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Time varying market efficiency of the GCC stock markets

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HIGHLIGHTS

- We examine the weak-form efficient market hypothesis of the GCC stock markets.
- We use employ GARCH-M with state space time varying parameter and the rolling technique sample test on the long memory parameter.
- The Bai and Perron tests are employed to date the shift behavior inside the rolling time series.
- Results show that the GCC markets have different degrees of time-varying efficiency.
- The subprime crises and Arab spring have a significant impact on the time path evolution of market efficiency.

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ABSTRACT

This paper investigates the time-varying levels of weak-form efficiency and the presence of structural breaks for the GCC stock markets over the period spanning from May 2005 to September 2013. We use two empirical approaches: (1) the generalized autoregressive conditional heteroscedasticity in mean (GARCH-M) model with state space time varying parameter (Kalman filter), and (2) a rolling technique sample test of the fractional long memory parameter d. As long memory estimation methods, we use the detrended fluctuation analysis (DFA) technique, the modified R/S statistic, the exact local whittle (ELW) and the feasible Exact Local Whittle (FELW) methods. Moreover, we use the Bai and Perron (1998, 2003) multiple structural breaks technique to test and date the time varying behavior of stock market efficiency. Empirical results show that GCC markets have different degrees of time-varying efficiency, and also have experiencing periods of efficiency improvement. Results also show evidence of structural breaks in all GCC markets. Moreover, we observe that the recent financial shocks such as Arab spring and subprime crises have a significant impact on the time path evolution of market efficiency.

1. Introduction

It is well know that good functioning of the stock market is important in order to achieve an efficient allocation of resources. On the other hand, the efficient allocation of resources relies on the information obtained on the basis of the market prices. Hence, the public authorities should pay more attention to the set up and development of an efficient stock market.

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A substantial literature has focused on the market efficiency. Nevertheless, until now most of previous studies have not only produced mixed results but also been limited to developed and emerging markets. Frontier markets such as those in the Gulf Cooperation Council (GCC) have been widely overlooked despite their growing importance in recent years.

Frontier markets are characterized by political instability, poor liquidity and thin trading, inadequate regulation, weak accounting standards and publication rules, and large currency fluctuation. In addition, many countries are overly dependent on volatile commodities. Moreover, the GCC stock markets are recent compared to developed stock markets, and that some were not even in existence prior to the year 2000 (e.g. Abu Dhabi Securities Market, Dubai Financial Market, and Doha Securities Market). Therefore, investigating the efficiency of the GCC stock markets, which have a special economic, institutional and microstructure features, will be of great importance for both academic researchers and practitioners.

Given that the stock markets in GCC countries are still in the early stages of their development, it is not sensible to address the issue of whether the stock markets are efficient or not. Indeed, it is hardly credible for newly established stock markets to be born efficient since it takes time for the price discovery process to become known. However, as market participants become more experienced and the market system becomes better developed over time, the level of efficiency in these infant markets will gradually improve [1,2]. Hence, the more relevant research question is whether they are becoming more efficient.

A new stand of research has developed since Emerson et al. [1] and Zalewska-Mitura and Hall [2] and Arouri et al. [3]. These studies examine the evolution of the efficiency of stock exchanges over time rather than assessing it at a given point of time. This methodology allows us to explore a continuous and smooth change in the behavior of stock prices and thus captures the evolution of efficiency over time rather than splitting the period into sub-periods on the basis of postulated factors. The advantage of a time-varying parameter model is that it depicts market efficiency as a continuous process. More specifically, in non-overlapped sub-samples studies, the specific event of interest (such as financial liberalization, trading systems automation, the implementation of a price limits system and financial crisis) is selected a priori. Instead, the time varying framework first let the data detect those periods of inefficiency, and then investigators can proceed to identify the associated events.

The aim of the present paper is to implement the evolving efficiency test for the GCC stock markets in order to investigate the dynamics of their weak-form efficiency. To this end, we use daily data from 6 GCC stock markets over the period spanning from May 2005 to September 2013, allowing us to test for the impact of many organizational reforms undertaken by the authorities during the last decade. The sample period also allows us to account for the subprime credit crisis as well as the recent Arab Spring effects on the GCC stock market efficiency. The present paper is therefore better able to know whether the reforms so far undertaken are effective, and thus may help policy-makers to improve market efficiency, in order to reduce distortions in the economy.

In this paper the question of time varying efficiency or ongoing efficiency is investigated using two approaches. The first approach combines the time varying parameter model with the generalized autoregressive conditional heteroscedasticity in mean (GARCH-M) model (state space GARCH-M(1,1) model). The second approach is based on rolling window technique which gives a time varying estimate of the fractional long memory parameter "*d*". Moreover, both parametric and non-parametric tests of long memory estimation methods are used in this study (the modified R/S statistic, the detrended fluctuation analysis (DFA) technique, the exact local whittle (ELW) and the feasible Exact Local Whittle (FELW) methods). Further, the ranking of markets is made based not only on the mean or the median of the estimated values of the long memory parameter, but also on the percentage of time window that market departs from efficiency. Finally, we use the Bai and Perron (1998, 2003) multiple structural breaks technique to test and date the time varying behavior of stock market efficiency.

The novelty of this paper lies in the following. Firstly, we use the most recent data from May 2005 to September 2013, a large period that allows us to account for the global financial crisis as well as the recent Arab Spring effects. Secondly, recently developed long memory and structural break tests have been implemented in the analysis. To the best of our knowledge, till now no study has examined the efficiency of GCC markets using all of these methods and sample period.

The remainder of this paper is organized as follows. Section 2 presents the literature review of market efficiency and the GCC stock markets. Section 3 presents the empirical methodology. Section 4 describes the data and discusses the empirical results. Finally, Section 5 concludes the paper.

2. Market efficiency and GCC stock markets

2.1. Literature review of market efficiency

The efficient markets hypothesis (EMH) defines an efficient market as one in which new information is quickly and correctly reflected in its current security price. Fama [4] classifies the EMH into the weak-form, semi-strong-form and strong-form. In the present paper, we focus on the weak-form version, which asserts that security prices fully reflect all information contained in the past price history of the market.

Previous studies test the predictability of stock returns on the basis of past price changes. These studies employ many statistical tests to detect different types of deviations from a random walk in financial time series, such as linear serial correlations, unit root, nonlinear serial dependence and long memory. A survey of previous empirical evidences on the EMH

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