Quantifying Trading Behavior in Financial Markets Using Google Trends

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Quantifying Trading Behavior in Financial Markets Using *Google Trends*

SUBJECT AREAS:

STATISTICAL PHYSICS, THERMODYNAMICS AND NONLINEAR DYNAMICS

APPLIED PHYSICS

COMPUTATIONAL SCIENCE

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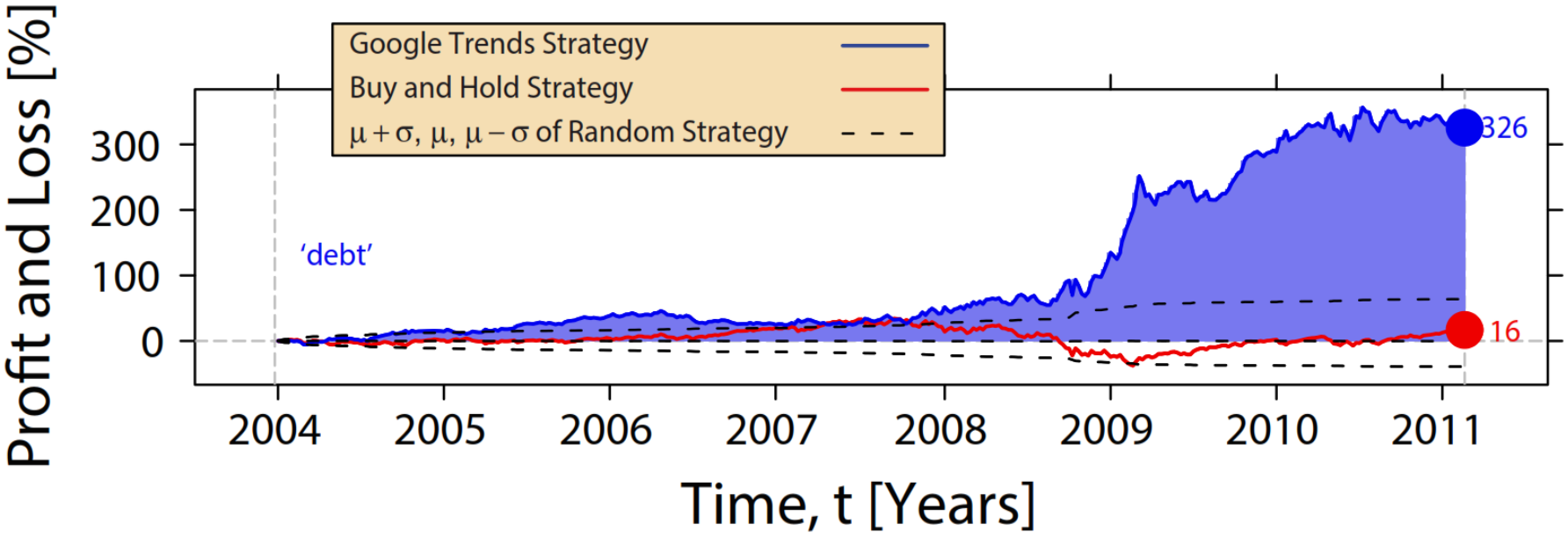
Crises in financial markets affect humans worldwide. Detailed market data on trading decisions reflect some of the complex human behavior that has led to these crises. We suggest that massive new data sources resulting from human interaction with the Internet may offer a new perspective on the behavior of market participants in periods of large market movements. By analyzing changes in *Google* query volumes for search terms related to finance, we find patterns that may be interpreted as "early warning signs" of stock market moves. Our results illustrate the potential that combining extensive behavioral data sets offers for a better understanding of collective human behavior.

