

## Quantitative Finance &gt; General Finance

# Markets are efficient if and only if $P = NP$

Philip Maymin

(Submitted on 11 Feb 2010 (v1), last revised 13 May 2010 (this version, v2))

I prove that if markets are weak-form efficient, meaning current prices fully reflect all information available in past prices, then  $P = NP$ , meaning every computational problem whose solution can be verified in polynomial time can also be solved in polynomial time. I also prove the converse by showing how we can "program" the market to solve NP-complete problems. Since  $P$  probably does not equal  $NP$ , markets are probably not efficient. Specifically, markets become increasingly inefficient as the time series lengthens or becomes more frequent. An illustration by way of partitioning the excess returns to momentum strategies based on data availability confirms this prediction.

Comments: 33 pages; extended literature review and some additions

Subjects: **General Finance (q-fin.GN)**; Computational Complexity (cs.CC)

Cite as: [arXiv:1002.2284v2](#) [q-fin.GN]

## Submission history

From: Philip Maymin [[view email](#)]

[v1] Thu, 11 Feb 2010 05:56:16 GMT (695kb,X)

[v2] Thu, 13 May 2010 07:26:53 GMT (715kb,X)

*[Which authors of this paper are endorsers?](#)*

Link back to: [arXiv](#), [form interface](#), [contact](#).

## Download:

- [PDF](#)
- [Other formats](#)

Current browse context:

**q-fin.GN**

[< prev](#) | [next >](#)

[new](#) | [recent](#) | [1002](#)

Change to browse by:

[cs](#)

[cs.CC](#)

[q-fin](#)

## References & Citations

- [NASA ADS](#)

Bookmark([what is this?](#))

