists of enlarging the set of admissible investment strategies so as to include dynamic risk-controlled strategies such as constant-proportion portfolio insurance (CPPI) strategies, or their extension in a pension management context sometimes referred to as contingent immunisation strategies or dynamic liability-driven investment (LDI) strategies. In fact, implementing risk-controlled strategies aiming at insuring a minimum funding ratio level above 100% allows shareholders to get some (limited) access to the upside performance of risky assets, while ensuring that pensioners will not be hurt by the induced increase in risk.

## Risk and regulation in the European fund management industry

### in partnership with CACEIS

This chair deals with the issue of operational risk and performance in a changing regulatory framework for the European fund management industry. It analyses the major risks those in the industry face as a result of regulation and of their practices, assesses their importance and impact in terms of solvency and business models, and proposes methods to mitigate them.

#### *Are Hedge-Fund UCITS the Cure-All?*

March 2010  
Noël Amenc, Samuel Sender

Regulations will soon be leading to the structuring of many hedge fund strategies as European coordinated funds or UCITS. Changes in UCITS regulation have made such structuring of hedge fund strategies as UCITS possible. A muddled

political agenda and an unfinished directive on alternative investment fund managers (AIFMs) will encourage hedge funds to take advantage of this leeway.

In this study, EDHEC-Risk canvassed managers of UCITS and alternative assets, their service providers, external observers such as regulators and trade bodies, as well as buyers of funds, for their views on the structuring of hedge fund strategies as UCITS. Four hundred and twenty-eight professionals, representing cumulative assets under management of approximately €13trn, responded to the survey.

The managers of alternative funds report that the uncertainties in the AIFM directive make any investment in compliance risky and are an argument for structuring their strategies as UCITS. An offshore hedge fund that relocates to Europe to benefit from the

passport to be provided for by the AIFM directive will find itself in a bind if the directive is never passed. Professional investors report that they will push for UCITS structuring because they are currently hamstrung by quantitative restrictions that prevent them from investing freely in alternative funds but allow them to do so in UCITS. For instance, 50% of insurance companies surveyed “very much” intend to ask promoters/managers to restructure hedge fund strategies as UCITS (25% say that they will not do so).

UCITS are thought of as lower risk than hedge funds, but more than 80% of live hedge funds in each strategy already meet the value-at-risk (VaR) requirement for UCITS. Although the recent crisis has cast doubt on the reliability of VaR numbers, they were once a useful selection criterion: in crises before 2008, high-VaR hedge funds were more likely to implode. In 2008, the crisis hit high- and low-VaR hedge funds indiscriminately; supposedly low-risk hedge funds based with leveraged positions in highly correlated securities also went belly up. Greek and German bond yields, once highly correlated, much less so now, illustrate changing correlations.

Many hedge fund strategies must also be profoundly altered to be structured as UCITS. They will need to shed most illiquid securities (such as distressed or long-term assets) as well as any non-financial assets; they will need to diversify their assets and limit counterparty risk arising from derivatives instruments. In addition, because UCITS funds cannot borrow more than 10% of the value of their assets and are generally forbidden from engaging in naked short sales, they will use derivatives instruments – potentially more costly because they involve a margin on top of the cost of borrowing securities – to short securities.

Respondents to the survey fear that turn-

*“For the liability for non-financial risks to be shared effectively, asset management companies, depositaries and other actors in the investment industry’s value chain must bear sufficient capital, a problem not yet tackled by fund regulations”*

ing hedge fund strategies into UCITS will lower returns. For instance, academic work shows that the illiquidity premium can be higher than 10% for some securities, but this premium cannot be fully accessed by UCITS. Funds will also be required to take on a depositary whose due-diligence requirements will increase the cost of services provided to UCITS. In addition to the normal cost of using derivatives, the more hedge funds structured as UCITS there are, the more expensive shorting may become. Currently, borrowing securities is easy because hedge funds, unlike UCITS, allow prime brokers to reuse securities as part of their collateral arrangements.

Last, heavily regulated UCITS are attractive, as they may enable professional investors to reduce the risk of operational losses caused by the likes of Madoff or Lehman. Operational risks from hedge fund strategies, however, are transferred either to depositaries or to asset managers. Depositaries have unclear

obligations and liabilities. They are subject to due diligence obligations and must validate valuation processes, both made more complex by the nature of alternative strategies.

This transfer of risk may, first, give investors, who may no longer do a profound analysis of the risks of investing in hedge funds, a false sense of security; adverse selection and moral hazard are thus more likely. Second, this foisting off of risk and responsibility will come with a cost to the asset management industry. EDHEC-Risk argues that clear contracts can help define responsibilities for operational risks and assign these responsibilities properly. But for the liability for non-financial risks to be shared effectively, asset management companies, depositaries and other actors in the investment industry’s value chain must bear sufficient capital, a problem not yet tackled by fund regulations.

### *The European Fund Management Industry Needs a Better Grasp of Non-financial Risks*

December 2010

Noël Amenc, Samuel Sender

Non-financial risks have been increasing since UCITS investment funds were first set up, but European authorities and investment professionals failed to study the impact of these risks when they facilitated the evolution of the funds.

In this research, we looked at how non-financial risks and failures have impacted the regulatory agenda in Europe and traced the management of liquidity, counterparty, compliance, misinformation and other financial risks in the fund industry.

The increase of non-financial risks in investment funds is the result above all of the growing sophistication of the transactions and financial instruments of investment funds, of the pursuit of non-traditional risk premia, as well as of such regulatory actions as the passage of the eligible assets directive (EAD) and the improved possibilities for leverage in sophisticated UCITS. In addition, inappropriate regulatory certification contributed to the sale of bad products, to misrepresentation of these products and to increasing risk. Country competition in the implementation of EU regulations and possibly in supervisory practices also had an impact.

The vagueness of the EU definition of depositary liabilities and the explicit reliance of UCITS on country regulations mean that in the EU country regulations in the fund industry can be understood by legal origins more than by EU law. As such, French financial civil law takes an administrative approach to depositary protection, an approach in which the depositary is an auxiliary to the regulator, whereas common-law culture relies on private contracts. The civil-law approach has influenced European financial regulations such as UCITS, in which depositaries play a central role in the protection of unit-holders. In the current reworking of depositary obligations, the French influence on EU law threatens depositaries with exorbitant liabilities.

Now that the differences in the depositary liabilities are better understood, the costs of depositary services in different European countries could soon diverge and regulatory arbitrage could gain importance, as investment firms could choose their home countries for no other reason than to reduce their costs, perhaps to the detriment of investor protection. Consequently, homogenisation of country regulations and of supervisory cultures is

necessary to prevent regulatory arbitrage.

The European Securities and Markets Authority (ESMA) will contribute to harmonisation, but the European regulations themselves (level 1 and level 2) should be reworked to ensure “better regulation.” If the member states of the European Union are unable to agree on reform, UCITS not exposed to non-financial risks should be distinguished from more modern UCITS that have potentially greater exposure to these risks. In other words, the failure to improve the regulatory

*“Now that the differences in the depositary liabilities are better understood, the costs of depositary services in different European countries could soon diverge and regulatory arbitrage could gain importance, as investment firms could choose their home countries for no other reason than to reduce their costs, perhaps to the detriment of investor protection”*

framework should imply a subset of “secure UCITS” in which depositaries would be unconditionally responsible for the restitution of assets. Assets would mainly consist of listed European securities admitted to central securities depositaries.

To shield investors from non-financial risks, all parties can be required to hold regulatory capital against these risks; insuring non-financial risks can also be considered. The pricing of insurance and of risk-sensitive capital requirements must be based on a measure or “rating” of the non-financial risks. These ratings would shed more light on non-financial risks arising from sub-custody risk, from market infrastructures, and from investments in other funds or in derivatives on other assets, risks that are not adequately reported today.

Last, governance can be improved by spelling out the responsibilities of the board and facilitating the intervention of unit-holders with class actions. EU laws impose no fiduciary duties on boards of directors, and the definition of their role is again left at the discretion of country regulators. The fiduciary duty of the board and of the chief compliance officer could be reinforced and include formal responsibility towards end-investors to ensure high standards of governance and best practices in the management of non-financial risks (as for financial risks).

