TICK SIZE, THE COMPASS ROSE AND MARKET NANOSTRUCTURELL

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Economists have begun using methods borrowed from the physical sciences to search for non-linearity's in economic and financial data. The so-called phase portrait from chaos theory, in which the values of a time-series are plotted against their delayed values, is one of the techniques that are employed for this purpose. It has recently been shown, however, that when returns on traded assets are plotted in this manner in two- or three-dimensional space surprising patterns arise which seriously distort the conclusions that can be drawn about the underlying data. These patterns - which resemble a compass rose reflect the microstructure of the market or, more specifically, the finite size of the "ticks" by which prices can change in a market. The present paper clarifies the reason for this phenomenon. It is shown that within the microstructure there exists nano-structure that becomes visible only when the computations are performed without approximation.
High frequency data from a foreign exchange market are used to illustrate this phenomenon,