

**Revising Market Efficiency : A Case Study of the Mongolian Stocks Market -
Top Listed 20 Companies Stocks**

By

JARGALSAIKHAN, Erdenechuluun

THESIS

Submitted to

KDI School of Public Policy and Management

In Partial Fulfillment of the Requirements

For the Degree of

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Committee in charge:


Professor Choi, Tae-Hee, Supervisor



Professor Sohn, Wook



Professor Lee, Jinsoo



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ABSTRACT

REVISING SHARE MARKET EFFICIENCY: A CASE STUDY OF THE MONGOLIAN STOCKS MARKET –TOP LISTED 20 COMPANIES’ STOCK

By

Jargalsaikhan ERDENECHULUUN

The paper is about the proof on whether the Mongolian Stock Exchange (MSE) series of return is independent and ensure the random walk model. It is a significant issue because the information gap is a vital factor influencing the investment decision-making for market makers. The majority of research is focused on developed countries, mainly Europe and the USA market. There is a need for further studies in new and developing markets, such as the Mongolian Stock exchange (MSE), one of the representatives of the emerging markets. Therefore, this study attempts to fill both gaps by providing evidence on the implementation—or lack thereof—of EMH and contributing to the literature on stocks market transparency in developing countries. The study consists of the empirical analysis and real-time trading stock on the Mongolian stock market by studying the event study approach based on the chosen listed company. If the returns are predictable, rational investors will exploit the profit opportunities. The study’s finding supports the policy recommendation’s implication for the market participants and regulatory agency to launch a web-based electronic registration system. Through this research, a beta version of the Information Disclosure System is developing.

Keywords: Mongolian Stock Exchange, transparency, web-based electronic registration system, Unit root test, Autocorrelation model.

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1. Introduction

Transparency and open data issues have intensified the impact of the global financial crisis (Vishwanath & Kaufmann, 2001). This means that investors tend to study the company on a certain amount of available information to make investment decisions to predict the risks in their portfolios. Additionally, a well-structured, efficient market is vital for security market development because traders and market participants can make investment decisions based on the quality of information (Gan et al., 2005). Consequently, market participants increase the trust in the stock market, earn returns above the market returns, and reduce the arbitrage opportunity based on an efficient stock market. Thus, information disclosure and transparency are fundamental elements to building efficient stock market development.

It is essential to remember a vast number of empirical studies on efficient markets and security pricing along with efficient stock market development. Of course, the data shows there is evidence of inefficiency in developed and developing markets, raising some controversy. However, we can realize that the general trend of developing and emerging markets is not weak-form efficient, whereas developed markets support weak-form efficient hypothesis. In fact, most research on informational efficiency in emerging markets focuses on examining weak-form market efficiency by empirical analysis considering the theory of the Efficient Market Hypothesis (EMH) with return series follows random walk and independent.

However, there is a need for a test and proof of whether the EMH theory is implemented using the event study approach. In fact, autocorrelation in excess daily returns and certain assumptions are conditional on changes in their variance in empirical analysis (Chan et al., 1992). In comparison, an event can event study can be advantageous and more practical in the real world.

Furthermore, the majority of research is focused on developed countries, mainly Europe and the USA market (Christopher et al., 2005), so there is a need for further studies in new and developing markets, such as the Mongolian Stock exchange (MSE), one of the representatives of the emerging markets. Therefore, this study attempts to fill both gaps by providing evidence on the implementation—or lack thereof—of EMH and contributing to the scientific knowledge on stock market transparency in evolving states.

Together with the important institution of the Mongolian security market is the MSE, established in 1991 to carry out the privatization of state-owned enterprises. Since it was found, the Mongolian stock market has been undergoing volatility as many other developing countries have an underlying reason for the economic condition. For instance, MSE Top 20 listed companies es, publicly traded, reached the highest point in its history in February 2011. MSE was ready with the new “Millennium IT” one year later, and MIT provided a giant leap forward with it. The implementation of MIT, a trading and settlement system that improves stock market capacity and transparency in the market, significantly influenced placing Mongolia on a watch list for possible promotion to frontier market status (Khangai, 2012).

However, the MIT system has not been established as a necessary improvement on the stock market transparency. This is because of many other reasons, including liquidity, the stock concentration of listed companies, no institutional investors, and information transparency (JICA, 2020). The primary underlying cause of these problems is the lack of stock market transparency. Hence, this paper emphasizes one of those reasons’ transparency and price efficiency.

Regarding transparency, we need to answer the following question. Is it possible to predict stock price? Is there a reliable and sufficient source for investors to make an investment decision in the security market? Evidently, those are significant issues because the information gap is an

essential factor influencing the investment decision-making process for market makers (Akbar et al., 2016). Nevertheless, it is vital to study whether the MSE TOP 20 return series is self-determining and come after the random walk model, based on previous studies, theoretical model related to this field of research. Theoretically, if our analysis rejects the random walk, this implies that the stock price is predictable. In this situation, rational investors will exploit the profit opportunities (Shleifer, 2000). In this regard, it can be observed the reasons behind the importance of research.

Moreover, the research consists of empirical analysis and real-time trading stock on the Mongolian stock market by studying the event study approach to understand stock market movement based on the chosen listed company. In conclusion, to launch Electronic Data Gathering, Analysis, and Retrieval (EDGAR) system, a market study related to EMH is crucial. The study's finding supports the fundamental research of developing a web-based electronic registration system that fosters the transparency of the stock market and supports the policy of regulatory disclosure rule and prevention of non-public information for market participants and regulatory agency.

This paper is structured as follow: the part 2 describes the general background of the topic. Part 2 reviews recent evidence on EMH. Part 3 identifies and describes the experimental analysis of the association between current stock prices and past stock history and investors' impulse response related to companies' news and announcement. The last part lays out a summary and makes further recommendations for future studies.

2.Literature review

Before proceeding further, it is necessary to define the critical terminology referred to in this paper clearly. The concept of market efficiency came to the crucial issue among the portfolio managers and other participants (Gan et al., 2005). Therefore, in order to clearly understand the concept of EMH, we first need to clarify the definition. On this occasion, depending on the combination of the factor market exhibit the various degree of efficiency. Indeed, the study will cover informational efficiency, which is known as market efficiency. Prof. Eugene Fama formulated the efficient market hypothesis (EMH) in 1970. The price of the futures shows all the information accessible. “You cannot beat the market” (Fama,1970).

This remarkable study efficient market hypothesis, henceforth known as EMH, is divided into three inseparable concepts. Firstly, the market is weak-form efficient or in other words, price of future securities is not influenced by past factors or situations; Secondly, the market is semi-strong form efficient. Where the available information in the market is reflected by the securities’ prices. Lastly, it assumes that the market is strong and efficient; total available information from private and public sources are reflected in security prices (Fama,1970). Moreover, the concept of “efficient market” is diverse because it can be interpreted depending on each country’s markets and the research methodology they are using. Fama provides an excellent review of the studies dealing with the efficient market as of 1970, and he classifies the EMH into three areas mentioned previously. The later studies build the classification of this work.

The first area of the literature examines against weak form efficiency. A study like Ghandi et al. (1980) points out that Kuwaiti stock markets share prices likely move systematically over time. The Bombay stock exchange in India shows weak form inefficiency similar to that in the

Kuwaiti stock market. A remarkable study by Mobarek et al. (2008) supports the not weak-form inefficient for Bangladeshi stock market. In this study, the evidence stock price does not follow the random walk model. Additionally, Johannesburg Stock Exchange (JSE) violate the weak form efficiency from the random walk model. Because JSE has a relatively small trading volume, and shares are “poorly marketable” compared to the other developed countries exchange, such as on the most recognize stock market, in New York NYSC (Roux & Gilbertson, 1978).