Class actions are likewise a means of imposing responsibilities, as investors can, as consumers, pool their resources to bring claims, regardless of the legal structure of the investment fund (investors are currently not greatly involved in daily monitoring of fund management and the unit-holder base is generally too highly fragmented to bring a claim, after the fact, against management).

The necessary improvements to risk management practices can then be driven by either regulatory bodies or industry groups.

# ALM and sovereign wealth fund management

## in partnership with Deutsche Bank

The chair involves formalising a dynamic asset allocation model that incorporates the most salient factors in sovereign wealth fund management, analysing the risk factors impacting the inflows and outflows of cash of sovereign funds, and exploring the design of solutions for optimal financial management of sovereign wealth funds.

### *Asset-Liability Management Decisions for Sovereign Wealth Funds*

October 2010

Lionel Martellini, Vincent Milhau

It is now widely recognised that sovereign funds represent a dominant force on international financial markets. Some estimates say they manage assets worth \$4trn – or slightly more than twice the estimated size of the hedge fund industry. Post-crisis estimates suggest the total will rise to \$7trn by the end of the decade.

This rapid growth of sovereign wealth funds and its implications pose a series of challenges for the international financial markets, and also for sovereign states. In particular, an outstanding challenge is to improve our understanding of optimal investment policy and risk management practices for sovereign wealth funds. Our research suggests that it is desirable to analyse the optimal investment policy of a sovereign wealth fund in an asset-liability management framework.

Broadly speaking there are three main kinds of sovereign wealth funds. The first group contains the natural resources funds, with an estimated 70% of total sovereign wealth fund asset holdings in the hands of resource-rich countries, such as the United Arab Emirates and Norway. The focus of these funds is maintaining economic stability against commodity price fluctuations and ensure that future generations will not be disadvantaged by the exploitation of natural resources by the current generation.

The second group relates to the foreign reserve funds, which notably includes a number of Asian countries such as China, South Korea and Singapore. The focus of these funds should be to hedge away the impact of risk factors behind these commercial surpluses, and also to generate higher returns than local sterilisation bond costs related to the issuance of sovereign debt aimed at reducing the monetary base expansion related to capital inflows.

The last group of funds, which accounts for a more marginal fraction of total sovereign wealth, contains the pension reserve funds for countries such as New Zealand, France or Ireland, which have set aside a portion of their pension funds and manage them separately to prepare for an aging society.

Intuition suggests that allocation policies should differ for different kinds of sovereign wealth funds. Recent advances in academic research have in fact paved the way for a better understanding of optimal asset allocation decisions for such long-term investors, which should depend on the risk factors impacting

the revenues to the sovereign fund, as well as the expected use of funds by the sovereign wealth funds.

For example, in the case of the Norwegian sovereign fund, which is a natural resource fund that has been set up to help meet future pension payments, the optimal allocation strategy should involve a short position in oil/gas commodity futures, or a long position in stocks of companies such as airlines that benefit from decreases in oil prices, so as to diversify away some of the risk exposure in the country's revenues. Additionally, it should include a long position in inflation-linked securities that will help the sovereign state to hedge away some of the inflation uncertainty in future pension payments.

This asset-liability management approach is the extension to sovereign wealth funds of the liability-driven investment (LDI) paradigm recently developed in the pension fund industry.

In general, uncertainty in the endowment stream is not entirely spanned by existing securities. For example, in the case of a sovereign wealth funds managing commercial surpluses, the endowment stream is related to worldwide

*“In the case of a sovereign wealth funds managing commercial surpluses, the endowment stream is related to worldwide economic growth, the fluctuations of which are not replicable by a traded asset. This induces a specific form of market incompleteness, which makes the dynamic asset allocation problem more complex”*

economic growth, the fluctuations of which are not replicable by a traded asset. This induces a specific form of market incompleteness, which makes the dynamic asset allocation problem more complex. It also raises the challenge of designing investable proxies allowing for the hedging of unexpected changes in risk factors that would be likely to impact the revenues flowing into the fund. For example, in the case of a foreign reserve sovereign wealth fund, where revenues are related to trade balance surpluses in the sovereign country (eg, China or Singapore), the risk factors impacting the contributions to the sovereign wealth funds would be related to world economic growth, inflation differentials and changes in currency rates, among others.

Overall, it appears that the development of an asset-liability management analysis of sovereign wealth funds has potentially important implications for investment banks and asset managers, which are expected to provide the investable proxies needed for the implementation of genuinely dedicated ALM and risk management solutions for sovereign wealth funds.

### *An Integrated Approach to Sovereign Wealth Risk Management*

June 2011

Bernd Scherer

Asset allocation for sovereign wealth funds (SWFs) focuses predominantly on optimal portfolio choice with shadow assets (ie, non-tradable, non-financial assets that are exogenous to the asset allocation decision, typically resource-based wealth such as underground oil in the case below). The generic advice from these models is to avoid assets with strong positive oil price correlation and seek exposure instead to recession-hedging assets such as government bonds. While this is a pure risk management argument, sovereign wealth funds taking this advice would have avoided the large losses they incurred in 2008.

Little research has been done into SWF investments related to foreign exchange (FX) reserves. Resource-based SWF assets are financed through foreign currency earnings on commodity exports. These assets represent sovereign wealth that can be used to manage macroeconomic risks or intergenerational distribution. However, many Asian SWFs are instead financed from FX reserves after periods of significant reserve accumulation. Reserve accumulation in managed exchange rate regimes is usually accompanied by sterilisation (ie, the domestic currency created to purchase foreign assets is sterilised through local currency debt issuance). Since we can think of these funds as being financed through borrowed funds (local currency debt), it is not always clear they represent net sovereign wealth. In fact, both assets and liabilities (bonds issued for sterilisation purposes) grow. As a consequence, increased economic leverage should lead to more conservative asset allocation policies.

We need to move from an SWF-centric framework to an asset-liability approach integrating sovereign liabilities (monetary base, local and foreign debt). Instead of focusing on SWF assets in isolation, the SWF is now integrated into total sovereign assets and liabilities. This integration is analogous to modern pension fund investing in which a pension fund is made an integral part of the corporate balance sheet and capital structure (enterprise-wide risk management) rather than managed as standalone entity. So far, SWF asset allocation has not taken liabilities into account. In fact, there is a widespread belief in the SWF literature that SWFs lack dedicated liabilities. Although this is true from the bottom-up view of an SWF portfolio manager, it is not true from the top-down view of a sovereign risk manager. The approach taken in our research, supported by Deutsche Bank, is to look at sovereign assets and liabilities in the same way as we would look at corporate assets and liabilities. In our view the sovereign balance sheet contains sovereign assets, ie, FX reserves, the SWF, as well as the present value of the primary budget (this can be thought of as the present value of future taxes minus future expenditures and reflects the present value of economic surpluses from running a country).

The right-hand side of the sovereign balance sheet describes how the economy is financed. We view the monetary base and local debt as equivalent to shares such that their local currency value multiplied by the current exchange rate resembles sovereign market capitalisation. Foreign currency debt is treated as a senior claim. Sovereign default occurs if sovereign assets fall below foreign debt (in foreign currency). As default is costly (ie, it comes with frictional bankruptcy costs in the form of social

unrest, capital flight and so on) we treat foreign currency debt as a hard threshold. An economy with zero foreign debt exhibits leverage of 0%. Suppose our sovereign state desires to maximise the long-term growth of net sovereign wealth (sovereign assets minus senior sovereign liabilities). Economic leverage can be thought of as increasing the volatility of net sovereign wealth. This leads to greatly reduced speculative demand in risky assets. Equally a SWF should find it desirable to invest in assets that have low correlation with changes in the sovereign state's primary budget. Assets that offer insurance

in bad states of the world for the particular sovereign sponsor (tail hedge) are even more desirable. Economies differ, and so should SWF asset allocation.

A few examples might illustrate this approach. The main risk factor for the primary budget in China, for example, is a slowdown in US consumer demand. So a Chinese SWF should not hold US retail stocks. In fact, a Chinese SWF might want to sell short Wal-Mart stocks (the biggest US retail stock highly dependent on Chinese exports and the main distribution channel for Chinese goods) and might want

to be long commodities to hedge the negative impact of rising commodity prices on growth in China. We can contrast this with Russia, where the Russian budget depends heavily on oil price growth and economic balance sheet leverage. This situation calls for more modest aggressiveness with a stronger focus on bonds. Finally, the Gulf Cooperation Council (GCC) countries share the dependence of Russia on oil revenues, but with much less economic balance sheet leverage (GCC countries have little outstanding foreign debt). They can thus allocate more aggressively than Russia.

