Find your bearings on the high seas of finance

The recent stock crashes and world markets crises have once more drawn attention to the fact that anticipating the mood of financial markets is next to impossible in the short run. Professor Barone-Adesi, Director of the Finance Institute, Faculty of Economics, USI-Lugano, has built a computational model for assessing risk in financial markets investments. The project is part of the national centre of excellence called FINRISK, which is funded by the Swiss National Science Foundation (FNSRS).

Is it possible to predict the ups and downs of the stock markets? *'Of course it is'*, answered without batting an eyelid J.P. Morgan, the famous American banker, *'Of course it is: markets will fluctuate'*. That was at the end of the nineteenth century. Even then, the shrewder ones had already grasped it: no use hazarding short-term guesses on share investments profits! Has anything changed with the advent of the latest information technologies? *'Computer-based mathematical models can shed light on the fluctuation of financial markets, much in the same way as we forecast the cyclical surges of the oceans'*, explains Prof. Barone-Adesi, *'There are some variables whose rise and fall can be predicted, rather like water levels, which vary according to the rise and fall of the tide. But other variables are unpredictable, as is the case with sea storms, tempests, and waves'*. Therefore predicting the short-term returns on stock-market trading remains perilous.

Know your risks, and be saved from drowning

Yet there is one measurable parameter: the risk attached to a certain type of investment. The research project initiated by USI's Faculty of Economics aims to develop mathematical models able to estimate the risks inherent in financial investments. This project is one of those conducted by the national centre of excellence, FINRISK, whose membership includes the finest research centres in finance in Switzerland. Risk is assessed with mathematical instruments using known parameters; the resulting formula is then applied to diverse situations, such as: a share parcel, an individual investor, or a global analysis. To resume our maritime metaphor, the various calculations will provide us with a shipwreck risk index but will draw a complete blank on the volume of fish catch. Clearly, in the event of the ship's sinking no fish will be caught and taken home. Depending on the type of investment, the mathematical simulation will provide different percentages of risk; each investor will have to decide whether to lower sails or to carry on with unfurled sails.

Creating models may well be seen as a purely academic exercise, of interest to no one but mathematicians involved in complex systems and chaos theory. *'Chaos is different, however'*, points out Barone-Adesi, *'and above all hard to predict. Instead of which, the research we have conducted shows us that investment risk behaviour is closer to the theory of probability - therefore computable - rather than to chaos. Not to mention that, as we have discovered, these models work quite well; indeed they have even been adopted by some stock exchanges and by major banks'.*

The shoeshine boy's rule

If you are unlucky enough not be able to apply mathematical models, Barone-Adesi jokingly reminds you of a little story told of Joseph P. Kennedy, J.F. Kennedy's father. Joe Kennedy was a notorious stock exchange speculator who, in the 1929 Wall Street Crash, was one of the few who managed to gain from Black Friday; while everybody around was forced to sell he would buy, having sold earlier, and thus made a fortune. He told people that he had understood it was time to sell when even his shoeshine boy started giving him advice on how to buy stocks and shares. *'A few years ago'*, reminisces Barone-Adesi, *'many people rushed up to me with advice on how to make money; more recently, that advice has stopped coming in. It's easy to make money when the market is buoyant, but if there are no checks on risk, sooner or later one ends up dashed against the rocks'.*

FINRISK

Risks assessed by means of mathematical models

Information technologies have changed the way people approach, or have access to, financial markets. Today, the operator is supplied with endless information, and he can quite easily invest on the national and international markets, close by or far-away, and in a whole spread of products. But these easier conditions are not reconcilable with the fact that one can hardly keep track of the results of thousands of companies. Therefore investment strategies have changed: they are now based on statistical modelling of market trends. History tells us that on average the stock market has always been bullish. Yet, this is a general comment, which applies solely to long-term periods. Beyond that, the fact remains: there is no way of predicting one's profits in the short term, and this is a truth commonly held by investors. On the other hand, the intensity with which returns fluctuate is fairly easy to forecast in the short run. Data like this one tells us nothing about possible profits, but it provides us with useful information on market instability (volatility) and consequently on the risks that might lie in wait with a particular investment at a given time. This risk varies according to probability laws, and can therefore be measured. In Prof. Barone-Adesi's research team at the Faculty of Economics, USI, some twenty people are engaged in this task. Here, researchers, while keeping constantly up to date with what goes on in the markets worldwide, create mathematical models to describe the evolutions of volatility of stock market quotations. On the basis of their analyses, researchers will determine the best choices for investors. A model can help us calculate, fairly reliably, investment risks, but clearly it will be no use in trying to predict extraordinary events, as for example September 11, or a sudden outbreak of war. After an unexpected incident, modelling allows us immediately to adjust our parameters and to issue new projections able to estimate the risk likely to be incurred by markets in the days following the catastrophic event. This certainly represents a positive progress for investors.

Professor Giovanni Barone-Adesi, Director, Finance Institute, USI

The national pole of excellence in finance

In 2001, the Swiss National Science Foundation designated the first 14 national poles or centres of excellence (referred to as PRN). FINRISK (financial valuation and risk management) is one of them. It may be defined as a research network in finance, which brings together over 30 academics from several Swiss higher-education institutions (the Universities of Zurich, Basle, Geneva, Lausanne, and Neuchâtel, Zurich's Institute of Technology, and the University of Lugano). FINRISK's objective is to foster both theoretical and applied research into the dynamics of creation and redistribution of riches. '*The national pole of excellence has made it possible*', comments Barone-Adesi, '*for a community of researchers to get together and collaborate on one set of themes*'. The programme has particular regard for the analysis and management of risk factors, where an interdisciplinary approach is de rigueur. FINRISK, moreover, envisages a transfer of knowledge to the private and public sectors. The network runs on a budget of SFr 3.7m a year, made up of SFr 2.7m from the FNSRS, and the remaining SFr 0.7m from the University of Zurich.

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