Furthermore, there have been studies by several countries such as developed by Claessens et al. (1995). The research considered 9 emerging markets, including Mexico, Turkey and Chile and showed a significant serial correlation in Stock market returns. Moreover, the authors suggested that the random walk model is not followed in developing market and violate the weak-form efficient market hypothesis. As a result, this study recommends that improved disclosure requirements, accounting standards, and settlement procedures. In sum, based on recent reports and research, weak form inefficiencies are common among developing countries stock market.

The second area of the literature examines supporting efficiency. It is imperative to clarify what we mean when we talk about the supporting weak form efficiency refer to the availability of information flows for decision making. It is already reflected in security prices. There have been studies by several scholars that supports weak-form efficiency. One representative, Sharma & Kennedy (1977), stated that the Bombay Stock Exchange is statistically significant and examined independence and randomness in India like that in the London Stock Exchange. Because market participants are most likely well-informed and sophisticated, with interaction (competition) between them suppressing any price dependence. Similarly, Chan et al. (1992) state that major Asian and USA markets including, South Korea, Singapore, Taiwan, Hong Kong, Japan, and the United States, are “weak-form efficient individually and collectively in the long run”. In summary,

the latest headlines and research indicate that supporting the weak form efficiencies are prevalent in the stock markets of developed countries.

Finally, the growing body of literature used the event study method to determine the market efficiency level in the later years. The most widely accepted definition of event study appeared in 2018 research by Syed et al. (2018); Brown et al. (2018), respectively. In this report, the event study was defined as “new facts demonstrating that the attributes of event study methods vary by calendar time frame and are dependent on events sample firm characteristics like volatility” (Syed et al., 2018). Last but not least, the event study approach is not commonly studied in emerging markets when looking for recent reports and dissertations. Thus it has a much more gap to study less developed market like the Mongolian stock market by studying the event study approach to understand stock market movement based on the chosen listed company.

By and large, a controversy arises when the evidence on weak form efficiency described among the developed including the USA, Japan and Singapore, as Kuala Lumpur and developing markets such as Bangladesh and the Bombay Stock Exchange in India. But we can realize that the general trend of developing and emerging markets are not weak-form efficient, whereas developed markets support weak form efficient hypothesis, respectively. Moreover, most literature uses an empirical methodology, including unit root test, autocorrelation analysis, Q-statistics and random walk hypothesis, the framework of proofing EMH testing.

Additionally, the studies that use the event study approach are becoming more growth in recent years. This paper started with the lower position of efficiency, testing the market’s weak-form efficiency. Thus, the fundamental purpose of this study is to identify if the return series from the MSE stock market is self-contained or follows a random walk model. Similarly, the research question driving the study is to what extent a developing stock market like the MSE is efficient,

and what features drive the market’s return generation in the actual situation using the event study approach.

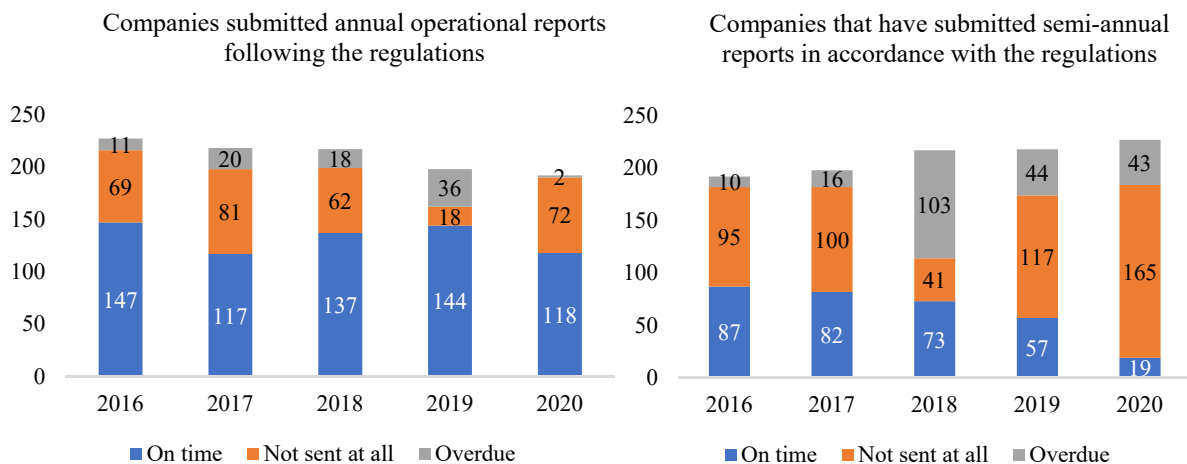
3. Background

3.1 Current situation of Mongolian stock market information transparency

3.1.1 Transparency of information of joint-stock companies

The Regulation on Regular Disclosure of Information by Issuers to the Public, approved by the Financial Regulatory Commission, stipulates those semi-annual reports must be submitted by August 1 and annual reports by April 1. As of 2020, only 118 of the 192 joint-stock companies submitted their annual reports on time. Of these, only 19 submitted their half-yearly reports on time, indicating a lack of transparency in the information provided by public companies.

Figure 1: Submission of financial statements and operational reports of joint stock companies to the competent regulatory authority.



Note. From *Mongolian Stock Exchange*

3.1.2. Legal environment

The Financial Regulatory Commission and the Mongolian Stock Exchange have approved laws, regulations, and laws with the aim to enhance a context of transparency and trust for the

investors, stakeholders, and public in general, especially regarding high level meetings for decision making and operations of joint-stock companies, as shown in the table below.

Table 1. Information transparency laws

Organizations	Laws, regulations and rules related to information transparency
Financial regulatory commission	Issuer information transparency procedure
	Procedures for announcing the shareholders meeting of a joint-stock company
	Regulations on revising the “List of internal information in the securities market and the procedure for reporting it.”
Mongolian Stock Exchange	Instructions for submitting information electronically from the issuer (MSE order)
	Information procedure of MSE joint-stock companies
State parliaments	Securities Market Law (Articles 76-79)

Note. From: Mongolian Stock Exchange, Financial Regulatory Commission

3.2 Qualitative survey of Mongolian stock market information transparency

According to the survey, there are few channels and sources of information on the stock market, and there is more than one source of information. This can lead to information anomalies.

We surveyed stock market participants and found the following results:

The following survey was conducted to determine the channels through which Mongolian stock market participants, researchers, and investors receive information. A total of 1,822,454 locals have securities accounts at the Central Securities Depository, and the sample size of the stock market participants was calculated as follows.

$$n = \frac{N}{N*(d)^2+1} \quad (1)$$

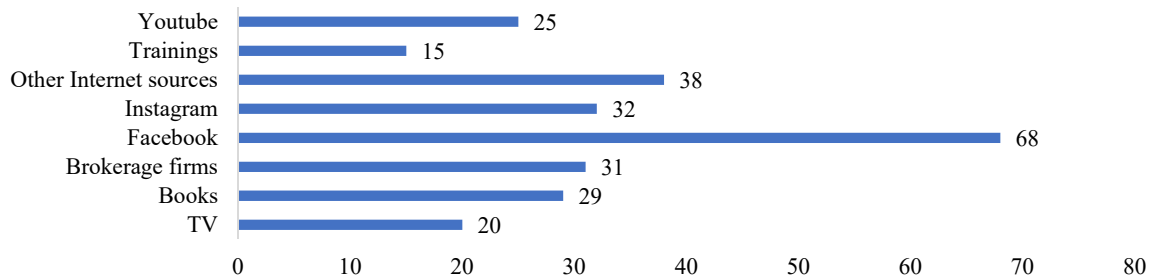
where, n – Sample size

N – Stock Market participants

(d) – 10% confidence interval

The sample size suitable for the study is 9 participants.

