



**THE ROLES OF CIRCUIT BREAKERS
IN MALAYSIAN CAPITAL MARKET:
AN IN-DEPTH ANALYSIS**

BY

IMTIAZ MOHAMMAD SIFAT

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ABSTRACT

This thesis investigates an oft-implemented intervening instrument in financial markets: circuit breakers. Proponents claim it endows a propitious time-out when asset (or market) prices are stressed and persuades traders to make rational trading decisions. Empirical works examining performances of regulatory rationales, such as deterring volatility, enhancing price discovery, interferences in trading, and a self-fulfilling gravitational pull (dubbed the *magnet effect*) seem to mushroom soon after headline-grabbing financial crises or flash crashes (as in May 2010 in the US). Though Asian markets such as Korea, Taiwan, Tokyo, Shanghai, and Shenzhen dominate the studies with mixed results, the only major study undertaken in Malaysian market by Chan et al. (2005) found evidence of worsening market quality, using transaction data from 1995. Since then, KLSE has become BM, trading platforms have grown sophisticated, and circuit breaker regime in the bourse underwent tweaks. Despite the changes, the limit of ± 30 percent is intact since 1989, albeit with some qualifications. This is rather puzzling, for (a) most exchanges prefer a very tight collar, (b) many exchanges experiment with the limit in tranquil times, presumably in quest of an optimal collar, (c) advanced exchanges commission studies corroborating the efficacy of the proposed regime and make the results known, and (d) most exchanges play with the circuit breaker around market crash periods to forestall the crash or reinforce confidence. Somehow, Bursa Malaysia did none for nearly 3 decades. The investigations of this thesis report result that are mixed to varying degrees of statistical robustness with no clear indication of improvement in stopping volatility to spill over the subsequent trading days and delay in emergence of equilibrium price. The limits, however, do not appear to interfere with trading activities, an indirect proxy for liquidity. The third empirical investigation utilizes proprietary high-frequency intraday data from January 2015 to September 2017 to examine existence of magnet effect and finds mixed evidence supporting a weak form of magnet effect and nearly as much repellant effect. Vast majority of stocks, however, exhibited neither. Moreover, price acceleration in magnet-esque scenarios were severe for most stocks with disproportionate lack of support from underlying order flow and volume. Lastly, the overall performance of different circuit breaker regimes in promoting efficient pricing via random walk is examined for affected stocks through a battery of parametric and nonparametric tests. The evidences favor the regulatory practice and indicate a liberal band corresponds with propensity for greater random walk.

ملخص البحث

تبحث هذه الأطروحة في أداة متداخلة تنفذ في البنية المجهرية للسوق المالي: وهي قواطع الدارات. مستوحاة من استخدام الهندسة الكهربائية للمصهر وقايةً من الضرر الذي يلحق بالدائرة بسبب الفائض الحالي. والمنظمون الماليون والتبادلات، منذ أواخر الثمانينيات، بدأوا استخدام الياقات المفوضة لمنع تقلبات الأسعار إلى ما هو أبعد من أي شريحة تعدُّ معقولة. هذه الممارسة، على الرغم من انتشارها في أسواق الأسهم والعقود الآجلة، كانت مثيرةً للجدل. يدّعي أنصارها أنها تمنح مهلة ملائمة عندما يتم تأكيد أسعار الأصول (أو السوق)، وإقناع التجار لاتخاذ قرارات التداول الرشيد. ويقلل المعارضون من قوتها، حيث يلوّحون بها بوصفها حاجزاً أمام عملية اكتشاف سعر الشراء. نظرًا لوجود أدلة تجريبية متضاربة، ولصعوبة قياس الوقائع المضادة ومجموعة كبيرة من القيود المنهجية الإحصائية، فإن خبراء الاقتصاد الماليين وخبراء الصناعة يتشاركون في وجهات نظرهم فيما يتعلق بكفاءة قواطع الدوائر. ومع ذلك، وتعزيز اكتشاف الأسعار، والتدخلات في التداول، وسحب الجاذبية التي تحقق ذاتها (التي يطلق عليها تأثير المغناطيس)، تتكاثر بعد وقت قصير من الأزمات المالية أو حوادث الأعطال (كما حدث في مايو 2010م، في الولايات المتحدة). في الواقع، كان العمل النظري في الميدان راكدًا في أواخر التسعينيات، حيث كان من الصعب القيام بأعمال تجريبية لاختبارها بسبب عدم وجود أطر، وقلة حادة في البيانات، وعدم معالجة القيود الإحصائية. وإن كان ببعض المؤهلات. هذا الأمر محيرةً إلى حدٍ ما، لأنّ (أ) معظم التبادلات تفضل طوعًا ضيقًا للغاية، (ب) عديد من التبادلات التجريبية مع الحدّ في أوقات هادئة، ويفترض في البحث عن الطوق الأمثل، (ج) دراسات لجنة التبادل المتقدمة التي تؤيد فعالية النظام المقترح وجعل النتائج معروفة، و(د) تؤدّي معظم التبادلات مع قاطع الدائرة حول فترات انهيار السوق لتحطيم الانهيار أو تعزيز الثقة. بطريقة أو بأخرى، لم تفعل بورصة ماليزيا أي شيء منذ ما يقرب من ثلاثة عقود، ودعتنا للتساؤل: (أ) هل حدّ السعر في ماليزيا يعمل حقًا لتحقيق أهدافه المعلنة؟ و (ب) هل $\pm 30\%$ حقًا البقعة الحلوة؟ إذا كان الأمر كذلك، لماذا الجميع يفضلون تشديد الفرقة؟ هذه الرسالة تحاول إخماد هذه

