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# Nationality and risk attitude: Testing differences and similarities of investors' behavior in selected financial markets

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## ABSTRACT

We first applied cluster analysis on selected stock market indexes (NASDAQ, DAX, Nikkei 225, FTSE 100, and Dow-Jones) for identifying four global fundamental patterns of stock markets behavior (to be named "market conditions"). On each of these patterns (attesting similar market conditions) we then applied Support Vector Machine (SVM) classification technique to test for the similarities and differences in the behavior of investors in the various stock markets. Our results show a good degree of separation of investors' behavior for the selected national stock markets (i.e., investors in different national financial markets react differently, facing the same market conditions, while the two US national markets (NASDAQ and Dow-Jones) behave the same). The results could be interpreted as a positive evidence for different investor behavior (and risk attitude) in different national stock markets. The presented approach could be used for further classification of financial indices behavior, and investment strategies associated with multinational investment portfolios.

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## 1. Introduction

The paper presents cross-cultural differences revealed by differences in dynamics of stock indices of several national stock markets. We take a data-driven approach by applying machine learning techniques on historical data indices. Since the efficient market hypothesis assumes that all information is embedded in stock prices (Da-Silva, Matsushita, & Giglio, 2008), the historical data should provide sufficient information on

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prevailing risk level associated with the market conditions for each past time period (Basu, 1997; Kam, Benton, & Pan, 1997). This observation serves as the basis for grouping historical records according to their similarity to form clusters of price vectors associated with homogenous market conditions. On the other hand, the dynamics of stock prices reflects investors' preferences which are largely governed by individual investors risk attitudes and perception (Fellner & Maciejovsky, 2007; Keller & Siegrist, 2006). This observation motivates application of classification algorithms within the clusters to test for differences between records that originate from different national stock markets.

An attitude towards risk and risk perception plays crucial part in individual's decision-making under uncertainty (Bonin, Constant, Tatsiramos, & Zimmermann, 2009). As financial decision making inheritably involves great degree of uncertainty, there is large body of empirical research for modeling and quantifying attitude and perception of risk by various population groups (Dohmen et al., 2011). Understanding risk-related preferences of different individuals based on their socio-economic and demographic profile allows to tailor financial products (e.g. insurance, retirement programs) to match needs of a specific group. It has been shown that personality traits, parents' education level and even person height affect risk perception of an individual (Bonin et al., 2009). Among these factors, the cross-cultural differences play a significant role when analyzing multinational investment strategy (Weber & Hsee, 1999). Thus, it is of interest to identify whether different national stock indices behave differently under similar market conditions.

Since the behaviors of different financial markets depend on their individual market condition (Ardagna, 2009) this paper first identifies four fundamental market conditions and then sets out to examine and compare the behavior of the various selected stock markets under similar conditions. The whole process is described in Fig. 1.

The rest of the paper continues as follows: Section 2 describes the data preprocessing and analysis; Section 3 describes the usage of SVM for finding the differences and similarities between each pair of stock markets. Section 4 describes the results; and Section 5 concludes the paper.

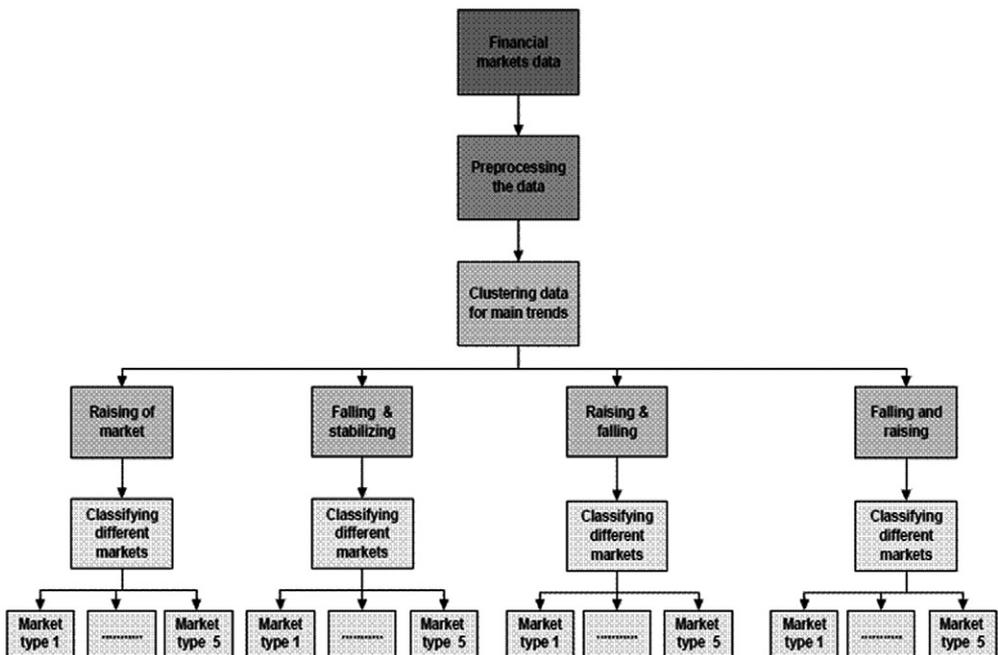


Fig. 1. An overall framework scheme of data analysis process.

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