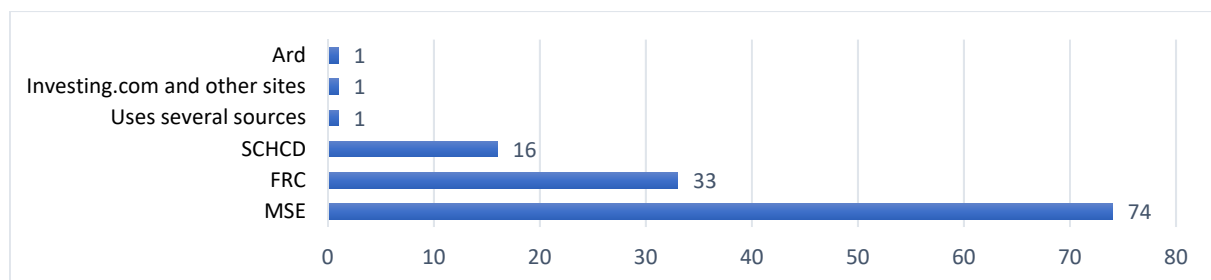
Figure 2 What information channels do you use to get stock market information?



Note. From *Researcher estimation based on survey*: Available at https://docs.google.com/forms/d/1_RBGMwBzkishFQtYXEJsOR_JgXCUsWbX7BGSfPXfU/vi/ewform?edit_requested=true

The study covered a total of 90 stock market participants. According to the questionnaire, 68 participants, which is out of 90. On the other hand, 75.6 per cent of the participants received stock market information from the Facebook platform or other social media platform. Moreover, 42.2 per cent of the study participants acquired market information from different internet sources, and 34.4 per cent of them received information from brokerage firms.

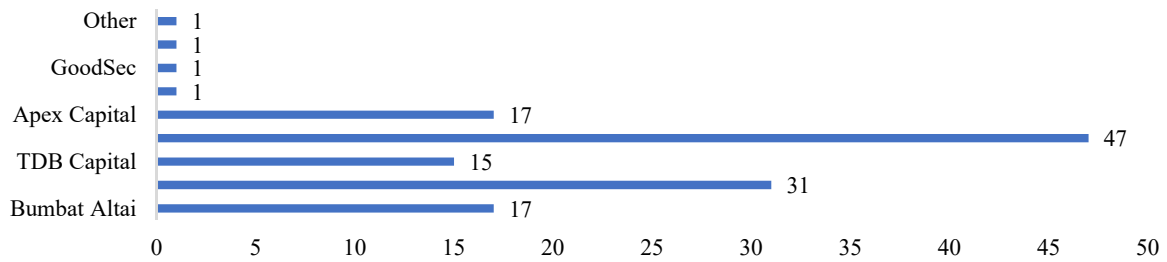
Figure 3 Which of the entities do you get most stock market information?



Note. From *Researcher estimation based on survey*,

The data shows that 85.1 per cent of the study participants received their information from MSE, indicating that MSE is the largest domestic stock market database.

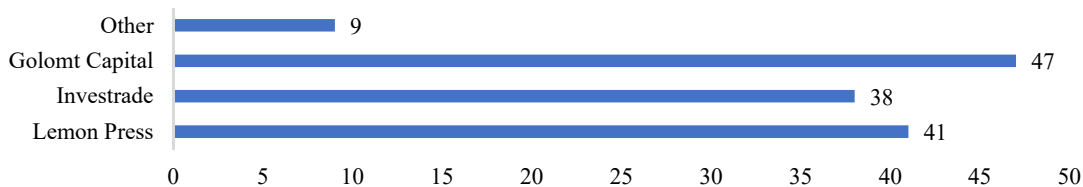
Figure 4 Which brokerage company do you get stock market information?



Note. From *Researcher estimation based on survey*

The majority of respondents received stock market information from Ard Securities, Golomt Capital, and TDB Capital, which are Mongolian most extensive investment banking and security services.

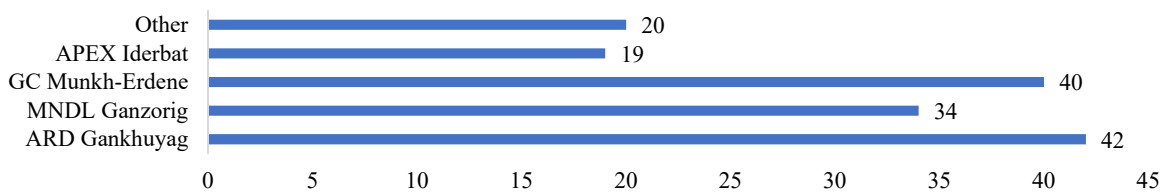
Figure 5 Which of the following websites do you get the most stock market information?



Note. From *Researcher estimation based on survey*.

Lemon Press and Investrade are newly established news channels. Out of 47 per cent of the participants regularly receive information from the Golomt Capital website, 41 per cent from the Lemonpress website, and 38 per cent from the Investrade website.

Figure 6 Who is the most influential social influencer in your stock market decision?



Note. From Researcher estimation based on survey.

The 48.8 per cent of the respondents surveyed said that we are getting stock market information from Gankhuyag Ch, CEO of the Ard Financial Group. The share price of Ard Financial Group JSC has risen eightfold in the last four months due to the impact of social influencing.

3.3 Case of Mongolian stock market transparency

Based on the above survey, consider the following two cases. In the following two cases, The study would like to express how much this system is needed in Mongolia.

Case 1. Lack of transparency and inaccurate reporting

At the moment, 96 listed companies out of the 194 joint-stock companies made the report available to FRC and the general public for their financial, operational information.

According to the FRC guideline, JSC's should report their half-year report by August 1st and annual report by April 1st, respectively. However, Only less than 50 per cent of the Mongolian joint-stock company was reported on time. According to the Law on Violations, the listed companies should report their financial and operational activities on time by the rule of the regulatory agency, in this case, FRC. Unlike many other countries, this non-payment of non-even delivery of information is not punished in the country properly in Mongolia.

There is a so-called rule of securities issuers information transparency that rule was approved in 2015. it is a rule of FRC, but they have not even updated that rule, which is changed. Afterwards, in 2016 proved a new law which is called Law on Violations. There are so many types of violations, including issues with financial reporting are present in this law.

In this law, in provision 11.10, a particular article touches on reporting of the listed companies. According to the law on violations, the listed companies should report financial and operational activities in the framework of guideline regulated by the regulatory agency, in this case, FRC.

JSC's must publicly make the information available within a certain period. At the same time, they report to the related regulatory agency and their brokers. If they do not do it on time, they got a penalty of 2 million tugriks. Alternatively, some JSCs receive 20 billion dollars from the public, but their penalties weigh only 20 million tugriks disproportionate. Therefore, this kind of regulation in Mongolia needs to change. As such, a 10Q report obliges public companies in the USA to inform all shareholders on time if they do not notice a special announcement that there is a unique cassette after six months. A special commission is created, and they will have to liquidate the assets of that public company. It is fairer because they are already working with public money.

Case 2. Example of short media coverage on fines related to financial reporting that upset many investors and employees of the company.