Methods

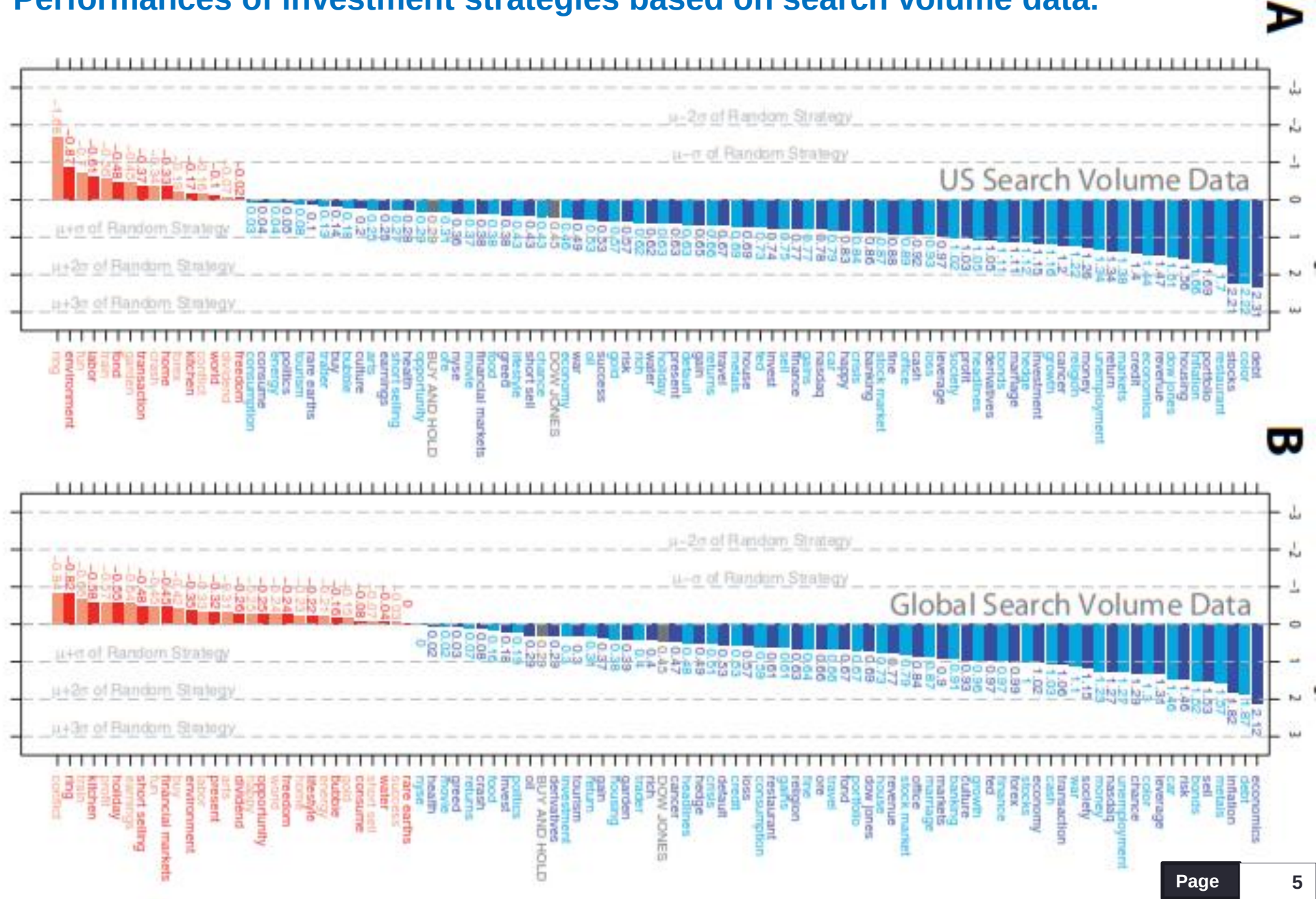
- We suggest that within the time period we investigate, Google Trends data **did not only reflect** the **current state** of the stock markets but may have also been able to **anticipate** certain **future trends**.
- Investors may **search for more information** about the market, before **eventually deciding to buy or sell**.
- Our results suggest that, following this logic, during the **period 2004 to 2011 Google Trends search query volumes** for certain terms could have been used in the **construction** of **profitable trading strategies**.
- We analyze the performance of a set of **98 search terms**.
- We **included terms related to** the concept of **stock markets**.

