

M2 Research Internship: Optimal mixing of heterogeneous portfolios

May 19, 2021

Laboratory name: CFM Chair of Econophysics & Complex Systems, LadHyX

CNRS identification code: UMR CNRS 7646

Internship location: Ecole polytechnique, Palaiseau, and Capital Fund Management, Paris.

Thesis possibility after internship: YES

Funding: YES

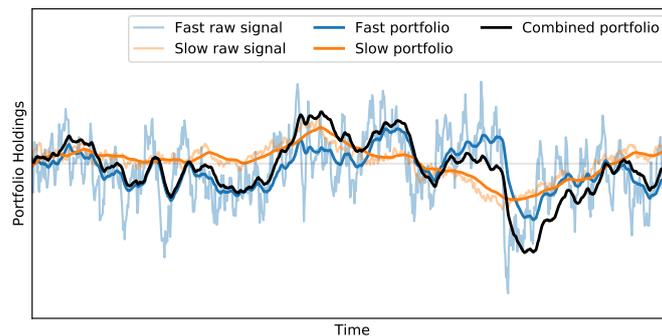
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Subject

The decision of asset managers and hedge funds are typically driven by signals that encompass a vision on future returns within a basket of financial instruments. Such signals are heterogeneous in nature: some of them reflect short-term expectation about the future price trajectory (hours or days), whereas others might reflect long term macroeconomic expectations (years). Whereas in absence of transaction costs, there is a standard way of blending those signals into a unique predictor [3], in presence of costs slow and fast signals might require a different trading style. Unfortunately, besides some simple cases [2], the general solution to the optimal mixing problem is mathematically intractable. Analytical insight can be obtained only in ad-hoc settings by resorting to clever tricks [1, 4].



On the other hand, some progress can be made by employing mean-field approximations and numerical exploration, which is the goal of this internship. We would like to build an intuition of what the optimal mixing policy for heterogeneous trading signal is in some simple, stylized case, possibly capturing that within a toy model providing an intuition on what should happen in more realistic cases.

The internship will be held within the CFM Chair of Econophysics and Complex Systems at Ecole polytechnique (visit www.econophysics.com) in close connection with Iacopo Mastromatteo and Michael Benzaquen (Capital Fund Management). The internship will comprise theoretical and numerical components. A good background in data analysis and Python is advised.

References

- [1] J. DE LATAILLADE, C. DEREMBLE, M. POTTERS, AND J.-P. BOUCHAUD, *Optimal trading with linear costs*, arXiv preprint arXiv:1203.5957, (2012).
- [2] N. GÂRLEANU AND L. H. PEDERSEN, *Dynamic trading with predictable returns and transaction costs*, *The Journal of Finance*, 68 (2013), pp. 2309–2340.
- [3] H. MARKOWITZ, *Portfolio selection*, 1959.
- [4] R. MARTIN AND T. SCHÖNEBORN, *Mean reversion pays, but costs*, arXiv preprint arXiv:1103.4934, (2011).