In 2018 South Gobi Sands resources, publicly listed mining company announced that, has not made their payment USD to China Investment Corporation on due date. In the aftermath of

the acute announcement, one of the Mongolian broadcast agency posted that South Gobi had defaulted.

After this broadcast post, the Stock price of SGS immediately decreased. As a result, It impacted their operation, including suppliers who forced some advance payments.

Those are the example of listed companies' low transparency and inefficient information. It interprets as how quick the market can respond to inaccurate reporting. Therefore, it is essential to have a system like EDGAR in Mongolia, where official information is obtained from regulatory agencies' sources and public companies post information openly and transparently at all times. In the future, FRC needs to launch an e-system like EDGAR and will support the further development of the security market.

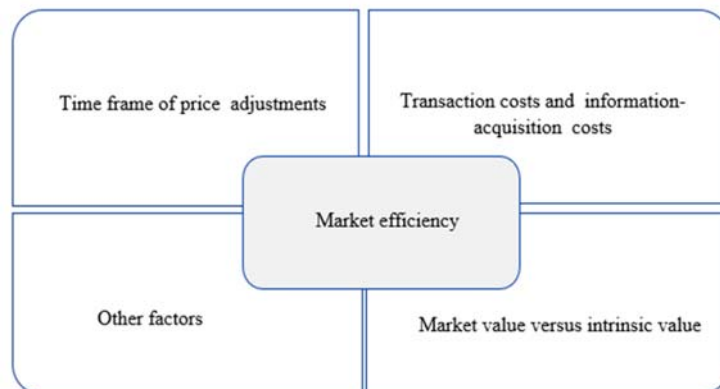
In sum, FRC should adopt a web-based electronic registration system (EDINET of Japan, DART of South Korea, EDGAR of the US). Many countries have launched such cutting-edge systems, sped up public issuance, and reduced costs and opened more opportunity to investors. (See Annex. Figure 2)

4. Theory

4.1 Efficient market hypothesis

Efficient market depending on the combination of the factor market exhibit the various degree of efficiency. The study will be cover informational efficiency. In other terms, for a portfolio manager, market efficiency is a crucial topic. Market efficiency, a concept derived from the efficient market hypothesis, states that a price of an asset represents all information available about that security. Thus, in an efficient market, any investor have same right to decision making and can access information that investors can use to make a profit, same as abnormal profit. Eugene Fame was established in 1970 as an efficient market hypothesis.

Figure 7 Factors affecting the market efficiency



Note. From *Chartered financial analyst curriculum*, by Reading 47, Vol5, 2019, p.115

The efficient market consist of 3 types.If the share price reflects only the asset’s past price and the current price (and dividends, quantitative and trading volume), it is a weak form of EMH. In contrast, if the stock price reflects all public and private information, the market can be tested to determine whether it is a strong form of efficiency, predictions of returns based on the publicly available information (Fama,1970).¹

Figure 8 Market efficiency cases

MARKET PRICES REFLECT:

Forms of market efficiency	Past market data	Public information	Private information
Weak form of market efficiency	+		
The semi-strong form of market efficiency	+	+	
A strong form of market efficiency	+	+	+

Note. From *Chartered financial analyst curriculum*, Reading 47 Vol5, p145.

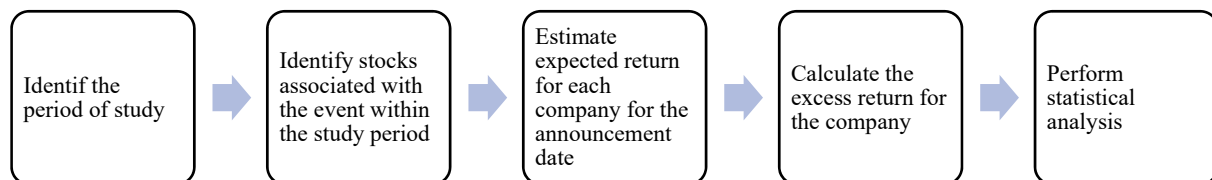
A¹ According to the Securities Market Law, internal information is information that is not available to the public that affects the price of certain securities.

It is essential to study the market that includes which level of efficiency. One way to achieve this is to calculate how long it takes for trading activity to affect the price of a security. That is the point at which the information becomes available. For example, in a highly efficient foreign exchange market, the time lag could be less than a minute. If the time lag is long, a trader with this information will have enough time to profit from it.

4.2 Event Study

Event studies research the dynamics explaining the speed rate stock prices adjust to certain economic phenomena. In this research, we use the methodology called event study's to examine the impact from the MSE listed dividend companies on the average abnormal returns. We considered daily data of stock prices to determine the dividend effect. According to Brown and Warner (Using daily stock returns - The Case of Event Studies, 1985), daily data are more precise than monthly or weekly when handling the market model.

Figure 9 Event Study Process



Note. From *Chartered financial analyst curriculum*, by Reading 47, Vol5, p145

5. Analysis

5.1. Empirical analysis

5.1.1. Data

The empirical exploit the Mongolian stock exchange Top 20 listed companies' logarithm return daily from 2012 to 2020. This study period included and captured all significant economic events since MSE established in 2012.

In terms of the MSE Top 20, Index is the Mongolia Equity Market Index is based on the top 20 stocks listed on the MSE with the biggest market capitalization and average daily trade. It is the same as S&P 500 index, the top 500 companies listed on the USA market. This research uses daily time series data.

Regarding the geometric mean of rates of return, it captures how total returns are linked over time. Thus, the geometric mean for performance reporting is more appropriate when comparing returns from different sub-periods, past performance is more theoretically tractable. to the arithmetic mean for study (Mobarek,2008).

$$R_{mt} = \text{Ln}\left(\frac{PI_t}{PI_{t-1}}\right) \quad (2)$$

where, R_{mt} - Market return; Daily price index for PI_t , PI_{t-1} daily price index; Ln- natural log

5.1.2. Methodology

Stationary process

It can be argued that one of the primaries uses of time series data in the past for analysis is to predict future values. First and foremost, on this research, to predict future values, it is mandatory to ensure that the time series data are stationary. In the same sense, the relationship between today's and tomorrow's data should be the same as the relationship between any two days in the past. It is relevant to determine that is time-series data's are stationary or not. Determining whether a series is stationary can strongly influence its properties, behavior, and structure for the

stationarity or otherwise of a series. To avoid those challenges and difference can adjust the problem. The degree of the difference depends on the normality of the data.

Strictly Stationary Process

A strictly stationary process is one where,

for any $t_1, t_2, \dots, t_T \in Z$, any $k \in Z$

$$P\{y_{t_1} \leq b_1, \dots, y_{t_n} \leq b_n\} = P\{y_{t_1+m} \leq b_1, \dots, y_{t_n+m} \leq b_n\} \quad (3)$$

and $T = 1, 2, \dots$

A weakly stationary process

$t = 1, 2, \dots, \infty$, it is said to be weakly or covariance stationary

1. $E(y_t) = \mu, \quad t = 1, 2, \dots, \infty$
2. $E(y_t - \mu)(y_t - \mu) = \sigma^2 < \infty$
3. $E(y_{t_1} - \mu)(y_{t_2} - \mu) = \gamma_{t_2-t_1} \quad \forall t_1, t_2$ (4)

According to these three assumptions, a stationary process should have a constant mean, constant variance, and autocovariance structure.

