Optimizing Trading Strategies through Genetic Programming

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A number of empirical and theoretical studies (e.g. LeBaron 1999, De Grauwe and Grimaldi 2006) during the last three decades suggest that the application of technical analysis in the foreign exchange market can yield substantial excess returns. Olson (2004), on the other hand, argues that abnormal profit opportunities arise due to temporary inefficiencies which are in accordance with an evolving market. He further argues that the returns of simple trading rules over recent periods have declined, if not completely disappeared.

In this work, rather than studying the performance of a fixed set of rules, we investigate the ability of Genetic Programming (GP) to identify profitable trading signals. GP is an extension of Genetic Algorithms (GAs) that explores a space of computer programs to identify the one that addresses a given task most effectively (Koza, 1992). Like GAs, GP employs genetic operators inspired from Darwinian evolution in order to evolve a population of candidate solutions towards more promising regions of the search landscape. The method allows the construction of rules of arbitrary complexity and, therefore, it can be argued that it resembles the behaviour of an optimizing market agent more adequately than a simple trading rule. Neely *et al.* 1997 employ GP to identify profitable trading rules in several daily foreign exchange rate series. Their findings suggest that trading rules obtained through GP substantially outperform simple trading rules.

As a benchmark we employ the daily Euro US Dollar exchange rate over the period from January 4th 1999 to December 30th 2005. Using one third of the available data to discover rules and the remaining two thirds to evaluate their generalization performance, our preliminary computational experiments indicate that the algorithm is always capable of identifying highly profitable rules in the training set. For a period in the test set equal in length to that of the training set, several of these rules achieve an overall rate of return close to the one they achieved in the training set. Their profitability, however, declines as they are applied to data further into the future. Overfitting is frequently attributed to the presence of noise in the data and is typically encountered in daily foreign exchange rate series. Approaches to overcome these limitations will be considered and discussed.