## Structured products and derivative instruments

sponsored by the French Banking Federation (FBF)

This chair investigates the optimal design of structured products in an asset-liability management context and studies structured products and derivatives on relatively illiquid underlying instruments.

### *The Benefits of Structured Products in Asset-Liability Management*

December 2008  
Lionel Martellini, Vincent Milhau

This paper introduces a continuous-time dynamic asset allocation model for an investor facing liability constraints in the presence of inflation and interest rate risks. When funding ratio constraints are explicitly accounted for, the optimal policies, for which we obtain analytical expressions, are shown to extend standard option-based portfolio insurance (OBPI) strategies to a relative risk context, with the liability-hedging portfolio replacing the risk-free asset. We also show that the introduction of maximum funding ratio targets would allow pension funds to decrease the cost of downside liability risk protection while giving up part of the upside potential beyond levels where marginal utility of wealth (relative to liabilities) is low or almost zero.

### *Option Pricing and Hedging in the Presence of Cross-Hedge Risk*

June 2010  
Lionel Martellini, Vincent Milhau

This paper addresses the question of option pricing and hedging when the underlying asset is not available for dynamic trading, and some other asset is used as a substitute. We first provide an overview of the various hedging methodologies that can be used in this incomplete market setting, distinguishing between self-financing and non-self-financing strategies. Focusing on a local risk-minimisation criterion, we present an analytical expression for the optimal hedging strategy and the corresponding option price. We also provide a quantitative measure of the residual risk over the life of the option. We find that the use of the optimal strategy induces a much smaller replication error compared to the replication error induced by a naive Black-Scholes strategy, especially for low levels of the correlation between the underlying

asset and the substitute. In the absence of transaction costs, we also find that cross hedge risk is more substantial than the risk induced by discrete trading for reasonable parameter values. While this result implies that trading in the substitute can only be rationalised for exceedingly high correlations, the presence of (higher levels of) transaction costs is likely, however, to make trading in the actual underlying asset a prohibitively costly alternative.

### *Option Pricing and Hedging in the Presence of Basis Risk*

February 2011  
Lionel Martellini, Vincent Milhau

This paper addresses the problem of option hedging and pricing when a futures contract, written either on the underlying asset or on some imperfectly correlated substitute for the underlying asset, is used in the dynamic replication of the option payoff. In the presence of unspanned basis risk modelled as a Brownian bridge process, which explicitly accounts for the convergence of the basis to zero as the futures contract approaches maturity, we are able to obtain an analytical expression for the optimal hedging strategy and corresponding option price. Empirical analysis suggests that the hedging demand against basis risk is an important ingre-

dent of the hedging strategy. For reasonable parameter values, we also find the replication error implied by the optimal strategy to be substantially lower than that implied by heuristic strategies routinely used in practice.

### *Idiosyncratic Risk and the Cross-Section of Stock Returns*

February 2011  
Rene Garcia, Daniel Mantilla-Garcia, Lionel Martellini

Idiosyncratic volatility has received considerable attention in the recent financial literature. Whether average idiosyncratic volatility has recently risen, whether it is a good predictor for aggregate market returns and whether it has a positive relationship with expected returns in the cross-section are still matters of active debate. We revisit these questions from a novel perspective, by taking the cross-sectional variance of stock returns as a measure of average idiosyncratic variance. Two key advantages of this measure are its model-free nature and its observability at any frequency, which allows us to present new results on the properties of daily idiosyncratic volatility series. Through central limit arguments, we formally show that the cross-sectional dispersion of stock returns can be regarded as a consistent and asymptotically efficient estimator for idiosyncratic volatility. We empirically confirm that the cross-sectional measure provides a very good proxy for average idiosyncratic risk as implied by standard asset pricing models and that it predicts well aggregate returns, especially at the daily frequency. The predictability power of idiosyncratic risk is further increased when adding a measure of cross-sectional skewness to the cross-sectional variance factor. We finally provide evidence that idiosyncratic risk is a positively rewarded risk factor.

## Advanced modelling for alternative investments

in partnership with Newedge Prime Brokerage

The purpose of the chair is to expand the frontiers in alternative investment modelling techniques by enhancing the understanding of the dynamic and non-linear relationship between alternative investment returns and the returns on underlying fundamental systematic factors, and analysing the implications for managing portfolios that include alternative investments.

### *EDHEC-Risk Hedge Fund Reporting Survey*

November 2008  
Felix Goltz, David Schröder

A revisited version of this research was published in the Spring 2010 issue of the *Journal of Alternative Investments*.

The objective of this survey was to shed light on current industry practices in order to establish ►

◀ an industry benchmark for hedge fund reporting in Europe. The survey enabled us to compare industry practices, guidelines issued by industry bodies, and academic research into hedge fund performance and risk disclosure.

The survey is divided into two parts. The first part outlines the issues with hedge fund reporting and gives a brief review of the state of the art in performance and risk analysis for hedge fund investments. The second part presents the survey's findings on industry practices and on the preferences expressed by investors and managers.

Overall, the results suggest that investors' requirements for hedge fund disclosure diverge considerably both from hedge fund managers' perception of what is relevant and from guidelines and "best practices" published by industry bodies. In addition, today's reporting still relies heavily on risk and performance measures that the academic literature has found unsuitable for hedge fund portfolios.

### *Passive Hedge Fund Replication – Beyond the Linear Case,*

September 2009

Noël Amenc, Lionel Martellini, Jean-Christophe Meyfredi, Volker Ziemann

A revisited version of this paper was published in the March 2010 issue of *European Financial Management*.

In this paper we assess the out-of-sample performance of various non-linear and conditional hedge fund replication models. We find that going beyond the linear case does not necessarily enhance the replication power. On the other hand, we find that selecting factors on the basis of an economic analysis can lead to a substantial improvement in out-of-sample replication quality, whatever the underlying form of the factor model. Overall, we confirm the findings in Hasanhodzic and Lo (2007) – the performance of the replicating strategies is systematically inferior to that of the actual hedge funds.

### *Improved Estimates of Higher-Order Comoments and Implications for Portfolio Selection*

February 2010

Lionel Martellini, Volker Ziemann

A revisited version of this paper was published in the April 2010 issue of the *Review of Financial Studies*.

Portfolio selection techniques are routinely blamed for failing investors at the very times when diversification benefits are most needed. In other words, diversification seems to work only when investors do not need diversified portfolios, that is, when the core components of investors' portfolios perform relatively well.

It is well documented that in extreme market conditions, correlations between most asset classes converge very fast towards 100%, regardless of what their historical average value might have been. For example, investing in emerging markets might seem attractive in terms of diversification benefits when assessing the situation based on long historical track records, which typically show relatively low correlation between stock markets in developed and less developed economies. On the other hand, when the US equity markets go into severe decline, the performance in most emerging markets is also typically very weak. 2008 proved yet another painful illustration of the fact that there are few places to hide when US equity markets tumble.

In this context, some have wondered whether the failure of standard portfolio

## Advanced investment solutions for liability hedging for inflation risk in partnership with Ontario Teachers' Pension Plan

This chair analyses the design of novel forms of inflation-hedging portfolios that do not solely rely on inflation-linked securities but instead involve substantial investment in traditional asset classes. Overall these novel forms of inflation hedging solutions should be engineered to generate higher expected performance for a given inflation hedging level, which in turn will allow for a decrease in the cost of inflation hedging.

diversification techniques could be explained by their inability to account for extreme market moves. It is clear that simple portfolio selection techniques based on expected returns and the variability of returns are inappropriate when asset returns are not normally distributed (ie, the returns deviate from the classic bell curve of distribution around the mean). As a result, numerous asset managers, both in traditional and alternative investment, have suggested that the measure of the variability of returns, volatility, be replaced by other risk measures such as value-at-risk or conditional value-at-risk, for example, which put greater emphasis on the presence of extreme downside risk in asset returns. A recurring criticism of volatility is

*“Numerous asset managers, both in traditional and alternative investment, have suggested that the measure of the variability of returns, volatility, be replaced by other risk measures such as value-at-risk or conditional value-at-risk, for example, which put greater emphasis on the presence of extreme downside risk in asset returns*

that it measures both expected gains and losses, while investors are generally only interested in guarding against losses.