In sum, it can be argued that one of the primaries uses of time series data in the past for analysis is to predict future values. To predicts future values, it is needed to ensure that the time series data are stable. The efficient market will have a random walk or unit root nature, and stock returns will not be predictable from past data. If the stock price is random, any price shock will continue, and the return on the stock will not keep the trend. Conversely, if the stock price series is stationary, any trend will follow over time, and future prices can be predicted according to past trends, giving potential investors an advantage.

5.2. Event study analysis

5.2.1. Data

According to the latest research, including Sohn et al. (2019), and Biak et al. (2012), the outcome of earning announcements to stock prices disclosure events suggests that the earnings announcement date should be identified as that. This study collected the disclosure event dates from DART, a Korean Joint-stock companies data registration system. For this study, In Mongolia does not have a registration system. We collected the most relevant disclosure news announcements from the Mongolian Stock Exchange's website for sample firms.

The study considers companies from Mongolian Stock Exchange (MSE), and the sample period is from the year 2020 to the year 2021 end of August. The window estimate was taken for 15 days. The event analysis was performed considering 5 companies with the highest market capitalization listed on the Mongolian Stock Exchange. One of the companies, ERDN Resource JSC, did not pay dividends during the survey period, so the study was based on the remaining four companies. See the table below for the Cumulative abnormal return.

Table 2. Top 5 company in Top 20 listed companies

№	Ticker	Company Name	Market Capitalization (billion MNT)
1	APU	APU JSC	755.33
2	TTL	Tavantolgoi JSC	387.09
3	AARD	Ard Financial Group JSC	284.28
4	ERDN	Erdene Resource Development JSC	247.81
5	INV	Invscore NBFI JSC	225.94

Note. From *Mongolian stock exchange*, by MSE, 2021 (mse.mn)

Table 3. Sample companies' dividend information

Company name	Ticker	DIVIDEND INFORMATION
APU JSC	APU	According to decision No. 21/11 of the Board of Directors of APU JSC dated August 16, 2021, based on the company's results for the first half of 2021, it was decided to pay dividends of MNT 46 or 48.8 billion MNT per share.

Tavan Tolgoi JSC (TTL)	TTL	The list of shareholders entitled to receive dividends was issued on April 1, 2019, and it was decided to transfer the dividends to the company's premises and to the shareholders' account in "SDC" SOEC by May 3, 2019.
Ard Financial Group JSC	AARD	According to Resolution No. №20 / 37 of the Board of Directors of "Ard Financial Group" JSC dated February 18, 2020, 34.95 MNT per share and a total of 1 billion MNT will be distributed as dividends to the shareholders from the 2019 net profit.
INVESTOR NBFJ	INV	The Board of Directors of Investor NBFJ JSC decided to distribute MNT 17.00 per share or a total of 1.2 billion MNT as dividends to its shareholders from the net profit of 2020 by its Resolution No. A / 04-T dated February 19, 2021.

Source: Mongolian stock exchange

5.2.2. Methodology

The difference between the actual stock return on that day and the normal return, predicted by two inputs expressed by the α and β parameter, shows an abnormal return on a separated day.

$$AR_{i,t} = R_{i,t} - (\alpha_i + \beta_i R_{m,t}) \quad (6)$$

To measure the total impact of an event over a particular time period, each abnormal returns to create a cumulative abnormal return.

$$CAR(t_1, t_2) = \sum_{t=t_1}^{t_2} AR_{i,t} \quad (7)$$

An event study is an instrument applied to estimate the impact of a certain circumstance on the company's stock return. The circumstance or also called “event study” is a methodology that determines whether an “abnormal “stock price affects the associated with an unanticipated event.

On the other hand, as long as there is not enough information about the financial markets , there should be an immediate reaction to the event on the announcement date and no further reaction on the upcoming trading days. In this study, we focus on the dividend announcement.

6. Result

6.1. Empirical Analysis result

The empirical findings are examined in detail with each statistical study. Firstly, The study tested the autocorrelation by using Ljung-Box statistics. For a joint hypothesis test to result in a rejection it is only needed that an autocorrelation coefficient reported statistically significant. The Box–Pierce (1970) test, on the other hand, has weak small sample characteristics, suggesting that it makes incorrect decisions often in small samples. It was conducted a Box–Pierce test variation with enhanced small sample properties. So, another version of this, the Ljung-Box statistic, was developed. This statistic is useful for checking the linearity of time series. The Ljung–Box (1978) statistic is the refined version of this statistic.

$$Q^* = T(T + 2) \sum_{k=1}^m \frac{t_k^2}{T-k} \sim \chi_m^2 \quad (5)$$

where, P^k = Auto-correlation coefficients at lag k ; n = sample size.

Using the results, we can consider confidence-level criteria (at 95% of confidence) for the autocorrelation coefficient. If, for any value, the autocorrelation coefficient of the sample is outside this range $\pm 1.96 \times \frac{1}{\sqrt{T}}$, we reject the zero assumption that the true values of the coefficients in the s lag are zero. In this case, all the autocorrelation coefficients are jointly zero or the null hypothesis, turning to the joint tests.

Table 4. Test result of the Auto-correlation

Lag	Autocorrelation (2012-2020)	Ljung-Box Statistics (36 df)	Lag	Autocorrelation (2012- 2020) /continue/	Ljung-Box Statistics (36 df) /continue/
1	0.189*	82.203**	19	0.041	162.63**
2	0.102*	106.22**	20	0.06	170.96**
3	0.05	112.08**	21	0.001	170.96**
4	0.041	115.9**	22	0.032	173.38**
5	0.067	126.34**	23	0.005	173.44**
6	0.048	131.75**	24	0.033	175.97**
7	0.061	140.23**	25	0.042	180.09**
8	0.058	148.05**	26	0.03	182.22**
9	-0.012	148.41**	27	0.071	194.06**
10	0.043	152.69**	28	0.022	195.16**
11	0.003*	152.71**	29	-0.006	195.23**
12	0.026	154.28**	30	0.002	195.24**
13	0.013	154.69**	31	-0.003	195.26**
14	0.008	154.85**	32	0.033	197.81**
15	0.019	155.67**	33	0.018*	198.56**
16	0.017	156.38**	34	0.025	200**
17	0.023	157.63**	35	0.008	200.13**
18	0.022	158.75**	36	-0.026	201.71**

Note. Data from the Log of the Daily Market Return

* At two standard error limits: significant auto-correlation

** LB statistics significant at 1% level of significance.

The coefficients of autocorrelation were evaluated for the market return series log. As a result, the estimation shows significant autocorrelation at various lags during the entire sample period. (See Table1). The coefficient of self-correlation is evident in the 1st, 2nd, 11th and 33rd lag (positive sign) in the sample period (auto-correlation coefficient). The fact that non-zero autocorrelation coefficients are evident in the series returns' market return log indicates that the values depend on each other. The non-zero autocorrelation of the series associated with Ljung-Box Q-statistics that are jointly significant at the 1 per cent level at 36 degrees of freedom (lags) suggests the random walk model does not follow the return series of the MSE.

- Null hypothesis H0: The Mongolian Stock Exchange (MSE) index series is a random series.
- Alternative hypothesis H1: The Mongolian Stock Exchange (MSE) index series is not a random series.

Given the positive self-relationship dynamic strategy that appears to be earning higher returns on the average market, a prominent investor wishing to achieve a higher return may use the timing strategy for the market (the buying if the equity prices are low and selling at high stock prices (Indonesia, 2000)).