الاستفسارات، ولتحقيق ذلك، ينقسم التحقيق الأول إلى توليفة من البحوث والممارسات العالمية والإقليمية من قواطع الدوائر وعديد من المتغيرات الفرعية، والأساس المنطقي التنظيمي، ومع ذلك، لا يبدو أنّ الحدود تتداخل مع أنشطة التداول، وهو وكيل غير مباشر للسيولة. يستخدم التحقيق التجريبي الثالث بيانات عالية التردد خلال اليوم في الفترة من يناير 2015م، إلى سبتمبر 2017م، لفحص وجود تأثير المغناطيس ويجد دليلاً مختلطاً يدعم شكلاً ضعيفاً من تأثير المغناطيس وتأثير مطرد تقريباً. ومع ذلك كانت الغالبية العظمى من الأسهم لا تظهر. علاوةً على ذلك.

APPROVAL PAGE

The thesis of Imtiaz Mohammad Sifat has been approved by the following:

Azhar Mohamad
Supervisor

Zarinah Hamid
Co-Supervisor

Ahmad Fawwaz bin Mohd. Nasarudin
Internal Examiner

Hawati Janor
External Examiner

Noryati Ahmad
External Examiner

Mohammad Naqib S/O Ishan Jan
Chairman

DECLARATION

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'If you are grateful, I will surely increase you [in favor]' (Qur'an: 14-07)

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CHAPTER ONE

INTRODUCTION

1.1 CIRCUIT BREAKERS

Mondays are usually associated with the color blue. It's the day of the week dreaded by employers, employees, students, professors, janitors, and just about everyone else. The 19th of October in 1987 was a Monday too. In financial market literature, this day has the unholy distinction of being known as "Black Monday." On this day, the S&P 500 dropped from 283 to 225—a 20.5percent intraday fall. The resulting loss in market capitalization has been estimated at over USD 20 billion (Bogle, 2008). In the same month, 19 other international exchanges experienced a plunge of 20 percent or more. Most notably, Hang Seng Index lost 45.8 percent of its value in that month. In the aftermath of the crash, The Brady Commission Report (1988) proposed widespread implementation of circuit breakers in a bid to provide a cool-off period to investors, which they can use to assess market information and reflect on price levels. Circuit breaker, for the uninitiated, refers to a gamut of automated or discretionary mechanisms employed in financial markets that restrict, interrupt, and/or suspend trading of securities temporarily. The Brady Commission's hope was that investors will use the time-out to make rational decisions, unencumbered by fear or panic. The commission's report, broadly supported during the Ronald Reagan administration, helped single-handedly propel this whole new genre of financial market intervention across the globe.

Circuit breakers, at a conceptual level, were not novel in 1988. Hieronymus (1971) had conjectured about the possibility of using limits in commodity futures markets to collect margins. A decade later, Brennan (1986) advanced a theoretical model arguing in favor of the aforesaid efficiency. Nonetheless, with negligible

practical use, such discourse was tangential to financial economists, until revived by the Black Monday crash. Since then, circuit breakers have enjoyed remarkable popularity among regulators and exchanges. Its most popular variant—price limit—affixes a maximum fluctuation limit on a daily or per-session basis for individual securities. Trading halt, per contra, entails temporary suspension of trading based on pre-set rules. Halts can be asset-specific or market-wide. If market-wide halt conditions are met, the whole market is suspended, regardless of whether individual asset price fluctuation limits are triggered. Real life examples of these are provided below (Table 1.1):