While such attempts at incorporating extreme risk measures into portfolio construction techniques, with the prospect of enhancing diversification benefits in difficult market conditions, seem entirely legitimate from a conceptual standpoint, they do however pose serious implementation challenges. We have analysed whether portfolio selection techniques with a focus on extreme risks are truly superior to traditional return and risk analysis in situations when risk management matters most.

One key problem with explicitly introducing a focus on extreme risk in portfolio diversification techniques is that such techniques require estimates for many more parameters. For example, optimising a portfolio which holds 20 assets would require the estimation of over 10,000 parameters! Estimating so many parameters based on limited samples will inevitably lead

to substantial increases in estimation error for these parameters, which in turn will adversely impact the performance of the portfolio construction technique.

Given the dramatic increase in the number of dimensions involved, one may wonder whether portfolio selection techniques that rely on extreme risk measures can be implemented efficiently in realistic situations. Does a portfolio selection technique which assumes that asset returns are not normally distributed and incorporates extreme risk measures always lead to a better portfolio compared to using a simple approximation of expected returns and variability through mean-variance analysis?

Our research confirms that if one uses naïve sample estimates, mean-variance analysis is actually better than portfolio selection taking extreme risks into account, even in situations where deviations from normality are severe. Hence, managers trying to incorporate extreme risk measures in diversification techniques are likely to fall short of their overly ambitious goal unless they make a specific attempt to address the increased complexity of portfolio selection techniques that rely on extreme risk measures. This result confirms that one should prefer mean-variance analysis if one is not prepared to use improved risk parameter estimation techniques, which are designed to help reduce the number of parameters to estimate by imposing some structure on the estimation problem.

In trying to minimise extreme risk and make their risk evaluation more sophisticated, many asset managers increase the number of risk parameters to be estimated, which in turn leads to less robust and less relevant results than if they had stuck with a simple measure of portfolio volatility. Good intentions are only rewarded if they are backed up by a serious effort at meeting the challenges related to the increased complexity implied by the more ambitious expectations.

### *Optimal Hedge Fund Allocation with Improved Estimates for Coskewness and Cokurtosis Parameters*

September 2010

Asmerilda Hitaj, Lionel Martellini, Giovanni Zambruno

Since hedge fund returns are not normally distributed, mean-variance optimisation techniques, which would lead to substantial welfare losses from the investor's perspective, need to be replaced by optimisation procedures incorporating higher-order moments and comoments. In this context, optimal portfolio decisions involving hedge fund style allocation require not only estimates for covariance parameters but also estimates for coskewness and cokurtosis parameters.

This is a formidable challenge that severely exacerbates the dimensionality problem already present with mean-variance analysis. This paper presents an application of the improved estimators for higher-order co-moment parameters, introduced by Martellini and Ziemann (2010), in the context of hedge fund portfolio optimisation. We find that the use of these enhanced estimates generates a significant improvement for investors in hedge funds. We also find that it is only when improved estimators are used that portfolio selection with higher-order moments consistently dominates mean-variance analysis from an out-of-sample perspective. Our results have important potential implications for hedge fund investors and hedge fund of funds managers who routinely use portfolio optimisation procedures incorporating higher moments.

# The case for inflation-linked corporate bonds: issuers' and investors' perspectives

in partnership with Rothschild & Cie

The purpose of this research chair is to support research undertaken at EDHEC-Risk on the benefits of inflation-linked bonds from the issuers' perspective as well as from the investors' perspective. The research chair also focuses on comparing and contrasting issuers' and investors' perceptions of inflation-linked bonds.

## *Optimal Design of Corporate Market Debt Programmes in the Presence of Interest-Rate and Inflation Risks*

March 2011  
Lionel Martellini, Vincent Milhau

Inflation-linked securities were first introduced by sovereign states in order to respond to an increasing need for inflation hedging. While most inflation-linked debt is still issued by sovereign states, there has been recent interest from state-owned agencies, municipalities and also corporations, in particular utility or financial-services companies. Intuitively, if a firm's revenues tend to grow with inflation, then having some inflation-linked issuance can be a natural hedge.

In this context, it is perhaps surprising that some large corporations still implement debt structure solutions involving no inflation-linked bonds. This situation may in part be explained by a common belief that debt management decisions should be primarily governed by the desire to reduce the cost of debt financing.

This reduction in cost is based more often than not on an anticipation of future interest rates. The standard argument suggests that a corporation should seek to issue fixed-rate bonds if it anticipates an increase in interest rates. Conversely, the corporation should seek to issue floating-rate bonds if it anticipates a decrease in interest rates. However, taking bets on interest rates can turn out to be quite risky, notably when uncertainty on rates increases or when it is difficult to find fixed-rate funding whose duration matches the investment requirements.

Rather than solely focusing on the cost of the debt, which ultimately results from financial bets which are not part of the company's core business, it seems that the real question for financial managers is to limit the risk of the funding. It could for example involve avoiding an unbearable cost for a property firm during the necessary refinancing of investments and working capital after interest rates rise and cause a contraction in real estate activity.

In this paper, we propose a formal analysis of a corporation's debt management decisions. We take it that the corporation is subject to default risk and can employ various debt instruments, including fixed-rate debt, floating-rate debt, and inflation-linked debt. We argue that the main motive behind debt management is not to reduce the cost of debt financing, but instead to hedge interest rate and inflation risk exposures. This approach, which is based on matching the company's financing with the exposure of its activities to interest rate and inflation risk, constitutes a transposition of the well-known technique in institutional financial management called asset-liability management.

By matching the interest rate and inflation exposure of the liabilities to all of the company's assets, the chief financial officer can contribute to reducing the variability of the firm's cash flows net of interest payments. This has a direct positive consequence in terms of decreasing the firm's beta (the stock's volatility in relation to the market), decreasing the probability of default, and consequently decreasing the cost of equity and increasing equity value. It is in this context that we have studied the benefits of companies issuing inflation-linked debt. Our conclusions are clear. The vast majority of firms would be well advised to issue inflation-linked debt because their future income (which corresponds to the present value of their assets) is rarely completely decorelated from inflation.

Naturally, as one would expect, we find that the optimal share of inflation-linked bonds increases with the correlation between changes in inflation rates and changes in the revenues of the firm. In an empirical application, we have found the increase in shareholder wealth associated with a more optimal debt structure to be substantial. These benefits would further increase in the event of a rise in inflation uncertainty, or a deterioration in market conditions that reduces the distance to default.

Overall, our unambiguous conclusion is that most corporations should issue some inflation-linked bonds. In this context, and given the natural appetite for inflation-linked bonds from both institutional investors (pension funds and sovereign funds in particular) and private/retail investors interested in retirement solutions, it seems that the key conditions are met for the successful launch of an inflation-linked corporate debt market, with a concern regarding the need to generate sufficient market depth and liquidity that can probably be best alleviated through private placement deals in the early stages of market development.

# Solvency II benchmarks

in partnership with  
Russell Investments

Solvency II is the risk-based regulation for European insurance companies. The Solvency II framework is severe on investment in equities – the consumption of capital makes the investment in equities very costly. The fall in global equity has been set to 30% for the global index and to 40% for other equities such as alternative assets. This is referred to as the standard formula. Solvency II, however, allows or sometimes favours departures from the standard formula.

The standard formula can be adapted to use undertaking-specific parameters, mainly for company-specific liabilities and possibly for some alternative assets. Then, the standard formula can be supplemented with partial internal models, where the aim is to have better modelling and better risk management practices within one risk-type.

EDHEC-Risk Institute is constructing benchmarks that are representative of a dynamic allocation strategy between bonds and equities providing a confidence level above 99.5% and maximal consumption of capital (non-aggregated SCR consumption). These benchmarks are based on dynamic core-satellite techniques. This kind of approach allows investors to respect a maximum drawdown or maximum loss limit for specific horizons.

