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STATISTICAL MECHANICS AND ITS APPLICATIONS

DCCA cross-correlation in blue-chips companies: A view of the 2008 financial crisis in the Eurozone

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HIGHLIGHTS

- We analyze by DCCA cross-correlation coefficient the blue-chips companies in the Eurozone.
- With the DCCA coefficient, we qualify and quantify how each blue-chip is adherent to its country index.
- From this analysis, we can construct an adhesion map of each company with respect to the global index.

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ABSTRACT

In this paper we analyze the blue-chips (up to 50% of the total index) companies in the Eurozone. Our motivation being analysis of the effect of the 2008 financial crisis. For this purpose, we apply the DCCA cross-correlation coefficient (ρ_{DCCA}) between the country stock market index and their respective blue-chips. Then, with the cross-correlation coefficient, we qualify and quantify how each blue-chip is adherent to its country index, evaluating the type of cross-correlation among them. Subsequently, for each blue-chip, we propose to study the 2008 financial crisis by measuring the adherence between post and pre-crisis. From this analysis, we can construct an adhesion map of each company with respect to the global index. Our database is formed of 12 Eurozone countries.

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1. Introduction

The economy can be understood as a complex system. Complex systems are dynamic, non-linear, adaptive, not-deterministic, and can create emergent behavior with self organized criticality [1–4]. Knowing that we have economic data as a time series, one way to study those time series is by trying to understand auto and cross-correlations arising from these systems [5]. Considering that in general, the relations that move financial markets are still mysterious, cross-correlation analysis between financial time series can be of great importance in understanding the links between these different markets [6–10].

When we have different financial time series, it is possible to analyze their individual behavior. For example, this analysis allow us to identify the dependence of a given time series. This could be done through linear or non-linear approaches. [11]