Table 1.1 Recent Real-Life Examples of Different Circuit Breaker Activations

Price Limit	On September 14, 2017, Sazgar Engineering Works Limited (Ticker: SAZEW) in Pakistan Stock Exchange (PSX) closed at Rs. 157.15. PSX employs a ± 5 percent price limit. This means the next day SAZEW's price cannot go over $(157.05 * (1 + .05)) = \text{Rs. } 165.00$ or below $(157.05 * (1 - .05)) = \text{Rs. } 149.19$. In subsequent days, SAZEW triggered the upper limit (<i>ceiling</i>) 3 days in a row. As such, prices closed at Rs. 165, Rs. 173.25, and Rs. 181.91 on September 14, 15, and 18. Two weeks later, SAZEW also experienced a lower-limit (<i>floor</i>) trigger. With a closing of Rs. 171.31 on September 26, price fell to Rs. 162.75 on September 27—registering a 5 percent (maximum) fall. (Source: PSX)
Asset-Specific Trading Halt	On October 18 th , 2017, Universal Stainless & Alloy (Ticker: USAP) was halted by NASDAQ (Source: NASDAQ). The reasons cited are: <ul style="list-style-type: none"> a) Code: T1—impending release of material news. b) Code: T2—dissemination of news through regulatory compliant method(s). c) Code: T3—resumption upon NASDAQ determination that extraordinary price-volume action no longer threatens pricing integrity.
Market-wide Trading Halt	A glitch in the trading platform triggered a market-wide circuit breaker as AMZN (Amazon) fell by 87 percent and many large-cap stocks' prices moved up or down to exactly USD 123.47. (Source: Thomson Reuters DataStream)

While price limits are easily calculable as per parameters set by authorities, trading halts enacted for firm-specific events or market-wide anomalies are more

intricate. For example, NASDAQ and New York Stock Exchange (NYSE) enforce 35 different codes for trading halts. Among them, the most common are material news, corporate action, abnormal market activity, regulatory concern, etc.

Compared to halts, price limits enjoy more popularity in the emerging and frontier markets—especially the Middle East, South Asia, South East Asia, and Far Eastern markets. Major stock exchanges that don't utilize price limits include London Stock Exchange, American and Canadian markets, and Australian Stock Exchange (ASX). Some American futures markets, however, employ price limits—requiring an initial margin. If the margin account value dips below the maintenance margin ratio as per mark-to-market daily settlement, the investor faces a margin call: i.e. is requested to top-up the lost amount. This helps assuage the risk of default through stipulating a maximum to the additional funds required.

Though the regulatory hope of price limits is to prevent market panics and, by extension, crashes, critics contend that price limits can exacerbate volatility, delay discovery of equilibrium price, interfere with trading, and exhibit a gravitational pull towards themselves (Kim, Liu & Yang, 2013). Thus, a long debate persists among academics and practitioners on whether price limits are effective. Till now, the debate is not settled. The next section discusses what an ideal limit is.

1.2 WHAT CONSTITUTES A GOOD PRICE LIMIT?

At its essence, regulators employ price limits to deter panic and prevent market crashes. Therefore, a regulator hopes that price limits contribute to price reversal, not price continuation. For instance, let's say—in reaction to a public news arrival—price of TENAGA falls from RM 15.00 to RM 10.50 (a 30 percent fall) on Monday. On Tuesday, regulators (and investors) hope to see a price above RM 10.50 rather than a continued fall, because that would imply price limits on Monday simply delayed adjustment of price to new fair value of—say—RM 9.50. If price does indeed fall to RM 9.50 on Tuesday, it shows that the limits principally failed to accommodate alignment of prices to fundamentals. Another purport of circuit breakers is to reverse market overreaction endemic to extreme positive or negative price movement episodes. Kim and Rhee (1997) argue that in price limit regimes, large price drops occur due to investor overreaction to lower-limit hits. Thus, if the stock's new equilibrium level lies higher than the limit threshold, limits prevent traders from realizing unnecessary losses by selling at a price lower than equilibrium. Likewise, in a large price up-swing due to investor overreaction in presence of upper-limit hits, if the stock's equilibrium lies lower than the *ceiling*, a good price limit prevents investors from overpaying for the stock via buying at an irrational premium.

Theoretical and empirical discourse on what makes a price limit optimal is also plagued by what is known as counter-factual dilemma. Put simply, there is no way to ascertain what could/would/should have happened had the limits not been in place. This makes empirical testing and determination extremely difficult (Kim, Yague & Yang, 2008). The best efforts of academia have been restricted to experimental tests of limits' performance in enabling price discovery, tracking continuation and reversal patterns, and scrutiny of interference to trading activities. Thus, our understanding of an ideal

price limit can only be speculative and qualitative—i.e., a good price limit is one that allows investors to execute their trading plans, presents least frictions, counters overreaction, and lowers volatility. Quantification in percentage or nominal terms is extremely difficult and thus rarely attempted in academia. The next section outlines our laboratory Bursa Malaysia's history with circuit breakers.