The purpose of the benchmarks is to enable all small- or medium-sized European insurance companies which do not have a full internal risk mitigation model to be able to avail of an objective academic reference in order to manage the risk of their equity investments. This approach will facilitate dialogue with regulators and auditors to validate risk management practices that allow for divergence from the standard formula in the area of the cost of capital of equity investments.

# Dynamic allocation models and new forms of target funds for private and institutional clients

in partnership with UFG-LFP

This chair examines the limitations of the traditional techniques supporting target-date funds and looks at the advantages of an asset-liability management approach sensitive to the period and to the economic cycle for target-date funds, in particular for pensions.

## *From Deterministic to Stochastic Life-Cycle Investing: Implications for the Design of Improved Forms of Target Date Funds*

September 2010  
Lionel Martellini, Vincent Milhau

Stricter accounting rules and an increased regulatory focus on risk management have led corporations to transfer some pension-related ▶

risks to individuals. As a consequence, the retirement system in most developed countries has experienced a substantial transformation in recent years, with a shift from defined benefit (DB) plans to defined contribution (DC) plans. As a result, employees must increasingly rely on their own savings and investment decisions to fund their retirement. This is a serious concern, not only because of the consequential transfer of risk, but also because individual investors typically lack the expertise needed to implement educated investment decisions. In response to this concern, the asset management industry has started to look into packaged investment mutual fund products providing investors with dedicated solutions for their long-term investment needs.

One key innovation in this area is the development of “life-cycle” or “target date” funds (TDF), which propose changing the stock exposure of the fund as a function of the time remaining until the target maturity date. Hence, the target mix evolves in time until a date called the target date or target maturity date of the fund, with a predetermined decrease in equity allocations.

Embedding the life-cycle allocation decisions within a one-stop decision is a valuable attempt at providing added-value to unsophisticated investors who otherwise will likely make sub-optimal decisions. However, the question remains of whether existing life-cycle funds make sense in their current format. There is an intuitive justification to the advocated decrease in equity allocation: the fact that equity returns tend to revert to the mean (come back to their long-run average values) would justify equities being less risky over the long term, and would also justify the allocation to equities decreasing when approaching the horizon. The reduction in equity allocation would therefore cushion the impact of a fall in the stock market just before retirement.

While such arguments seem to make compelling intuitive sense, it hardly seems plausible, on the other hand, that an allocation strategy depending purely on time-horizon, regardless of what happens in the economy, could be truly optimal! Life-cycle investing can be analysed naturally within the area of dynamic portfolio optimisation introduced by Nobel Prize winner Robert Merton, who has opened a world of opportunities for more subtle dynamic asset allocation decisions, involving adjustments to the asset mix as time goes by.

It is in fact possible to show that when equity prices are mean-reverting, the optimal strategy does involve a higher allocation to equities for the young investor compared to the investor who is close to retirement date, which is consistent with the standard forms of target date funds. On the other hand, the optimal strategy also displays an element of dependence on the state of the economy, suggesting that the allocation to equities should be increased when equities have become cheap and decreased when they have become expensive, as measured through a proxy like the dividend yield or price-earning ratios.

Our preliminary results suggest that omitting to take the state of the economy, and therefore the state of the financial markets, into account in life-cycle investing, as is the case with available target date funds, leads to genuine under-performance of the funds. Overall, the extended forms of life-cycle strategies that adjust the allocation to equities, not only as a function of time-horizon but also as a function of the relative cheapness of equity markets, strongly dominates the standard approaches by avoiding buying too high and selling too low.

Implementing such extended forms of target-

date funds in a delegated money management context is a serious challenge, which requires a narrower classification of plan participants based on factors other than the age of the participant. The challenge is to divide the relevant subjective attributes (mainly age, risk-aversion and funding status) and objective attributes (current (estimated) level of the risk premium provided by equities, current level of interest rates and current level of volatility) into as few parameters as possible.

Given that individual investors will have to be increasingly responsible for investment

decisions related to retirement risk, it is more than appropriate for the asset management industry to work towards the design of life-cycle funds. We argue, however, that available products, based on a predetermined decrease in equity allocation, are too limited in scope. Financial innovation is needed to design better target date funds that truly take into account the market conditions. Overall, we believe that there certainly is ample room for added value between one-(allocation)-size-fits-all (investors with same age) solutions and do-it-yourself approaches to long-term investment decisions.

## Strategic research projects

In addition to the research chairs detailed above, EDHEC-Risk also has close partnerships with major industry leaders on strategic research projects. Among the many projects past and present are the following:

### *EDHEC European Real Estate Investment and Risk Management Survey*

in partnership with Aberdeen Property Investors

Research into real estate as an asset class must enable industry participants to refine traditional approaches and to consider real estate within the bounds of asset management and asset-liability management. It is in this way that research can help real estate take its place in multistyle, multi-class portfolios, contribute to the design of integration methods that optimise its risk/return trade-off, and, finally, enable the class to deliver on its full potential. This survey takes stock of developments in the real estate investment market, reviews academic evidence on allocation to and management of real estate, and analyses the results of a large-scale, pan-European survey of institutional practices.

### *Exploring the Commodity Futures Risk Premium: Implications for Asset Allocation and Regulation*

in partnership with CME Group

This research examines the asset allocation potential of commodity futures by looking at the conditional correlations between the commodity risk premium and the returns of traditional assets (eg, fixed income and equity indices). In particular, it studies how the conditional correlations between the commodity risk premium and the returns of traditional assets evolved over time, and how they evolve in periods of high volatility in traditional asset markets. This will measure the diversification benefits of commodity futures as an asset class, across time and when they matter most.

### *Using Index Options to Improve the Performance of Dynamic Asset Allocation Strategies*

in partnership with Eurex

While stock picking strategies are in principle meant to exploit evidence of predictability in individual stock specific risk, most equity managers, as a result of their bottom-up security selection decisions, often end up making discretionary, and most of the time unintended, bets on market, sector and style returns as much as they make bets on individual stock returns. In this research, we show how portfolio managers

in the Euro-zone can benefit from using derivatives markets to actively manage their asset allocation decisions in a systematic manner.

### *The Benefits of Volatility Derivatives in Equity Portfolio Management*

in partnership with Eurex

This research is dedicated to exploring the uses of volatility derivatives by professional investors, with specific emphasis on their equity portfolio management applications. The project will show how volatility derivatives can be used to optimise access to the equity risk premium in a controlled volatility-risk environment, and engineer equity portfolios with downside-risk properties that compare favourably to solutions put forward by leading asset managers.

### *The Benefits of Bond ETFs for Institutional Investors: The Natural Vehicle for a Core-Satellite Approach*

in partnership with Euronext

The development of bond ETFs is an important subject in terms of innovation and benefits for European institutional investors. The goal of the research is to show that bond ETFs are not only natural investment vehicles to implement passive indexing strategies, but they can also be used to implement a wide range of active investment strategies.

### *The EDHEC European Alternative Multimanager Practices Survey*

in partnership with Fimat Global Fund Services (now part of Newedge Group)

This study, the first in Europe on the application of the results of academic research within alternative multimanager, is based both on a review of all the professional and academic research on alternative investment and a survey of the practices of European multimangers, to which 61 firms (investors, advisors and funds of funds) replied, representing a total of 136 billion euros under management.

### *Financial Engineering and Global Alternative Portfolios for Institutional Investors; Alternative Investments for Institutional Investors: Risk Budgeting Techniques in Asset Management and Asset-Liability Management*

in partnership with Morgan Stanley Investment Management

This research presents an empirical analysis of

the benefits of alternative forms of investment strategies from an asset-liability management perspective. Using a vector error correction model (VECM) that explicitly distinguishes between short-term and long-term dynamics in the joint distribution of asset returns and inflation, we identify the presence of long-term cointegration relationships between the return on typical pension fund liabilities and the return of various traditional and alternative asset classes. Our results suggest that real estate and commodities have particularly attractive inflation hedging properties over long horizons, which justify their introduction in pension funds' liability-matching portfolios.

#### *The EDHEC European Investment Practices Survey*

in partnership with Newedge

This survey enabled us to compare industry practices and academic research in the fundamental areas of investment management. The three major components of the survey are an explanation of the methodology, a background (including a brief history of academic research into risk and asset allocation, indices and benchmarks, asset-liability management, and performance measurement) and, finally, the results, a presentation and analysis of the responses to our questionnaire as well as 10 key conclusions.

