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# An ecological/evolutionary perspective on high-frequency trading

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## Abstract

What follows is an account of the concepts of information and noise as they apply to an analysis of high-frequency trading according to ‘heterodox economics’. The text proposes a framework according to which finance can best be understood as a complex technical system tightly coupled to other social, economic systems. To be more precise, the paper attempts to show how finance is not just any complex system but it can be understood as an ecology of evolving socio-technical systems, sub-systems such as investment banks, hedge funds, high-frequency trading traders, retail investors, pensions funds, etc. All of these are the technical building blocks of our financial markets. Moreover, we attempt to show how concepts from other disciplines, such as entropy, information and noise, can be useful in opening up the world of finance from its traditional economic milieu. Although the following text is confined to the discursive realm of humanities/social sciences, it echoes the analytical approaches of

econophysics and experimental economics and particularly the ongoing research around ‘computational evolutionary economics’ [Mirowski, P. 2007. “Markets Come to Bits: Evolution, Computation and Markomata in Economic Science.” Journal of Economic Behavior & Organization 63: 209–242; Mirowski, P. 2010. “Inherent Vice: Minsky, Markomata, and the Tendency of Markets to Undermine Themselves.” Journal of Institutional Economics 6: 415–443]. This becomes particularly relevant in the context of the so-called robot phase transition from human-dominated trading to the more automatic electronic trading. The current microstructure of automatic market-making can be understood as an ‘ecological niche’ developed by ultra-fast trading algorithms which ‘feed’ on the asymmetries and disparities of the wider ‘financial ecology’. They do this by dissipating noise and adding to the complexity of market microstructure a behaviour that can push the whole ecology to critical thresholds, sometimes referred to as flash crashes. This whole process can ultimately be described by Philip Mirowski's notion of ‘inherent vice’, as well as by Sir Robert May's concept of instability ‘which develops in ecosystems upon increasing bio-diversity’ [Caccioli, F., M. Marsili, and P. Vivo. 2007. “Eroding Market Stability by Proliferation of Financial Instruments.” The European Physical Journal B – Condensed Matter and Complex Systems 71: 467–479 ; Haldane, A., and R. May. 2011. “Systemic Risk in Banking Ecosystems.” Nature 469: 351–355].

Keywords:

sustainability | capital markets | financial services regulation | sustainable development | accountability

## Notes

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