Modern data analysis tools in personal financial services: a quantitative revolution?

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Abstract. I argue that dramatic advances in methods and tools of data analysis are having an equally dramatic effect on how decisions are made in the personal financial services sector. A series of examples are given, and the sorts of tools needed are described.

1 Introduction

The mathematical revolution in the financial market sector is now well established. Over the past several decades it has become more and more advanced, employing legions of researchers, predominantly mathematicians and physicists, who might otherwise have gone into the academic world, and who have knowledge and skills of the types of mathematics needed for the financial sector.

This revolution is rather unusual because it represents a direct link between advanced mathematics and practical application: most applications of mathematics involve fairly straightforward and well established mathematics, even mathematics which is centuries old. In contrast, the mathematics of financial markets, of options, futures, swaps, and other complex products is cutting edge. Several journals catering for these advances have sprung up, and many books, ranging from the introductory to the advanced have been written about this new area of application of mathematics.

Broadly speaking, this area is concerned with managing risk at a macroscopic level. The risk that a corporation's share price will drop, that cold weather will damage the harvest, that a hurricane will hit the Eastern seaboard of the USA, and so on. Of course, now that tools which essentially allow one to bet on the future outcome of uncertain events have been developed they have begun to be applied to a wide range of outcomes of other events. They are, after all, essentially gambling instruments.
What has attracted less media interest, however, are the parallel changes which are beginning to impact the personal financial services sector. Perhaps it is because most of these are concerned with the micro level, the level of individual people, that they do not attract such interest. Perhaps it is because the revolution is still at an early stage, and has not built up the momentum of the derivatives market. Perhaps it is because there have been no vastly expensive disasters, such as the LTCM fiasco, which have captured the public attention. Whatever the cause, the