#### *MiFID and Best Execution; Transaction Cost Analysis A-Z: A Step towards Best Execution in the Post-MiFID Landscape*

in partnership with NYSE Euronext, SunGard and CACEIS

The final implementation of the MiFID directive has radically transformed the European capital markets landscape. The objective of this research was to provide a comprehensive view of what transaction cost analysis is, shed light on the main underlying concepts and document the tools and techniques that have

been developed in the academic and professional worlds.

#### *Investing in Hedge Funds: Adding Value through Active Style Allocation Decisions*

in partnership with Société Générale Asset Management Alternative Investments

In this research, we introduce a suitable extension of the Black-Litterman Bayesian approach to portfolio construction that allows for the incorporation of active views about hedge fund strategy performance in the presence of non-trivial preferences about higher moments of hedge fund return distributions. We also present a numerical application illustrating how investors can use a multifactor approach to generate such active views and dynamically adjust their allocation to various hedge fund strategies while staying coherent with a long-term strategic allocation benchmark. Overall the results in this paper strongly suggest that significant value can be added in a hedge fund portfolio through the systematic implementation of active style allocation decisions, both at the strategic and tactical levels.

#### *Structured Forms of Investment Strategies in Institutional Investors' Portfolios; Benefits of Dynamic Asset Allocation Through Buy-and-Hold Investment in Derivatives*

in partnership with Société Générale Corporate & Investment Banking

The focus of this research is to determine what fraction risk-averse institutional investors should optimally allocate to structured investment strategies (ie, strategies involving a non-linear exposure with respect to underlying asset classes) in a general economy with stochastically time-varying interest rates and equity risk premium. We also study the impact of the presence of realistic levels of market frictions and heterogeneous expectations on volatility estimates. Our conclusion is that

typical institutional investors, with a strict focus on risk management driven by the presence of liability constraints, should optimally allocate a significant fraction of their portfolio to structured investment strategies.

#### *Structured Equity Investment Strategies for Long-Term Asian Investors*

in partnership with Société Générale Corporate & Investment Banking

The focus of this project is to analyse structured forms of investment management involving in particular a target volatility for the risky underlying asset as well as the introduction of short option positions, both of which initiatives aim at reducing the opportunity cost of downside risk protection. The objective is to develop a formal comparative analysis of the distribution of various forms of allocation to equities, involving naked equity, equity with constant volatility target, as well as non-linear payoffs written on these underlying assets/strategies

#### *Assessing the Quality of Stock Market Indices: Requirements for Asset Allocation and Performance Measurement*

in partnership with UBS Global Asset Management and BNP Paribas Asset Management

This is the first study to have been carried out on the quality of market indices as a benchmark for institutional investors. Since the design of market indices is not affected by the securities chosen by managers and since they benefit from the sound reputation of major financial institutions, credit rating agencies and major international stock exchanges, market indices appear to be the ultimate reference not only for strategic allocation but also as a measure of investment management performance. Evaluating the quality of these indices as a benchmark is therefore a question that is essential to institutional investors.

# Ten years of applied research

**Felix Goltz**, Head of Applied Research, EDHEC-Risk Institute



While EDHEC-Risk makes important public contributions to the advancement of applied financial research and the improvement of industry practices, it also employs its expertise to conduct proprietary research for clients and develop new products with business partners.

The insights drawn from EDHEC-Risk's Indices & Benchmarking, ALM and Asset Management and Derivatives and Asset Management research programmes over the past 10 years have led to a series of products that provide more efficient or more academic-based solutions to investors' needs than the indices and benchmarks currently available on the market. In order to clearly identify this type of activity and distinguish it from the fundamental research activities, EDHEC-Risk Institute created a spinoff in 2010, EDHEC-Risk Indices & Benchmarks, which aims to be one of the leading beta designers for the investment industry.

It is important to note that EDHEC-Risk Institute, as an academic institution, can only propose offerings that are supported by proven research and scientific results via the EDHEC-Risk Indices & Benchmarks spinoff. If there is no consensual academic state-of-the-art in an area then we will not take the initiative to transfer our methodology towards the industry.

## EDHEC-Risk Alternative Indexes

The different hedge fund indices available on the market are computed from different data, according to diverse fund selection criteria and index construction methods; they unsurprisingly tell very different stories. Challenged by this heterogeneity, investors cannot rely on competing hedge fund indexes to obtain a "true

and fair" view of performance and are at a loss when selecting benchmarks. To address this issue, EDHEC-Risk was the first to launch composite hedge fund strategy indices as early as 2003.

Using factor analysis techniques, the EDHEC Alternative Indexes are built as the best one-dimensional summaries of the information conveyed by competing indexes for a given style. The EDHEC composites are thus able to capture a very large fraction of the information contained in the competing indexes while implicitly minimising their various biases. Consequently,

the EDHEC Alternative Indexes tend to be very stable over time and thus are easily replicable.

## FTSE EDHEC-Risk Efficient Index Series

FTSE Group and EDHEC-Risk Institute launched the first set of FTSE EDHEC-Risk Efficient Indices at the beginning of 2010. Offered for a full global range, including ▶

◀ All World, All World ex US, All World ex UK, Developed, Emerging, USA, UK, Eurobloc, Developed Europe, Developed Europe ex UK, Japan, Developed Asia Pacific ex Japan, Asia Pacific, Asia Pacific ex Japan, and Japan, the index series aims to capture equity market returns with an improved risk/reward efficiency compared to cap-weighted indices.

The weighting of the portfolio of constituents achieves the highest possible return-to-risk efficiency by maximising the Sharpe ratio (the reward of an investment per unit of risk). In order to maximise the Sharpe ratio, the methodology seeks to reliably estimate two essential inputs needed for portfolio optimisation: the expected returns of each stock which are calculated indirectly by the riskiness of each stock; and the covariance matrix of returns for all stocks which is calculated using statistical factor models that describe the co-movement of stock prices through their exposure to common risk factors.

These indices provide investors with an enhanced risk-adjusted strategy in comparison to cap-weighted indices, which have been the subject of numerous critiques, both theoretical and practical, over the last few years. The index series is based on all constituent securities in the FTSE All-World Index Series. Constituents are weighted in accordance with EDHEC-Risk's portfolio optimisation, reflecting their ability to maximise the reward-to-risk ratio for a broad market index. The index series is rebalanced quarterly at the same time as the review of the underlying FTSE All-World Index Series.

A customised version of the FTSE EDHEC-Risk Eurobloc Large-Cap Index has also been built based on the best-in-class SRI universe established by ERAFP, the French Civil Service Complementary Pension Scheme. As a major European pension fund, ERAFP has put a lot of time and effort into its socially responsible investment (SRI) policy and seeks to promote the values of its SRI charter, such as human rights and rule of law, good governance and protection of the environment. ERAFP is therefore happy for other institutional investors to participate in this promotion by using the same index.

## Efficient relative return benchmarks

The equity offering has recently been completed by an efficient relative return benchmark offer which enables investors to keep their traditional reference indices while benefiting from the implementation of passive investment represented by an optimal diversification benchmark for which the relative risk (tracking error) compared to the reference index can be modulated and controlled explicitly.

The words "index" and "benchmark" are often used indiscriminately in practice even though they are two a priori very different concepts: a reference index is a portfolio that should represent the performance of a given segment of the market, so the focus is on representativeness; a custom benchmark is a portfolio that should represent the fair reward expected in exchange for risk exposures that an investor is willing to accept, so the focus is on efficiency.

For most investors this distinction may be semantic, but it leads clearly to different approaches to passive investment. For example, an index that is constructed differently to a cap-weighted index will always be considered a substitute for the latter, so it seems normal that investors would expect this new reference index to have the same level of transparency,

and perhaps the same level of popularity, as the previous one. In the end, what determines the success of a new reference index will be as much its financial characteristics as its "popularity", not only with investors but also with consultants.

