Diversity and relative arbitrage in equity markets

Konstantinos Kardaras

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A financial market is called "diverse" if no single stock is ever allowed to dominate the entire market in terms of relative capitalization. In the context of the standard Ito-process model initiated by Samuelson (1965) we formulate this property (and the allied, successively weaker notions of "weak diversity" and "asymptotic weak diversity") in precise terms. We show that diversity is possible to achieve, but delicate. Several illustrative examples are provided, which demonstrate that weakly-diverse financial markets contain relative arbitrage opportunities: it is possible to outperform (or underperform) such markets over sufficiently long time-horizons, and to underperform them significantly over arbitrary time-horizons. The existence of such relative arbitrage does not interfere with the development of option pricing, and has interesting consequences for the pricing of long-term warrants and for put-call parity. Several open questions are suggested for further study.