Cumulative performance of an investment strategy based on Google Trends data

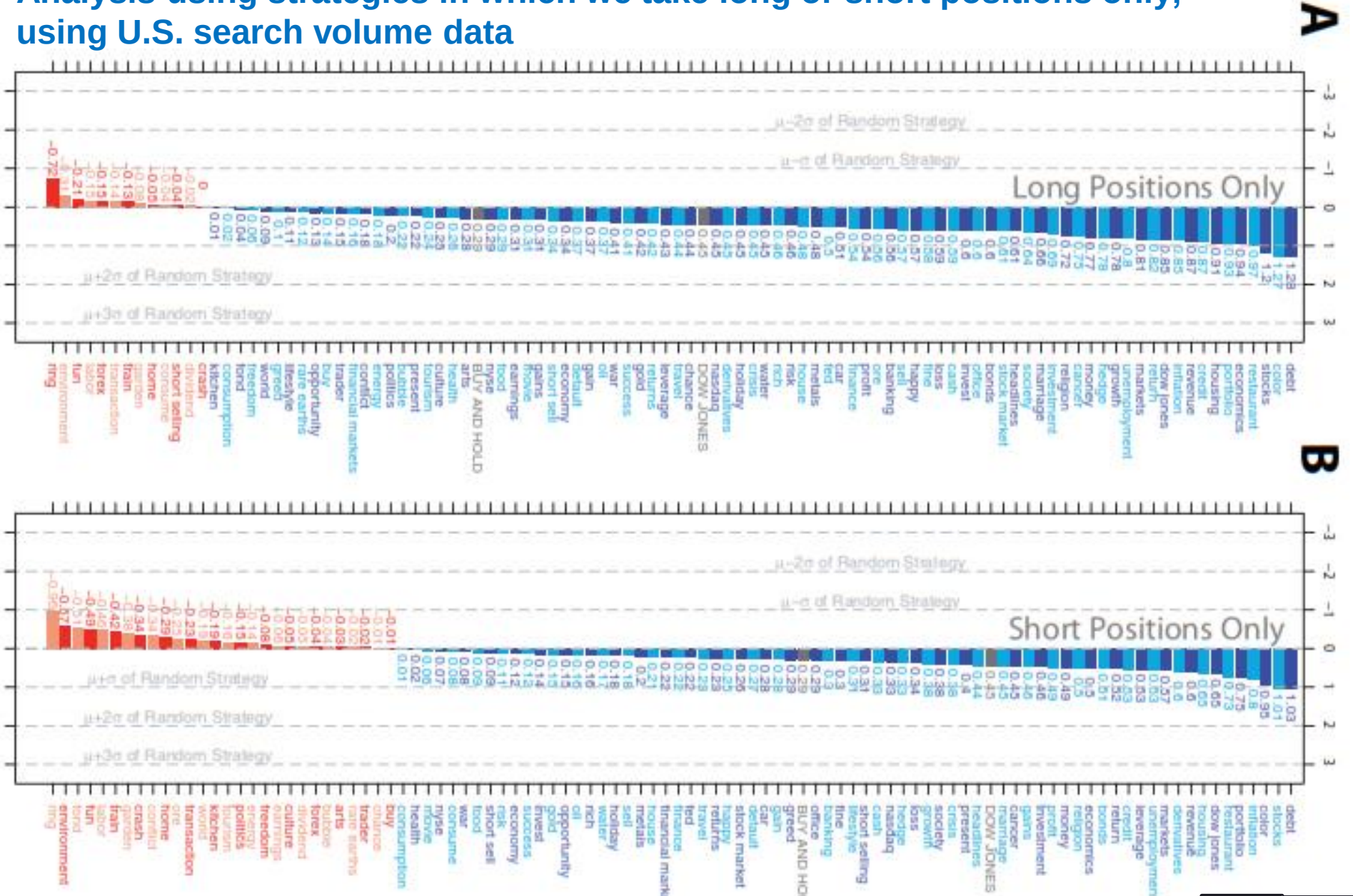


- Profit and loss for an **investment strategy** based on the **volume** of the **search term debt**, the **best performing keyword** in our analysis, with Δt 53 weeks, plotted as a function of time (blue line).
- This is compared to the ‘‘buy and hold’’ strategy (red line) and the standard deviation of 10,000 simulations using a **purely random investment strategy** (dashed lines).
- The **Google Trends strategy** using the search volume of the term debt would have yielded a **profit of 326%.**

Performances of investment strategies based on search volume data.



Analysis using strategies in which we take long or short positions only, using U.S. search volume data



Discussion

- In summary, our results are consistent with the suggestion that during the period we investigate, **Google Trends** data did **not only reflect** aspects of the **current state** of the **economy**, but may have also **provided some insight** into **future trends** in the **behavior of economic actors**.
- Using historic data from the period between January 2004 and February 2011, we **detect increases** in **Google search volumes** for **keywords** relating to financial markets **before stock market falls**.
- Our results suggest that these **warning signs** in **search volume data** could have been exploited in the construction of **profitable trading strategies**.