Naturally, implementation of a new form of reference index is not risk free. All rebalancing schemes, with the notable exception of cap-weighting or equal-weighting, assume a certain level of out-of-sample stability in the structures that led to the in-sample estimation of the parameters. Whether one tries to reduce the dimensions of a variance-covariance matrix with a factor model, or uses accounting attributes to define the size of a company and de facto its position in an index, or creates a link between the risk and return of a stock, all of these methodological choices are more or less relevant depending on the period chosen. That is why we have always considered that the evaluation of an alternative weighting scheme for an index can only be carried out over a long period; that globally this evaluation could not concern the ability of diversification to reduce portfolios' risks (cf. Amenc, Goltz, Stoyanov 2011) but instead involves obtaining greater efficiency in the investment over long periods, ie, a better return for each unit of risk. This serious approach to the performance of alternative forms of indices will probably lead investors to diversify the alternative forms of investment. As an example, it is interesting to observe that minimum vola-

*"A custom benchmark will be judged less on its transparency or its relative simplicity than on its capacity to enable investors to achieve their diversification objectives"*

tility and efficient indices do not have the same outperformance in relation to cap-weighted indices in different market conditions.

A custom benchmark does not necessarily aim to replace an index because the objective in using it relates to the implementation of a passive investment strategy. The goal of the custom benchmark is not to serve as an external reference for the investment but to be a genuine representation of the investor's inter- or intra-class allocation choices. Ultimately, it is not so much the "popularity" of a benchmark that will lead to its success but its customisation and appropriateness to reflect the investor's strategic choices in terms of risk and reward. Since it is not being used as an external reference, a custom benchmark will be judged less on its transparency or its relative simplicity than on its capacity to enable investors to achieve their diversification objectives, notably with regard to an external reference represented by a cap-weighted index.

The Efficient Relative Return Benchmark methodology enables institutional investors to benefit from the latest progress in the area of diversification in order to avail of customised benchmarks that are representative not only of their choice of absolute risks (geographic, sector, style, etc) but also of their relative risks by implementing a particularly innovative and efficient process for managing tracking error with respect to a market index.

This relative return approach allows investors to limit the risk of eventual underperformance when market conditions do not allow efficient indices to outperform (which is the case in speculative bubbles when diver-

sification is not useful and momentum is the best investment) and obviously given the fact that like for the vast majority of alternative forms of indices, there can be moments when the in-sample estimation, through significant deformation of the structures (eg, correlation), loses its out-of-sample robustness. The relative return benchmark approach represents a choice of implementation of the efficiency concept that is more modest, and less high-performance, but also less risky.

Ultimately, this efficient relative return benchmark offering allows investors to benefit from the performance of efficient diversification while continuing to rely on the popularity and simplicity of traditional cap-weighted indices for their global asset allocation and also for their communication to all their stakeholders.

## EDHEC IEIF Commercial Property (France) Index

in partnership with the Institut de l'Épargne Immobilière et Foncière (IEIF)

Institutional investors allocate considerable shares of their portfolios to real estate, primarily in anticipation of diversification benefits. Institutional investors would like to use index-based products for this purpose; however, real estate indexing has proven challenging. It has been challenging largely because real estate features such characteristics – rarely found in other asset classes – as high unit values and indivisibility, limited liquidity, great heterogeneity; active property management is also required. As a consequence, existing indices based on direct or indirect investment have several drawbacks. Indices based on direct investment are generally not investable and rely on subjective appraisals, so they show smoothed and lagged returns and the transparency of their components is wanting. Indirect investment indices usually rely on listed real estate investment vehicles and consequently have great exposure to equity market risk.

The EDHEC IEIF Commercial Property (France) Index addresses these issues by using unlisted property funds under the French SCPI scheme as the index underlying, given a certain liquidity threshold. The index has very attractive diversification properties and is representative of the real estate market; at the same time it is fully transparent and investable and has little exposure to financial market risk. These characteristics make the EDHEC IEIF Commercial Property (France) Index an interesting underlying for index-based products that could satisfy the demands of institutional investors.

## Life-cycle investment benchmarks

EDHEC-Risk has developed life-cycle benchmarks that enable innovative approaches in the area of private wealth management to be implemented in an asset-liability context. These benchmarks can be used as a support for pensions and savings product offerings that genuinely take into account the horizon of the investment, the investor's loss aversion and the real or nominal protection of future pension flows.

# Ten years of speaking up on important issues for the financial industry

**Peter O'Kelly**, Marketing & Communications Manager, EDHEC-Risk Institute



## *EDHEC Comments on the Amaranth Case: Early Lessons from the Debacle*

October 2006

In this position paper, we examined how Amaranth, a respected, diversified multi-strategy hedge fund, could have lost 65% of its \$9.2bn assets in a little over a week. To do so, we take the publicly reported information on the fund's natural gas positions as well as its recent gains and losses to infer the sizing of the fund's energy strategies. We found that as of the end of August 2006, the fund's likely daily volatility due to energy trading was about 2%. The fund's losses on 15 September 2006 were likely a nine-standard deviation event. We discussed how the fund's strategies were economically defensible in providing liquidity to physical natural gas producers and merchants, but found that, like Long Term Capital Management, the magnitude of Amaranth's energy position-taking was inappropriate relative to its capital base.

## *The Impact of IFRS and Solvency II on Asset-Liability Management and Asset Management in Insurance Companies*

November 2006

This report, supported by AXA Investment Managers, as mentioned in the research chairs and strategic research projects section above, provided an analysis of the IFRS and the Solvency II provisions in light of the asset management and asset-liability management issues facing insurance companies. It examined state-of-the-art techniques in these areas, with particular focus on their suitability and relevance with regard to the requirements for insurance companies to manage their risks better, and went on to provide details of the limits placed by the IFRS environment on insurance companies in terms of asset management solutions in the presence of liabilities, thereby highlighting the additional volatility constraints on income statements and shareholders' equity brought about by these new accounting standards.

## *Three Early Lessons from the Subprime Lending Crisis*

August 2007

In August 2007, as political leaders sought to lay blame for the evolving crisis on specula-

Over the past 10 years, EDHEC-Risk has taken a stance on issues of relevance to the financial industry when it feels that academic research has insights to offer on the subject in hand. These stances are a collective commitment not only on the part of the research team but also the whole institution to bring research results to the attention of companies and society at large.

As such, EDHEC-Risk has taken a position on, amongst many other issues, the inadequacies of the MiFID financial services directive; the eligibility of hedge fund indices within the framework of UCITS3; the lessons to be drawn from the subprime lending crisis; the ground to be covered for optimal implementation of the Solvency II directive, the solvency requirements for banks and the nature of asset management regulations following the credit crisis, the "fair value" accounting standards, the undesirable effects of banning short sales, the absence of excessive speculation on the US oil futures markets and the performance of socially responsible investing.

A summary of some of EDHEC-Risk's major positions on relevant industry topics over the past several years can be found below.

tors, EDHEC-Risk published a position paper affirming that hedge funds were not responsible for the subprime crisis. As the position paper explained, the problem was that banks, not hedge funds, had been affected by excessive investment in asset-backed securities and in structured credit products that turned out to be illiquid and those banks thus appeared insolvent to their counterparties in the money market. So it was the most heavily regulated institutions in the world – institutions whose new capital rules (Basel 2) were presented three years previously as the result of reflection on the lessons learned from the financial crises of the previous two decades, especially with respect to credit risk – that required the intervention of central banks on a massive scale.

## *Recommendations on Improving Hedge Funds' Risk and Performance Reporting*

November 2008

In drawing up the EDHEC European Alternative Multimanagement Practices survey in 2003, we were able to observe the gap that existed between the conclusions of the academic research work and the practices of multimanagers in measuring and reporting on the performance and risks of funds or portfolios of hedge funds. This observation led us in 2005 to carry out research and a survey on this fundamental dimension of the relationship between investors and managers: the EDHEC Funds of Hedge Funds Reporting Survey. The analyses, conclusions and recommendations that we presented were the fruit of both an investigation and a thorough dialogue with alternative investment professionals. We made the case that improved reporting would be useful to both investors and managers, and should not be seen only as a constraint by the latter.

Whether hedge fund managers should share information on such risk exposures with their investors, and how they should do so, was the focus of the EDHEC Hedge Fund Reporting Survey 2008, supported by the Prime Brokerage Group at Newedge, as mentioned in the research chairs and strategic research projects section above. This survey enabled us to compare industry practices, guidelines issued by industry bodies, and academic research into hedge fund performance and risk disclosure. The results suggested that investors' requirements for

hedge fund disclosure diverge considerably both from hedge fund managers' perception of what is relevant and from guidelines and "best practices" published by industry bodies. In addition, reporting was found to rely heavily on risk and performance measures that the academic literature has found unsuitable for hedge fund portfolios.

