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# Price limit bands, asymmetric volatility and stock market anomalies: Evidence from emerging markets<sup>☆</sup>

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### ABSTRACT

I investigate the effects of imposing different bands of price limits on stock returns and volatility in the Egyptian (EGX), Thai (SET) and Korean (KRX) stock exchanges. In addition, the paper examines whether the switch from narrow price limits (NPL) to wider price limits (WPL) structurally alters volatility and the day of the week anomaly. Using the extended EGARCH and PARCH asymmetric volatility models, I found that the switch from NPL to WPL structurally altered both asymmetric volatility and the day of the week anomaly in the EGX, SET and KRX. I argue that the price discovery mechanism is disrupted due to the switch as closing prices do not fully reflect all information arrived in the market when prices hit the limits and that is reflected on volatility and market efficiency.

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## 1. Introduction

Price limits are regulatory tools in both equity and futures markets in which further trading is prevented for a period of time with the intention of cooling market traders' emotions and reducing price volatility.<sup>1</sup> The trigger for such limits is when prices hit particular pre-specified price boundaries.<sup>2</sup> The proponents of price limits argue that they are efficient in reducing price volatility and providing time for both brokers and investors to adjust their portfolio positions. However, the opponents claim that these regulatory tools are useless as they lead to spreading out price volatility over a longer time, delaying price discovery, and

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<sup>1</sup> Kim and Yang (2004) argue that there are three main categories of circuit breakers, namely, price limits, firm-specific trading halts and market-wide circuit breakers.

<sup>2</sup> Price limits have a long history and were first implemented in the Japanese rice futures market (the Dojima exchange) in the eighteenth century (see Chung and Gan, 2005). In 1917, price limits on cotton futures contracts were used in the US. The Chicago Board of Trade (CBOT) adopted this regulatory tool in 1925 (Kim and Yang, 2004).

interfering with trading activity. See for example; Santoni and Liu (1993), Subrahmanyam (1994), Kim and Rhee (1997), Phylaktis, Kavussanos, and Manalis (1999), Lee and Chung (1996) and Ryoo and Smith (2002).

The efficient market hypotheses (EMH) state that stock prices should reflect all information disseminated in the market, so that price limits or any other regulatory policies may have a negative impact on stock markets (trading interference and volatility spillover hypotheses). In addition, imposing these regulatory policies implies a degree of market inefficiency and a clear violation of the semi-strong efficient market hypothesis, as price limits prevent stock prices from reaching their equilibrium levels (Kim & Rhee, 1997). Lee and Chung (1996) and Ryoo and Smith (2002) argue that price limits result in clear violation of the weak form market efficiency hypothesis as information is not fully reflected in closing prices when prices hit the limits in the Korean stock market. The existing body of the literature documents that price limits have three main effects namely volatility spillover, delayed price discovery mechanism and trading interference (Kim and Rhee, 1997). Lehmann (1989), Kim and Rhee (1997), and Lee, Ready, and Seguin (1994) among others argue that price limits interfere with the price discovery mechanism as imposing limits prevents prices from reaching their equilibrium levels and cause price volatility to spread out over the subsequent trading days following limits hit.

On the other hand, emerging stock markets are known to be more volatile and less efficient than well established markets. In particular, thinly trading markets are likely to be more risky and therefore the effect of shocks is greater than in larger, established markets. The existing body of literature on price limits investigates narrow price limits in many stock exchanges i.e. Tokyo and Athens Stock Exchanges (Kim and Rhee, 1997; Phylaktis et al., 1999). The empirical findings of these papers are mixed, therefore we cannot really decide whether narrow price limits decrease volatility and cool down the market. A question therefore arises as to whether price limits do in fact reduce price volatility, and secondly, do price limit regimes structurally alter *daily* stock returns and volatility. Finally, is there a relationship between these regulatory policies and stock market anomalies such as the day of the week phenomenon? There are a few stock exchanges over the world that have experienced a transition from narrow price limit to a combination of wider price limits and trading halts. However, there are no other studies – to the best of my knowledge – that have empirically investigated the relative efficiency of the alternative price limit regimes and the potential effect on stock market anomalies such as the day of the week effect. I try to fill this gap by using data from the Egyptian stock exchange (EGX), stock exchange of Thailand (SET) and Korean stock exchange (KRX). This paper then has two main objectives; firstly, it investigates the effects of imposing different bands of price limits on stock returns, volatility and the day of the week anomaly in the EGX, SET and KRX. Secondly, the paper examines whether the switch from narrow price limits (NPL) to wider price limits (WPL) structurally alters daily stock returns, volatility and the day of the week anomaly.

Using the extended EGARCH and PARCH time varying conditional variance models, I find that daily stock returns in EGX, SET and KOSPI are characterised by EGARCH and PARCH asymmetric volatility models with a generalised error distribution. Volatility persistence and clustering are highly significant for the three indices. I also found that negative shocks (bad news) have greater impact on conditional volatility compared with positive shocks (good news) for EGX30, SET and KOSPI. Thursday and Friday have positive and highly significant impact on returns for the SET and EGX30 respectively. However and consistent with the literature, Monday effect is reported in the SET. Results also show that there is no day of the week effect on returns in the KRX. Results suggest that the switch from narrow price limits (NPL) to wider price limits (WPL) structurally affects both asymmetric volatility and the day of the week anomaly in the Egyptian, Thai and Korean stock exchanges. Finally, The Power ARCH parameters are highly significant and their size is bigger within WPL windows. This suggests that the switch from NPL to WPL has significant and positive impact on conditional volatility of EGX30, SET and KOSPI market indices.

The paper has clear policy implications for the regulators in emerging markets as it investigates whether narrow or wider bands of price limits leads to more stock price stability and cool down emerging market volatility. Moreover as the paper links between the different regulatory policies and the day-of-the-week anomaly, it highlights potential causes of market inefficiency. The rest of the paper is organised as follows. Section 2 presents the literature survey and hypotheses development. Section 3 provides a brief background of the price limit regimes in EGX, SET and KRX. Section 4 describes the dataset. Sections 5 and 6 present details of the econometric modelling and the empirical results respectively. A conclusion is presented in a final section.

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