



Are price limits really bad for equity markets?

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ABSTRACT

Despite widely documented criticisms, price-limit rules are present in many equity markets around the world. Using a game-theoretic model, we argue that, if the cost of monitoring a market is high, price-limit rules are beneficial. Empirical tests based on a cross section of 43 equity markets across five continents support our theoretical prediction. We find that the probability of the existence of price-limit rules is greater in markets that incur higher monitoring costs due to poorer business disclosure, more corruption and less efficiency in legal, regulatory and technological environments.

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1. Introduction

In this paper, we provide a rationale for the popularity of price-limit rules in many equity markets around the world. We investigate the conditions that encourage stock exchange officials to consider rule-based price limits along with discretionary trading halts. We focus on the costs associated with completely replacing rule-based price limits with discretionary trading halts. We argue that, given the high expenses associated with continuous market monitoring, the use of rule-based price limits is determined by the level of maturity of a stock market and the systematic efficiencies in its legal and regulatory environment. In markets where monitoring costs are shared between the firms and the regulator, the use of price-limit rules will be much lower. For example, NASDAQ Stock Market Rules IM-4120-1, 4310(c)(15) and 4320(e)(13) require listed firms to provide full and prompt responses to NASDAQ requests for information related to unusual market activity or to events that may materially impact the trading of its securities. Likewise, the Australian Stock Exchange's (ASX) Rule 3.1B obliges firms to monitor mar-

ket trading continuously and to explain any abnormal trading activity questioned by the exchange. It should be noted that stock exchanges take several other monitoring and governance measures to enhance the effectiveness and the fairness of equity markets.¹

We argue that the cost of market monitoring is high when a market has systematic inefficiencies, such as poor business disclosure or lack of infrastructure or legal support. This is consistent with the findings of Frost et al. (2006). Therefore, regulators and exchange officials in such markets are often less informed and less equipped to detect information asymmetry and market abuse. As a result, in these markets, discretionary measures such as trading halts are not only costly, but also inadequate to serve as an optimal price-stabilizing mechanism. There are several instances of equity exchanges and market regulators explicitly stating the use of daily price-limit rules as a means to curb market manipulations. The Philippine Stock Exchange mentions on its website that price limits are used to reduce market manipulation. The Securities Exchange Board of India is currently contemplating an introduction of price

¹ Chang et al. (2008) document that day-end price manipulation declines after the adoption of the call market method to opening and closing on the Singapore Exchange (SGX). Chelley-Steeley (2008) observes that after the introduction of the closing call auction by the London Stock Exchange stocks adjust quicker to new information. Lagoarde-Segot (2009) argues that the market development in emerging market microstructures is affected by interrelated economic and political factors.

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limits on the first day of re-listing of suspended stocks to control price manipulative activities.²

Our study makes two contributions to the literature. First, to the best of our knowledge, as one of the few studies to model the role of price-limit rules in the context of price manipulations, our paper is the first to explicitly incorporate market monitoring costs into the tradeoff analysis. Second, we support our theory with a comprehensive empirical analysis using price-limit rules data covering more than 80% of the world's stock markets. Consistent with our theoretical predictions, we find that the probability of the existence of price-limit rules is higher in countries that face higher monitoring costs due to poorer business disclosure, higher corruption levels and lower efficiency in the legal, regulatory and technological environments.

A recent paper by Kim and Park (2010) is closely related to this study, in that they also investigate the role of price-limit rules in the presence of price manipulators. Our paper differs from theirs in three important ways. First, the theoretical model of Kim and Park (2010) focuses on how price limits can reduce the profitability of price manipulation. In contrast, our model emphasizes the benefits of price limits to the market regulators and participants. Second, Kim and Park (2010) do not model the costs of market monitoring, which regulators must incur to be effective. Our model incorporates cost and efficiency of market monitoring and shows how these variables may influence the existence of price-limit rules. Third, Kim and Park (2010)'s model is silent about the negative impacts of price-limit rules on market quality. As empirical evidence suggests that price limits affect price discovery and liquidity, we include these costs in the regulator's benefit function. Our model incorporates the possibility that price limits may decrease the profit potential of market manipulators and can make market monitoring more effective but, at the same time, may reduce the regulator's benefits from an orderly market. In a market where monitoring is costly, our model characterizes the conditions under which the benefits of price limits exceed the costs.

The rest of the paper is organized as follows. Section 2 provides the context of our paper in the price limits literature. Section 3 presents the theoretical model. Section 4 defines the econometric model and the data. Section 5 presents the empirical analysis. Section 6 concludes.

2. Background

Rule-based price-stabilizing mechanisms for individual securities, namely, daily price limits, are common to many stock exchanges around the world. Daily price limits are imposed when a given security price crosses above or below a pre-determined value. The existing literature on price-limit rules does not provide a formal theory justifying the existence of price-limit rules in equity markets.³ The main justification for price limits is that they can reduce price volatility and overreactions. However, these arguments have received limited support from academic researchers. For example, Fama (1989) and Lehmann (1989) criticize price-limit rules, claiming that they cause volatility spillover, delayed price discovery and trading interference.

² Please refer to FAQ section of the Philippine Stock Exchange website <http://www.pse.com.ph/html/Faq/faqs.html>. For detail information regarding price limits and price manipulation on first day of re-listing in the Indian market, refer to the news article titled "KGN relists after 7 years, zooms to Rs. 55,000," published on 22nd May 2008 in Business Line, an Indian business daily: <http://www.thehindubusinessline.com/2008/05/22/stories/2008052252090100.htm>.

³ Brennan (1986), Kodres and O'Brien (1994) and Anshuman and Subrahmanyam (1999) provide theoretical models explaining the existence of price-limit rules in futures markets, while Harris (1998) offers a political economy explanation for the existence of market-wide circuit breakers.

Subrahmanyam (1994) shows that rule-based price-stabilizing mechanisms increase market volatility and reduce liquidity. Empirical studies such as Chen (1993), George and Hwang (1995) and Kim and Rhee (1997) provide evidence that price-limit rules make markets more volatile over longer periods and interfere with liquidity and the price discovery process. Cho et al. (2003) report evidence of "magnet effects," in which the mere existence of price-limit rules can accelerate the speed at which large price movements are realized.

In summary, the existing evidence does not support the reasons that have been put forward for the use of price-limit rules in equity markets. However, as reported in Table 1, stock exchanges in 41 out of 58 countries that comprise our initial data sample impose such rules. The puzzling existence of price-limit rules in numerous equity markets motivates us to investigate the conditions that lead stock exchange officials to impose price limits on equity markets.

3. The model

This section describes our reduced-form model of the interactions between the regulator and manipulators in an equity market. The regulator in our model can be viewed as a stock exchange. It is important to note, however, that some functions of market regulatory authorities (e.g., US Securities Exchange Commission (SEC)) overlap with those of stock exchanges. We define a manipulator as an individual (or a group of individuals) who destabilizes security prices in the market for private gain. Examples of such manipulators include the colluding market intermediaries described in Khwaja and Mian (2005), fraudulent traders such as Jonathan Lebed⁴ and other manipulators of the internet bubble era, as described in Leinweber and Madhavan (2001).

To model the strategic game between the regulator and manipulators, we use a variant of the inspection game. In the literature, inspection games have applications in areas ranging from environmental regulation and crime control to accounting and economics.⁵ We assume that in equity markets there is one group of traders, which can manipulate security prices for its own benefit. This group is called "manipulators". Other traders are aware of the possibility that manipulators may be present in the market; accordingly, a regulator who ensures the fairness of the market's trading process is essential in providing the confidence that genuine traders (those who do not manipulate price) require to trade. In this model, the regulator represents the market's genuine traders. Although the market includes many securities, without loss of generality, the model describes a single representative security.

The regulator's objective is to keep order in the market. In an orderly market, traders are expected to earn a daily normal return, r . Mahoney (1997) discusses the economic incentives for a stock exchange to provide an orderly market to investors. The regulator's net benefit from an orderly market is v , which is closely related to the market's liquidity and price efficiency. We do not use explicit variables that represent the market's price discovery and liquidity. Instead, the higher value of the market regulator's net benefit (v) from the orderly market implicitly reflects greater liquidity and better price discovery in the market. The regulator knows that manipulators can manipulate security prices to earn an abnormal profit ($p > r$) at the expense of other traders. Rather than rely on any specific form of market manipulation, we assume that market manipulators can be of any generic form discussed in Allen and Gale (1992). We also assume that manipulators can manipulate

⁴ Fifteen-year-old Jonathan Lebed manipulated the US stock market between September 1999 and February 2000 using a pump-and-dump strategy. The SEC charged him on 11 separate occasions (Schroeder et al., 2000).

⁵ Avenhaus et al. (1998) provide a detailed survey of various forms of the inspection game and their applications.

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