## *The Dangers of Hasty Reform of the IAS Standards*

November 2008

In a position paper entitled "The Fair Value Controversy: Ignoring the Real Issue", EDHEC-Risk argued that the amendments to the IFRS 7 and IAS 39 standards were counterproductive. By making it possible, under certain conditions, to report at historical cost transactions that had previously been reported at fair value, these amendments reduced the amount of information contained in financial reports. These changes were likely to hide the real risks to which companies are exposed and to increase the mistrust of the financial community.

Even if fair value accounting led to a cyclical weakening – justified by the financial crisis – of the fair value of the equity of financial institutions, it is not the accounting standard setter's job to estimate the amount of additional capital needed or to call for a curtailment of business activity. That is the role of the prudential regulators.

## *Madoff: A Riot of Red Flags*

January 2009

For more than 17 years, Bernard Madoff operated what was viewed as one of the most successful investment strategies in the world. This strategy ultimately collapsed in December 2008 in what financial experts are calling one of the most detrimental Ponzi schemes in history. Many large and otherwise sophisticated bankers, hedge funds, and funds of funds have been hit by his alleged fraud. In this paper, we review some of the red flags that any operational due diligence and quantitative analysis should have identified as a concern before investing. We highlight some of the salient operational features common to best-of-breed hedge funds, features that were clearly missing from Madoff's operations. ▶

***The Basel II Reform That Would Have Made Most Injections of Public Funds Unnecessary***

January 2009

The financial crisis put great pressure on banks and led to a number of emergency measures intended to restore confidence in the banking system: tentative changes to accounting standards, recapitalisation of the banking industry, and higher capital requirements. Each measure targets a specific concern that arose during the crisis. Governments and regulators, however, have yet to deal with one of the essential causes of systemic risk: the inflexibility of prudential regulation for banking. As it happens, a single minor change would make it possible to restore much of the confidence in the banking sector without requiring any capital injections in the short term: acknowledging that banking capital ratios fall during downturns would have made most of the injections of public funds unnecessary. Making this change today would give governments far more room to support the real economy.

***A Welcome European Commission Consultation on the UCITS Depository Function, a Hastily Considered Proposal***

September 2009

The European Commission is seeking to harmonise the depository function and to strengthen protection mechanisms. EDHEC believes that beforehand there should be an in-depth study of the practices of the parties in the value chain and the regulations to which they are subject and that, beyond a minimum protective threshold, complementary protection should be optional, which supposes clear disclosures of the degree of protection and of its cost.

***The Inadvisability of Short Selling Bans***

April 2009, March 2010

EDHEC-Risk has denounced the various decisions to impose or extend short-selling bans as a political smokescreen that is likely to be counterproductive, both directly by disrupting market functioning and degrading market quality at a most testing time, and indirectly by further fuelling defiance vis-à-vis sovereign states and the continued inability of their political institutions to address the causes of the financial crisis.

In position papers in 2009 and 2010, “The Undesirable Effects of Banning Short Sales” and “Spillover Effects of Counter-cyclical Market Regulation: Evidence from the 2008 Ban on Short Sales”, EDHEC Business School Professor Abraham Lioui focused on the impact of the bans on leading market and financial indices in the US, France, the UK and Germany and found that these led to a systematic increase in the volatility of market indices and did not ease the downward pressure in the financial markets.

***The Dangers of Unilateral Regulation of the Credit Default Swap Markets***

March 2010

In an open letter addressed to European Internal Market Commissioner Michel Barnier in March 2010, EDHEC-Risk Institute warned of the dangers of prohibiting “naked” sales of sovereign credit default swaps. Besides the fact

that the lack of convergence on these issues with the US authorities left little hope of the measures being effective, EDHEC-Risk Institute thought that this ban would pose numerous problems and run up against legal and practical obstacles that would make it inapplicable or even counterproductive. It would be impossible for intermediaries and ultimately for regulators to verify investors’ holdings of the securities representative of the risk the credit default swaps are assumed to cover. A strict obligation to use credit default swaps to hedge the risk of sovereign debt would prevent sovereign nations from issuing long-term debt, as the CDS market for hedges of more than 10 years is relatively illiquid.

This prohibition would make it harder for countries to manage the interest rate risk on their debt actively, as their counterparties would then no longer be able to hedge the country risk of the interest rate swaps they may have entered into. This active management of the yield curve is a major component in the optimisation of the cost of public debt. More harmful still is that a very strict definition of a naked sale would keep investors who finance public investment or companies that enter into contracts with sovereign nations or with state-owned companies from hedging the default risk of their counterparties. Finally, by making the market for hedging default risk more complex, the markets may be deprived of the debt of countries with low ratings, of investors, and thus of liquidity, which would inevitably increase the cost of this debt.

***The Limitations of the UCITS Framework for Hedge Funds***

March 2010

EDHEC-Risk, with the support of CACEIS, surveyed UCITS and alternative asset managers, their service providers, external observers and investors for their views of structuring hedge fund strategies as UCITS for a report, “Are Hedge-Fund UCITS the Cure-All?”, mentioned in the research chairs and strategic research projects section above, which was published in March 2010. Most respondents feared that structuring hedge fund strategies as UCITS would distort strategies and diminish returns.

EDHEC-Risk suggested improved regulation of investment funds and properly designed incentives: incentives to invest in illiquid assets could be designed in regulated closed funds with a fixed horizon; incentives to adopt the AIFM directive could be given by modifying the prudential regulation of European institutional investors, notably insurers, and authorising them to invest directly in funds that comply with the AIFM directive; incentives to manage rather than to insure non-financial risks should be given by defining more clearly the responsibilities of distributors, asset managers, depositaries, and valuers.

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***Support for the Objective of Better Regulation of the Derivatives Markets for Commodities but Criticism of the Motivation behind the Future G20 President’s Position on the Subject***

September 2010

In an open letter to the European Commission in September 2010, EDHEC-Risk supported the idea of better regulation of the derivatives markets for commodities requested by France in a report sent to the commissioner by the French Ministers of the Economy, Energy and Agriculture, and which served as a basis for the French position ahead of its future presidency of the G20, but criticised the motivations behind the French request.

The assumption that underlay the French initiative, namely that derivative instruments are one of the causes of the high level of volatility in commodity prices, has absolutely not been demonstrated and is contradicted both by EDHEC Risk Institute’s own work and that of the IMF and the OECD. In these conditions, EDHEC Risk Institute thought that the European Commission should not commit to regulatory initiatives that are as important for the structure of the financial markets without the facts and arguments being clearly and objectively established.

***Publication on How to Improve the Management of Major Non-Financial Risks after Madoff***

December 2010

In December 2010, with the support of CACEIS, we produced a publication entitled “The European Fund Management Industry Needs a Better Grasp of Non-Financial Risks”, as mentioned in the research chairs and strategic research projects section above, in which we looked at how non-financial risks and failures had impacted the regulatory agenda in Europe and traced the management of liquidity, counterparty, compliance, misinformation and other financial risks in the fund industry.

By identifying the distribution of risks and responsibilities in the industry, we examined how convergence between country regulations could be achieved. Finally, we assessed how fund unit-holders could best be protected with appropriate regulations, improved risk management practices, and greater transparency.

***The Link between Speculation and Commodity Prices***

November 2008, November 2009, July 2011

In three separate position papers between 2008 and 2011, “Oil Prices: the True Role of Speculation”, “Has There Been Excessive Speculation in the US Oil Futures Markets?” and “A Review of the G20 Meeting on Agriculture: Addressing Price Volatility in the Food Markets”, EDHEC-Risk finds no evidence that speculation is a cause of high levels of volatility in commodity prices. The latter position, which is supported by the French presidency of the G20, is contradicted both by EDHEC Risk Institute’s own work, and also by two empirical studies conducted by the two main international economic organisations, the IMF, in its Global Financial Stability Report of October 2008, and the OECD, in the Speculation and Financial Fund Activity: Draft Report of April 2010.

# Thank You

Without the support of the industry over the past ten years, EDHEC-Risk Institute would never have been able to develop the ambitious research programmes that allow it to combine academic excellence and business relevance today



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