Further, the researchers employed the exact maximum likelihood auto-regression technique to evaluate if the current return series was independent or dependent and as well as the relationship between the series' first and second lag values. A coefficient that is significantly different from zero shows that share return can be anticipated using past return performance, according to the notion of the weak version of efficient market hypothesis.

$$\text{Ln}P_t = a_1 + a_2\text{Ln}P_{t-1} + U_t \quad (5)$$

Where U_t = random disturbance, an error term

P_t = where the current value of a variable, in this case, the price of the stock at time t

a_1 =where the constant term, in this case, the stock price that does not depend on the last price of the stock

a_2 = where the degree, in this case, the stock price at time t is dependent on the previous stock price denoted as AR(p)

Table 5 Auto-Regression Test results

Variable in the Model	Coefficient	SE	T-stat	Approx. Prob
$\text{Ln}R_{mt-1}$	0.177*	0.0208	8.491	0.000
$\text{Ln}R_{mt-2}$	0.069*	0.0208	3.303	0.001
CONSTANT	0.001	0.0002	0.775	0.438

Note. The data uses daily return series - AR * Denotes significant at 1% level.

To demonstrate the series' independence, a significant auto-regression coefficient is found at the 1% significance level for both the first and second lags. As a consequence, state that the return series are independent, or in other words the null hypothesis is rejected.

In addition, the study uses the ARMA model, it is used rather than the ARIMA model because it does not include the integration process. Because of MSE Top 20, an index is stationary in levels.

Table 6 Auto-Regression Test results

Variable in the Model	Coefficient	SE	T-stat	Prob.
ARMA (2,2)				
C	0.00024	0.00036	0.66836	0.504
AR(2)	0.9030*	0.03979	22.6977	0.000
MA(2)	-0.8458*	0.04767	-17.743	0.000
ARMA (1,1)				
C	0.00021	0.00032	0.66361	0.507
AR(1)	0.62434*	0.04628	13.4904	0.000
MA(1)	-0.4617*	0.05444	-8.4806	0.000

Note. The data uses daily return series - ARMA *Denotes significant at 1% level

The (AR) and (MA) model of significant coefficients are not equal to zero, which rejects and disregard the weak-form efficiency. Results indicates that the log return series on MSE are violating the random walk model and consistent with previous test. Moreover, the estimation demonstrates that the return series do not represent valuable correlation level.

The ARMA (2,2) represented the best fitted model with AR2coefficient (-.903); and MA1 (-.8458) represent a significant value at the 1 per cent level based on Akaike info criterion, Schwarz criterion, Hannan Quinn information criteria. (See Annex 2).

In brief, as previously estimations suggest that there is no proof that past returns information do not influence the current stock price on MSE, which is contrary to the market's

weak-form efficiency and demonstrates that the past return series can be used to forecasting potential returns.

6.2. Event Study result

Table 7. Event day and event window explanation

Event day	Event window	Event window estimation
Announcement of dividend earning announcement	The period in which abnormal return is calculated considering the some trading days of pre and post of the event day .	Window estimation is a time during which estimated returns are computed
0.00 (each companies announcement days are different)	(-15, +15)	12 months

Figure.10. Cumulative Abnormal Return

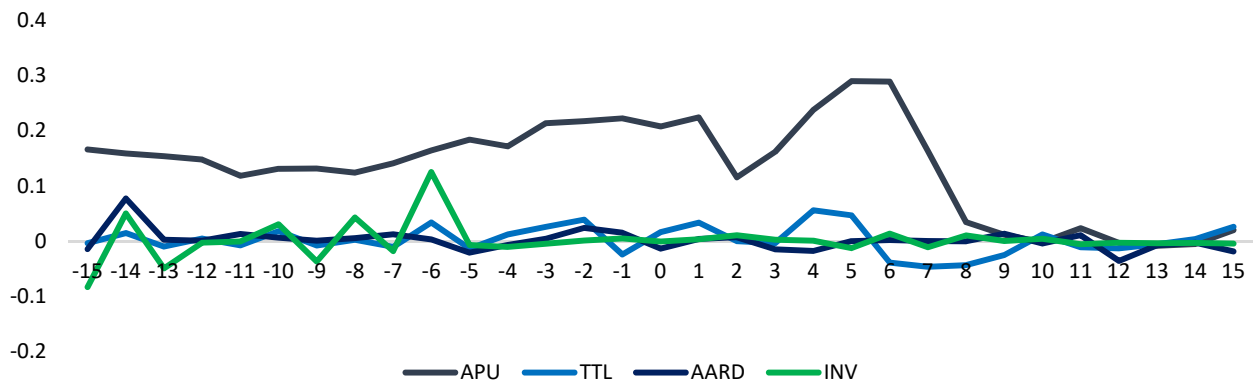


Table 8. Summary statistics of the sample stocks used in this study

APU (2021/08/16)			TTL (2019/05/03)		AARD(2020/02/19)		INV(2020/02/19)	
Pricing Date	Test Statistic	CAR	Test Statistic	CAR	Test Statistic	CAR	Test Statistic	CAR
-15.00	0.21	0.17	-0.13	0.00	-0.80	-0.01	15.76**	-0.08
-14.00	0.13	0.16	0.52	0.01	4.36**	0.08	9.54**	0.05
-13.00	0.18	0.15	-0.35	-0.01	0.15	0.00	9.34**	-0.05
-12.00	0.84	0.15	0.17	0.00	0.05	0.00	-0.54	0.00
-11.00	-0.36	0.12	-0.27	-0.01	0.74	0.01	-0.07	0.00
-10.00	-0.02	0.13	0.64	0.02	0.36	0.01	5.79	0.03
-9.00	0.22	0.13	-0.28	-0.01	0.05	0.00	-6.97	-0.04
-8.00	-0.48	0.12	0.09	0.00	0.31	0.01	8.16	0.04
-7.00	-0.66	0.14	-0.37	-0.01	0.71	0.01	-3.42	-0.02
-6.00	-0.55	0.16	1.20	0.03	0.19	0.00	23.75	0.13
-5.00	0.35	0.18	-0.48	-0.01	-1.18	-0.02	-1.31	-0.01

-4.00	-1.19	0.17	0.43	0.01	-0.38	-0.01	-1.97	-0.01
-3.00	-0.10	0.21	0.92	0.03	0.27	0.00	-0.90	0.00
-2.00	-0.15	0.22	1.39	0.04	1.36	0.02	0.23	0.00
-1.00	0.42	0.22	-0.86	-0.02	0.87	0.02	0.95	0.00
0.00	-0.47	0.21	0.59	0.02	-0.76	-0.01	-0.07	0.00
1.00	3.081**	0.22	1.19	0.03	0.23	0.00	0.64	0.00
2.00	-1.31	0.12	0.00	0.00	0.39	0.01	2.03	0.01
3.00	-2.15	0.16	-0.13	0.00	-0.84	-0.01	0.47	0.00
4.00	-1.49	0.24	1.98**	0.06	-0.99	-0.02	0.20	0.00
5.00	0.03	0.29	1.67	0.05	0.01	0.00	-2.38	-0.01
6.00	3.57	0.29	-1.38	-0.04	0.12	0.00	2.57	0.01
7.00	3.66	0.16	-1.65	-0.05	0.02	0.00	-2.04	-0.01
8.00	0.65	0.03	-1.54	-0.04	-0.01	0.00	2.00	0.01
9.00	0.33	0.01	-0.89	-0.03	0.77	0.01	0.08	0.00
10.00	-0.05	0.00	0.43	0.01	-0.23	0.00	0.84	0.00
11.00	0.67	0.02	-0.39	-0.01	0.62	0.01	-1.05	-0.01
12.00	-0.09	0.00	-0.46	-0.01	2.019**	-0.04	2.51**	0.00
13.00	-0.24	-0.01	-0.20	-0.01	-0.41	-0.01	-0.73	0.00
14.00	-0.15	-0.01	0.13	0.00	-0.16	0.00	-0.64	0.00
15.00	0.57	0.02	0.92	0.03	-1.05	-0.02	-0.82	0.00

For the Cumulative abnormal return of a given Company, T stat value is significant for APU JSC (1 day), TTL (4 days), AARD (12 days), and INV (12 days). Moreover, for Invest core JSC, 15.14, 13 days back of event period has on significant impact on abnormal return. T-Stat value at five percent is 1.96 then the value becomes significant. Simply we can conclude that the situation has influenced significant impact on announcement date. As the MSE-TOP 20 is a float-adjusted market capitalization index, we selected the top 5 companies with the highest market capitalization in event study.