1.3 EMPIRICAL SETTING: MALAYSIA

Historically, Kuala Lumpur Stock Exchange (Bursa Malaysia) enacted circuit breaker rules first on 4th of May 1989. The limits at the time were stipulated at ± 15 percent per trading session for old listings and ± 500 percent for new listings. Under this system, stocks were prevented from rising above or falling below a predetermined price level for a trading session. This limit was later doubled to ± 30 percent per session in December 15, 1989. Presently, the ± 30 percent stock-wise limit is in effect on a per-day basis, complemented by an intraday ± 8 percent limit—known as dynamic limit. The former entails a maximum of 30 percent deviation from the theoretical opening price determined in morning auction, and the latter means the trading platform will reject any order 8 percent over and above the last transacted price on intraday basis.

Bursa Malaysia justifies this practice through claims of internal study of index movements over a period of time including instances of sudden and sustained deceleration of index as well as a comparative study of international best practices (Asmar & Ahmad, 2011). It's worth pointing out that the circuit breaker mechanism only halts trading temporarily when triggered. All clearing, settlement, and depository operations continue normally (Khodavandloo & Zakaria, 2013). For instance, if a circuit breaker is triggered at 10-20 am, all trades matched at 10-20 am will be cleared and settled as normal according to endemic settlement system. All unmatched orders keyed

in before 10-20 am continue to be matched during trade halt. Investors are informed of circuit breaker trigger through dissemination of public announcements by various Bursa Malaysia sources, the media, internet outlets, and Bursa website, as well as stock brokers and dealers. Bursa also informs investors of next resumption of trade. Bursa claims this public announcement is to enable investors to assess and review existing market conditions based on hard information and less on market trends, speculation, and emotions, so that they can make well-informed investment decisions once trade resumes. Considering that the magnitude of the stock-wise limits harkens back to the decisions enacted nearly 28 years ago, it is worth investigating whether the mechanism is effective and still relevant despite myriad changes of external factors that influence market dynamics in the modern era. This problem is formulated more formally with theoretical and practical underpinnings in the next section.

1.4 STATEMENT OF PROBLEM

1.4.1 Theoretical Angle

An implicit undertone pervades neoclassical economics and finance textbooks that assume markets are efficient; its participants and agents are rational, and relevant fundamental and expected value of assets are properly reflected (or baked in, as Warren Buffett would say) in the market prices. However, as both industry practitioners and many empiricists would testify, reality is hardly so. Efficient market hypothesis, as it is more formally known as, no longer wields the clout it once had in finance. A wide array of empirical works and new insights from the domains of behavioral economics and finance underline the weight of investor irrationality and its consequent distortion of prices. Thus, the confidence on markets to self-govern, self-correct, and signal fair prices has diminished. While these market imperfections are all organic in nature, in the

sense that they aren't forced, the imposition of circuit breakers are a regulatory coercion. Furthermore, in recent times this practice has come under considerable scrutiny given the backdrop of 2007-2008 financial crisis, where most financial markets around the world lost a sizeable portion of their value. Essentially, if the price discovery and signaling mechanism of any market is impeded to the extent that supply and demand no longer are the key determinants, a problem emerges. Hence, circuit breaker practice is balked at by both advocates of *laissez-faire* economics and empiricist naysayers.

1.4.2 Praxis: GLOCAL Angle

On a global scale, circuit breakers are now widespread in equity and futures markets. Regulators and academics in favor of it claim that a moment of respite in stressful market situations can help investors introspect. As a result, they can be expected not to be swayed by irrational panic and focus on fundamentals to coolly make trading decisions. Their adversaries, however, decry such claims—firstly on the grounds of its derision for *laissez-faire* price discovery. Hence, they consider, on theoretical grounds, that circuit breakers are unnecessary or redundant. In the empirical battleground, however, evidences are conflicting, ambiguous, or inadequate. Much of this is due to methodological difficulties in estimating counterfactuals, lack of data, and statistical constraints. As such, experts diverge in their views. Yet, exchange personnel and securities commissions are among its ardent supporters. This is corroborated by the pace of circuit breaker adoption since the mid-1990s and almost no precedence of an exchange abandoning it altogether. The last few remaining major bastions of anti-circuit breakers too have recently succumbed to the cry for greater regulation; case in point: Singapore Stock Exchange (SGX) and Australian Stock Exchange (ASX).

