ABSTRACT – DISSERTATION

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EMPIRICAL MODELLING OF ENVIRONMENTAL RISKS

The role of the banking sector in promoting a more environmental friendly economic growth has become more important in the last years. This development has occurred together with the emergence of more market-oriented instruments of environmental protection in contrast to the past when environmental policy was primarily command-and-control based. Traditionally the insurance industry has shown interest in incorporating environmental risk assessment to their financial analysis since it has experienced the negative impact of natural events in its financial balances. With the enforcement of environmental regulation, credit and investment banks have increased the attention to the risks and opportunities of environment-related aspects. Credit banks are concerned about environmental aspects since these can fundamentally impact the future payment capacity of a firm, for example in situations in which a firm has been found environmentally liable. Environmental aspects offer numerous business opportunities for investment banks as for instance the construction of green portfolios. However, although banks are aware of the relevance of the integration of environmental aspects in their financial analysis, there is evidence showing that environmental considerations are not fully integrated in the core of credit and investment decision making process of the banking sector. The reason for this lack of integration is that there are several issues on the relationship between finance and environment that are not known or not well understood.

Among the prominent research work on the link between finance and the environment are several studies that show evidence of a measurable association between environment-related events and the stock price behavior of firms that react sensitive to environmental issues, such as the ones in the chemical and energy sector. In my doctoral thesis the return distribution of 33 environmental sensitive securities with different environmental performance of the chemical, oil and alternative energy sectors together with the Dow Jones Sustainability Index have been analyzed in order to assess the financial impact of environment-induced risks. Concretely, four aspects have been focused: the modeling of the statistical characteristics of environmental sensitive assets, the dynamic behavior of environmental risks by means of ARMA-GARCH models, the systematic or unsystematic character of environmental risks and, at the portfolio level, the risk-return structure of environmentally sound funds in contrast to the one of portfolios of firms with a poor environmental performance.

The contribution of this thesis to previous research consists in the approach taken, which is based on a more realistic asset distribution assumption than the normal distribution, the non-Gaussian stable distribution. Results of this research show that the risk profile of polluting firms is extreme leptokurtic in comparison to firms with a higher environmental performance. This characteristic may have important implications for risk management since the risk of securities that exhibit extreme kurtosis is more difficult to diversify. For environmental asset management, screening procedures based on stable distributions show a more realistic risk-return structure and therefore lead to better financial results. Finally, the fact that there are investors interested in green funds which exhibit a poor performance in terms of their risk-return structure shows that there may be other reasons besides pure economical considerations which are important for the process of economic decision making and that imply a different shape of an investor’s utility function than the one upon which the financial theory is based.
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