7. Conclusion

The study's findings corroborate those of several other studies conducted in emerging markets. (e.g., Ghandi et al. 1980; Mobarek et al. 2008 ; Roux & Gilbertson, 1978 ; Claessens et al., 1995). The study would be useful to compare between many developing economies because of these reaffirmation study results from of the emerging economies research.

The MSE Top 20 return series' predictability could be attributed to inefficiency, following the context of other developing countries. Indeed, those kind of markets share common characteristics such as poorly enforced disclosure requirements, thin and irregular trading. Less developed markets are in a seed stage compared to the other developed countries. In this sense, the Mongolian stock market can be compared with the Bombay stock exchange, the Johannesburg Stock Exchange, and Kuwaiti stock market since all are still in the path to evolution. Likewise, it seems to be like due to a market characteristic, for obvious reasons, including dearth of institutional investors, insufficient market regulatory framework and forming information transparency.

Along with the transparency of stock market information and access to information, the vast majority of Mongolian stock market participants, 70.1 % obtain company news and other information which support investment decision from electronic sources, such as social media and television. Besides, considering market participants and regulators, some empirical inferences of the results appears. Indeed, the Mongolian Stock Exchange born as a newly developing market in 1990 with some weakness since it is not operated following the guidelines of stock markets from developed and mature countries. However, this study could be classified as having a great deal of significance to equity market participants as follows:

Firstly, the absence of private and information reporting requirements in the market may explain that the return series are not independent. Second, the ineffectiveness of regulatory bodies and lower law enforcement standards are significant manipulation causes, fair dealing, and loyalty in the developing registration systems. At the same time, it is crucial to focus on the legal aspects of the Mongolian security markets due to an information disclosure requirement and information disclosure data gathering retrieval system.

Currently, there is no such kind of a disclosure system for an investor, financial analyst, and other market participants. Finally, long-run dependence could be hazardous since it lessens market confidence and market size and scope. Since the Mongolian stock market participants could struggle to deliver financial and other public information unless qualified and audited by regulatory and other specialized organizations, a beta version of the Information Disclosure System is developing through this research. The research highlighted the importance of the EDGAR system.

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Appendix

Appendix A: Daily Market Return of the Top 20 listed MSE

Variable	Mean (Std Error)	Median	Std.	Minimum	Maximum
AARD	0.842 (.25)	.000	3.88	-9.74	14.98
ADB	0.573 (.24)	.000	3.75	-11.66	15.00
ADU	-0.104 (.15)	.000	2.30	-8.85	9.14
AIC	0.304 (.16)	.000	2.60	-9.43	14.95
APU	0.157 (.09)	.009	1.40	-5.06	13.44
BDS	0.094 (.12)	.000	1.86	-9.82	14.88
BODI	0.021 (.14)	.000	2.14	-7.23	14.47
ERDN	0.260 (.18)	.000	2.85	-10.51	14.94
GOV	0.158 (.13)	.000	2.13	-8.63	13.82
INV	0.107 (.09)	.000	1.45	-7.98	13.67
LEND	0.202 (.19)	-.031	3.03	-9.29	14.99
MFC	0.060 (.13)	.000	2.11	-8.85	11.24
MMX	0.187 (.20)	.000	3.13	-14.26	14.18
MNDL	0.190 (.15)	.000	2.44	-7.72	14.99
MNP	0.450 (.21)	.000	3.24	-10.35	15.00
NEH	0.338 (.20)	.000	3.22	-14.22	14.99
SUU	0.090 (.09)	.000	1.36	-6.57	4.15
TTL	0.085 (.14)	.000	2.16	-9.33	9.77
TUM	0.192 (.16)	.000	2.48	-5.82	14.60
UID	0.522 (.31)	.000	4.94	-15.00	15.00

Note. Statistics from each company return and average market return. From Researcher estimation

Table 2.ARMA model information criteria

ARMA (2,2)	
Akaike info criterion	-6.3
Schwarz criterion	-6.28
Hannan-Quinn critter	-6.29
ARMA (1,1)	
Akaike info criterion	-6.3157
Schwarz criterion	-6.3057
Hannan-Quinn critter	-6.312

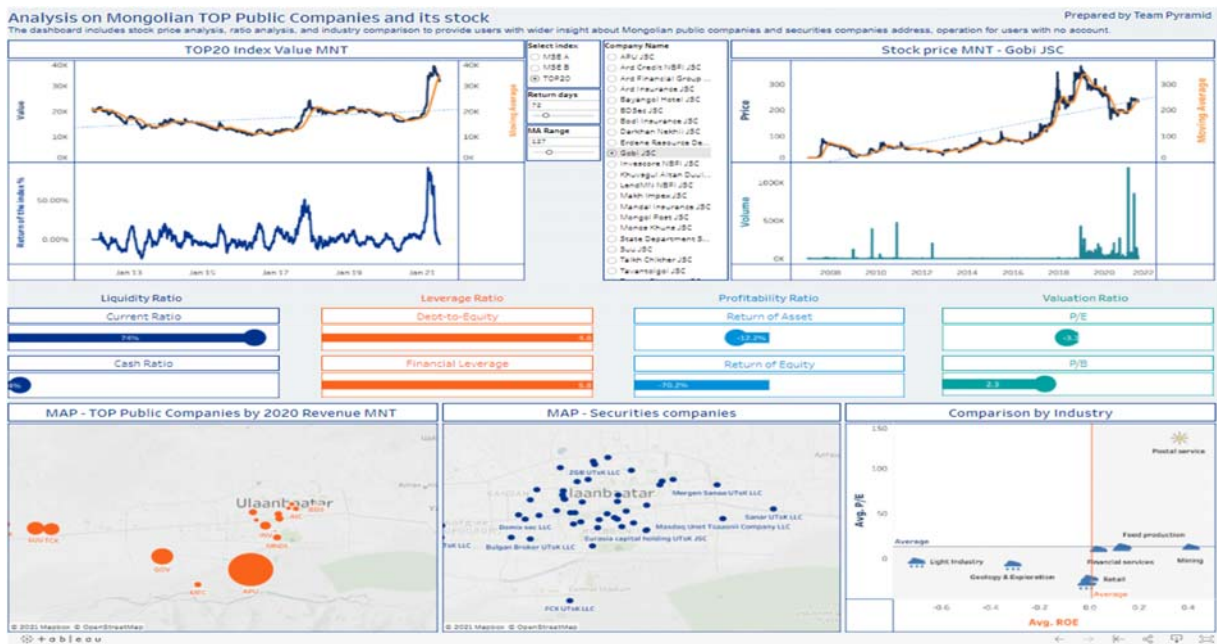
Note. From Researcher estimation

Appendix B: Electronic Data Gathering, Analysis, and Retrieval System

The screenshot displays the MFR Cedar.com website interface. At the top, there is a navigation bar with the logo of the Financial Regulatory Commission of Mongolia and the text 'MFR Cedar.com'. The main content area features a 'Welcome' message stating that the website provides access to public securities documents and information filed by issuers with the thirteen provincial and territorial securities regulatory authorities ('Mongolian Securities Administrators' or 'CSA') in the EDGAR filing system. Below the welcome message, there is a document viewer showing a 'FORM 10-Q' document. The document header includes 'Mongolia Financial Regulatory Commission of Mongolia' and 'APU Joint Stock Company'. The document content includes 'GENERAL INSTRUCTIONS' and 'A. Rule as to Use of Form 10-Q'.

