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Introduction

For a long time, the measurement of market risk in relation to hedge funds was considered of secondary importance. Alternative funds were initially the preserve of a few wealthy investors whose very personal relationships with the fund managers were more important than a statistical evaluation of risk. These historical investors in hedge funds maintained that the main source of returns was the talent of the fund manager, and that quantitative risk measures would inevitably fail to take into account the complexity of a particular manager's strategy and skill. In 2007, with over 10 000 hedge funds available, identifying each manager as having a specific style and denying the existence of a set of risk factors common to certain subsets of alternative strategy styles can no longer be justified. Moreover, nowadays all major institutional investors have significant exposure to hedge funds. The exception has become the rule and consolidation of market risk at the portfolio level – a standard practice for institutional investors – therefore requires the application of a simple and easily understandable synthetic risk indicator such as Value-at-Risk.

Another justification for the limited use of risk measures for hedge funds in the past also relies on the importance of qualitative due diligence in the risk management process. Before any investment is made in a hedge fund, caution dictates that an analysis of structural and operational risks should be carried out: several studies have shown that between 40 and 60 percent of hedge fund company failures are attributable to poor control of operational risk. Extensive due diligence, carried out by a dedicated team of operational risk specialists, is therefore crucial. Furthermore, investing in an alternative fund basically means delegating both the portfolio management and the associated risk management. It is therefore necessary to qualitatively evaluate the investment strategy, underlying positions, amount of leverage, credit risk, stop-loss limits, level of diversification and risk control tools and processes used by the fund manager.

But a structural and qualitative analysis, although vital, is not sufficient: the financial market instability of recent years, and the complexity

of hedge fund strategies, demand regular risk monitoring after the investment has been made. The quantitative measurement of hedge fund risks is an essential part of this monitoring process since it is systematic, continuous and can be automated – unlike qualitative monitoring, which requires frequent, meticulous analysis and on-site assessments.

The implementation of a robust Value-at-Risk approach raises however two main difficulties. First, neither volatility, nor downside deviation nor even the derived Value-at-Risk methods are reliable and robust market risk measures for hedge funds. Volatility is based on the principle that hedge fund returns are normally and symmetrically distributed, and consequently, that investors are no more concerned about losses than gains. As for downside deviation, although this takes into account the asymmetry of returns, it does not provide a full description of fat tail returns that are typical for hedge fund performance. These criticisms have resulted in the need for the development of more robust market risk measures for hedge funds that allow for the modelling of fat tail returns, hence the implementation of more sophisticated Value-at-Risk methods than the traditional variance–covariance Value-at-Risk.

Second, the underlying risks of an investment strategy may be overlooked if the concept relies solely on hedge fund returns (because of the sample selection), while a model measuring the sensitivity of historical returns to market indices does not take into account the key features of alternative funds: an investment strategy involving active management of traditional assets with a risk management overlay. The debate around hedge fund clones that occurred at the end of 2006 and was carried out throughout 2007 revealed that no academic consensus was reached on an explanatory model for alternative investment strategies using traditional assets as factors. Moreover, the absence of a benchmark and the high level of investment freedom available to hedge fund managers ends up with a highly heterogeneous universe of funds. As a consequence, the hedge funds industry is currently characterized by the absence of an efficient and standard classification of alternative investment styles.

Given the current state of knowledge, the pragmatic solution for a quantitative measure of hedge funds' market risk consists in giving up the explicit side of the model and focusing on an efficient measure. The model should not try to explicitly explain the kind and level of exposure to traditional risk factors, but simply measure the sensitivity to risk factors that implicitly contain various types of exposures to traditional assets. Taking into account the high level of heterogeneity of the hedge funds universe, the selection of a few relevant implicit risk

factors should be performed within a large number of latent variables (Best Choice Models).

The first step towards this type of pragmatic model was the application of the Sharpe (1988) Style Analysis to hedge funds, providing a Value-at-Risk based on the sensitivity of hedge funds to the CS/Tremont hedge fund indices. The Alternative Style Value-at-Risk was introduced by Lhabitant (2001) and Lhabitant (2002a). Developed for practical use when François-Serge Lhabitant was working at Union Bancaire Privée (UBP), the Alternative Style Value-at-Risk also became an academic success.