In academia, meanwhile, the topic shows patterns of seasonality. Empirical works examining performances of regulatory rationales, such as deterring volatility, enhancing price discovery, interferences in trading, and a self-fulfilling gravitational pull (magnet effect) seem to arise following headline-grabbing financial crises or flash crashes (as in May 2010 in the US). In fact, theoretical advancement has been flagging since the late 1990s. Thus, empirical works to test them were difficult to undertake. The 2000s witnessed a large number of empirical works, mostly from the Asia-Pacific markets, as time-series datasets became more accessible. Though Asian markets such as Korea, Taiwan, Tokyo, Shanghai, and Shenzhen dominate the studies with mixed results, the only study undertaken in Malaysian market by Chan et al. (2005) found evidence of deterioration in market quality, using transaction data from 1995-1996. Since then, KLSE has become BM, trading platforms and environments have grown sophisticated, and circuit breaker regimes in the bourse had undergone multiple tweaks. Despite the changes, the limit of ± 30 percent is intact since 1989, albeit with some qualifications.

Zooming in locally, Malaysian regulator's price limit choice is rather confounding for following reasons:

1. Most exchanges prefer a very tight collar,
2. Many exchanges experiment with the limit in tranquil times, presumably in quest of an optimal collar,
3. Exchanges in advanced markets commission studies corroborating the efficacy of the proposed regime and make the results known, and
4. Most exchanges improvise with the circuit breaker around market crash periods to forestall the crash or reinforce traders' confidence.

Somehow, Bursa Malaysia did none for nearly 3 decades, inviting us to ponder:

1. Does the price limit in Malaysia really work in achieving its professed objectives?
2. Is ± 30 percent really the sweet spot? If so, why does everyone else prefer a tighter band?

These queries have remained unaddressed for a long time. In fact, the dissensus surrounding circuit breakers' efficacy is a widely acknowledged void in market microstructure literature (Kim, Liu & Yang, 2013) and, thus, merits investigation. The vacuum is even more pronounced for Malaysia—with the only major published work being based on 2 years' worth of data from mid-1990s (Chan et al., 2005). Having said that, this thesis's purport isn't merely to replicate prior circuit breaker research with a Malaysian data-set and claim novelty. This thesis operates on a discrete permutation of motivations, methodological approaches, and research questions pertaining to the problems identified above in order to stimulate new insights into the controversy, reveal policy implications, and signal profitability cues to market participants. These are elaborated on in the next sub-section.

1.5 RESEARCH QUESTIONS AND OBJECTIVES

This section outlines the research questions addressed in this thesis, prefaced by the motivations behind it, and followed by the resultant structure followed in the thesis. Firstly, the quality of a financial market is assessed through several indicators. Among them, most prominent are liquidity, pricing efficiency, volatility, and returns. Price limits, directly and indirectly, impact all these variables. As such, under a price limit regime, an investor needs to understand and anticipate if and how the limits affect these variables, all which impact profitability. From a regulatory standpoint, a market watchdog is entrusted with enacting pre-set rules and monitoring trading activities so

that not only the market quality indicators exhibit satisfactory performances, but also trading activities are not hampered by non-fundamental extraneous forces. As such, price limits' non-interference with normal market activities and ability to prevent crashes is of great importance to securities commissions and exchange personnel.

While the rationale advanced in the preceding paragraph is universal, emerging and frontier markets are especially vulnerable to undesirable effects of price limit mechanisms. Many empirical works document the high volatility phenomenon characteristic of emerging markets (Bekaert & Harvey, 1997; Girard & Biswas, 2007). Also, empirical works on price limits' effectiveness in volatile emerging markets have yielded contradictory results (Kim & Rhee, 1997; Kim, Liu & Yang, 2013). Thus, whether price limits in an emerging market like Malaysia truly achieve the intended objectives is of interest to Malaysian stakeholders as well as non-Malaysian investors. Moreover, as Malaysia intends to graduate to a high-income economy, attract greater capital inflow, and compete with regional hubs like SGX and HKEX, smart money's perception of the pricing efficiency and risk of capital erosion due to miscalibrated price limit regimes in Bursa Malaysia merits a closer look. Furthermore, the efficacy of price limits in a wide-band market like Malaysia promises a unique way of understanding circuit breaker dynamics, which should interest many regional and global exchanges—particularly those exchanges with tighter limits that perform weakly in empirical tests (e.g., Taiwan, Egypt). Therefore, to answer the questions of whether price limits are effective in Malaysia in a manner that is beneficial to investors and regulators alike, the following questions are devised: