

Econophysics: Analyzing Market Microstructure with Methods of Statistical Physics

Time evolution of the market response

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Outline

1. Introduction
2. State of the Art
3. What I Want to do?
4. Objectives

Introduction

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Physics

The explanation of the nature (Natural Science)

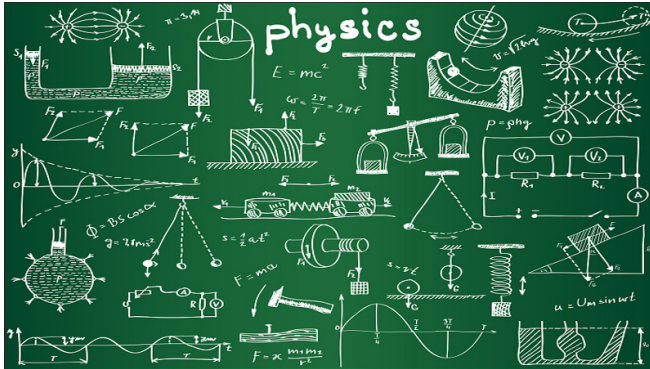


Figure: The main goal of physics is to understand how the universe behaves.

Economics

Is about limited resources and unlimited “wants”



Figure: Social science concerned chiefly with description and analysis of the production, distribution, and consumption of goods and services.

Econophysics

Applies theories and methods developed by physicists in order to solve problems in economics



Figure:

Statistical mechanics

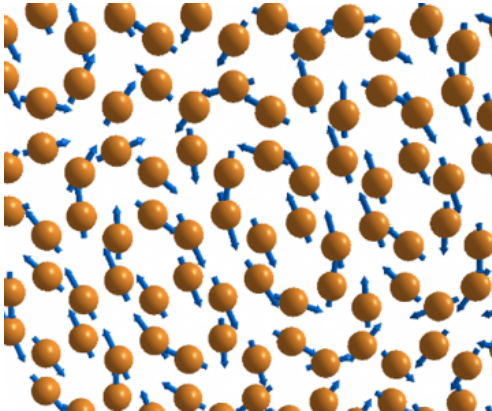


Figure: Many bodies interactions.

Financial markets



Figure: Market in which people trade items of value at low transaction costs and at prices that reflect supply and demand.

Comparison

Physics and Economics

Since the economic phenomena are the result of the interaction among many heterogeneous agents, there is an analogy with statistical mechanics, where many particles interact

State of the Art

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Market

Definition

A market is one of the many varieties of systems, institutions, procedures, social relations and infrastructures whereby parties engage in exchange.

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Order book



Figure: The order book is visible for all traders..

Correlation

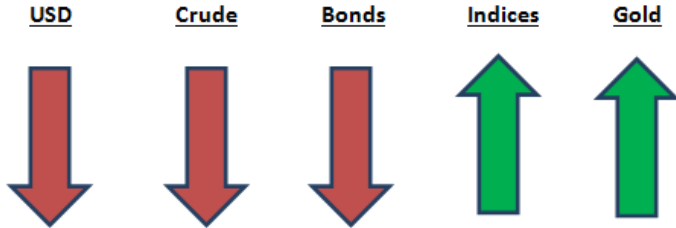


Figure: Market correlation.

Two extreme model scenarios

Efficient Market Hypothesis



Zero Intelligence Trading



Two extreme model scenarios

Efficient Market Hypothesis



Zero Intelligence Trading



Two extreme model scenarios

Efficiente Market Hypothesis



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Random Walk Model



Figure: Daily US-dollar-to-Euro exchange rate (January 1, 1999, to December 5, 2014).

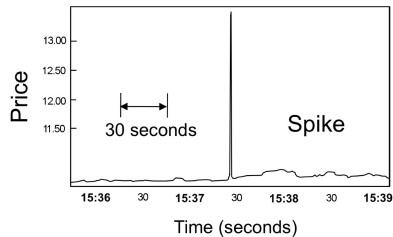
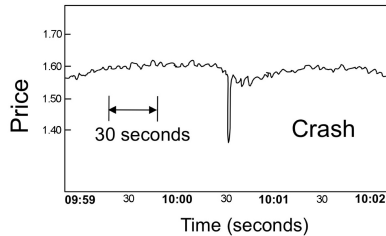
What I Want to do?

Project proposal

Microscopic analysis of stock markets



Ultrafast extreme events



Microstructure in currency exchange markets



Objectives

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General Objective

To analyze market microstructure with methods of statistical physics to understand time evolution of the market response.

Objectives

Specific Objectives

- ▶ To Analyze how universal the results of market response found in 2008 are when compared to a later year to determine time-dependent trends and market efficiency.
- ▶ To analyze ultrafast extreme events and high frequency trading using data set with one- millisecond resolution and refining the definition of a market order to determine time-dependent trends and market efficiency.
- ▶ To explore cross effects for the currency exchange markets to determine time-dependent trends and market efficiency.

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Questions ?