Contrary to what is often believed, the Style Value-at-Risk for hedge funds is not really a style drift model.¹ This would require both an accurate classification system and representative indices. But mixing these indicators through a Style Model enables us to build a basket of non-linear and dynamic exposures to traditional risk factors that matches more efficiently the exposures of any given hedge fund. As far as hedge funds are concerned, the main advantage of the style approach comes from its implicit aspects.²

The second step in the construction of a pragmatic Value-at-Risk for alternative investments consists of fully developing both the implicit and the automated selection aspects of the style approach. However, the level of complexity of implicit models may quickly increase and, as a consequence, practitioners tend to avoid them. This concern of maintaining a practical and simple risk measure led to the consideration of an automated selection approach or, more accurately, a Best Choice Implicit Model based on the inverse of a clustering analysis combined with a Principal Component Analysis. This is the implicit model presented here.

The target of this book is both to present a clear exposure of the fundamentals for a quantitative risk measure for hedge funds and to cover the technical aspects of the Style Value-at-Risk and the Implicit Value-at-Risk applied to hedge funds.³ Quantitative methods are a powerful tool to test a fundamental theory but may shrink to a poor, biased and

¹ Even though style analysis may be interpreted as a style drift model when analysing funds of hedge funds as an external investor (i.e. without the strategy transparency) and not as a portfolio manager.

² Actually, this is also, but to a lesser extent, one of the most appealing features of the traditional style model.

³ The high level of transparency on a methodology first developed for investment purposes of the second largest allocator to hedge funds (namely UBP – Union Bancaire Privée) is motivated by our strong interest in participating to the elaboration of a standard in risk measurement for hedge fund investors. Indeed, the absence of a common point of reference makes comparisons between different products and different approaches regarding alternative investments difficult.

non-robust approach when used to extract a theory from financial data. Quantitative methods blindly applied to hedge fund performance could lead to misrepresentation of risks embedded in such investment vehicles. As an example, investors who were excessively focusing on the stability of the returns of hedge funds having a short volatility position or collecting a high liquidity premium were quite surprised in 1994 and in August 1998. In order to avoid the pro forma effect and provide some perspectives of good forecasting power and out-of-the-sample robustness, any proposition for a risk indicator for the alternative funds should not be the sheer product of data mining. Remembering the paradigm shift that the investment industry witnessed during the last seven years and providing a clear exposure of the alternative funds universe is a prerequisite of any technical note on Value-at-Risk applied to hedge funds. Furthermore, only diamonds are forever and models work only within certain environments. As a matter of fact, if an efficient classification of alternative investment styles, as well as a robust family of passive indices, are proposed in the future, the models proposed in this book will lose their relevance. Finally, despite outstanding books on absolute return investments such as Ineichen (2003), Jaeger (2002), Lhabitant (2006a), Rahl (2003) and Reynolds Parker (2000), hedge funds still suffer from various misconceptions. Our choice was to deliberately expose straightforward considerations even though they might hurt some traditional beliefs. Obviously, we would expect puzzled readers to refer to the above references.

The book is thus divided into three parts. The first provides the fundamentals for the Style and Implicit Value-at-Risk through the practitioner's vision of the alternative industry. Chapter 2 describes the effect of the ongoing institutionalization of the hedge funds industry. Chapter 3 examines one of the most important feature of an absolute return industry, i.e. the high level of heterogeneity. Chapter 4 addresses the issue of the active and passive⁴ hedge funds indices. The failure of both approaches to provide a good representation of the hedge funds universe is the very root of the motivation for a Value-at-Risk based on a Best Choice Implicit Factor Model. Chapter 5 provides a qualitative insight of the four dimensions of risk management for an investor in hedge funds.

The second part of this book is devoted to the Style Value-at-Risk. Chapter 6 presents the original model as well as an out-of-the-sample

⁴ Often referred as hedge funds clones.

backtest. Chapter 7 proposes a new parameterization of the Style Model. Chapter 8 addresses the issue of annualization of any risk measure for hedge funds and illustrates a fundamental difference between traditional and alternative investments.

The last part of this book presents the Best Choice Implicit Model. In Chapter 9, the limits of the Style Analysis are addressed and the Best Choice Implicit Value-at-Risk is introduced. Chapter 10 addresses the issue of cloning hedge funds returns within the Best Choice Implicit Model framework, while Chapter 11 details the Risk Budgeting approach that can be used with those types of models. Finally, Chapter 12 examines the forecasting power of the Value-at-Risk exceptions monitoring and Chapter 13 provides some adjustments of the Value-at-Risk that are particularly relevant during a financing crisis, such as the one prevailing during the second half of 2007 and in 2008.