Note. From Web site developing in the framework of this study. Available at <https://sites.google.com/kdis.ac.kr/mfrcedgar-com/home>

Figure2. Analysis on Mongolian Top Public Companies and its stock



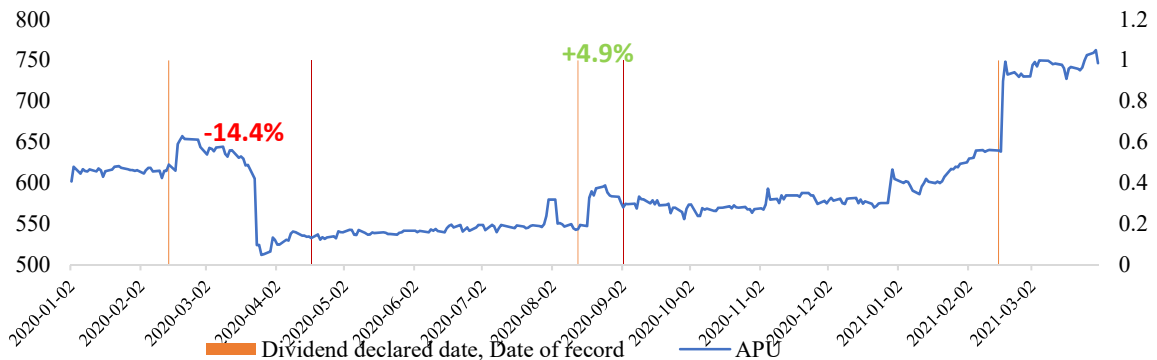
Note. Tableau public, Mongolian stock exchange dashboard . Available at https://public.tableau.com/app/profile/batbileg_gansukh/viz/shared/CHQJWYRMH?fbclid=IwAR1Q_rSQnR2PLYT8ilx8nJjVe0Hu39g9SJ3hteweEHnu0OMqO5H-maV8yJM

Appendix C: Detailed study of sample companies stock performance

APU JSC

APU JSC is mainly engaged in the food production industry. APU was established in 1924, was listed on the Stock Exchange in 1992. Now it is listed on the stock exchange 1,064,181,553 common shares were issued, and more than 4,000 shareholders own 742,877,000 ordinary shares of the company and trade freely. In terms of market capitalization, APU JSC is an outstanding company, listed as a Class I company. APU JSC divided its shares 100 times on July 15 in 2008, and 10 times on June 20 in 2016. Dividend policy of APU JSC: APU JSC has been implementing a dividend policy since 2005 and has a policy of allocating a constant profit per share. Typically, the stock's price tends to raise when the stock dividend is announced. But after a stock goes ex-dividend, the share price typically drops by the amount of the dividend paid. APU declared its dividend on 2020/08/13, 37.5 MNT per share. Up to the ex-dividend date, APU's share price has increased 4.9% or 26.5 MNT.

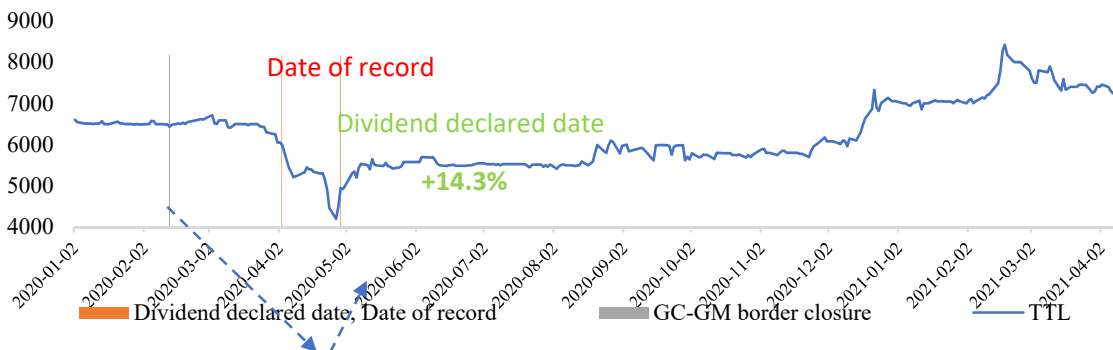
Figure 10 Event study of APU stock price



Tavan Tolgoi JSC

Tavan Tolgoi JSC was established in 1966 to operate in the coal mining sectors, and in 1995 it was registered on the MSE and became a state-owned JSC. Tavan Tolgoi JSC issued 52,665,200 ordinary shares and is traded on the MSE. The company is robust from the financial structure, positioning itself as the the second-largest company regarding capital assets. The shares of Tavan Tolgoi JSC are class I shares of the MSE, and on July 29, 2011, the company did a stock split of 1:100. A day after the dividend announcement, TTL stock price had been increasing continuously for 10 days and shows 14.3 per cent of return in 10 days. Mongolia’s closure of its border with China at the beginning of the Covid 19 virus outbreak reduced coal exports. Since the reopening of the wall in May, the previous level of coal exports has picked up, and exports tend to increase.

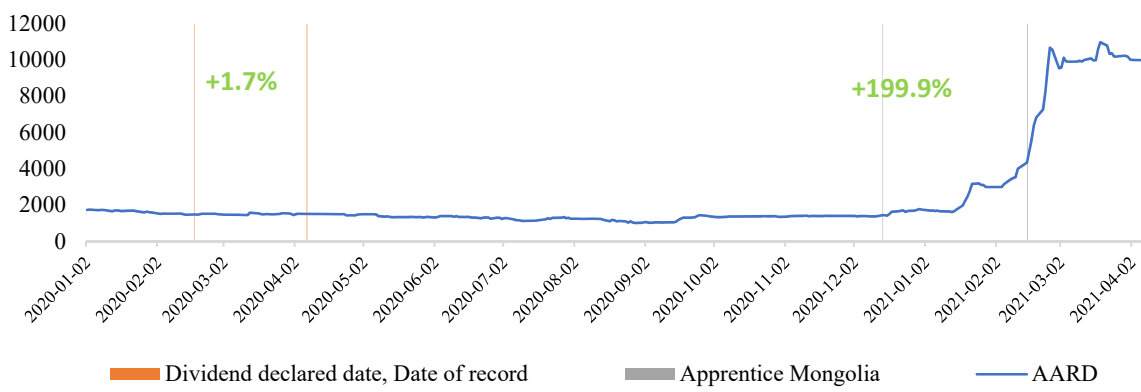
Figure 11 Event study of TTL stock price



Ard Financial Group JSC

Ard Financial Group is an investments firm. According to ARD's stock price chart, dividends have little effect on stock prices. Between dividend declared date and date of record, AARD also increased 1.7 per cent (average daily return from Jan 2020 to Apr 2021 equals 0.8 per cent). With the release of the Apprentice show in Dec 2020 to Feb 2021, ARD's share price rose 199.9 per cent and tripled.

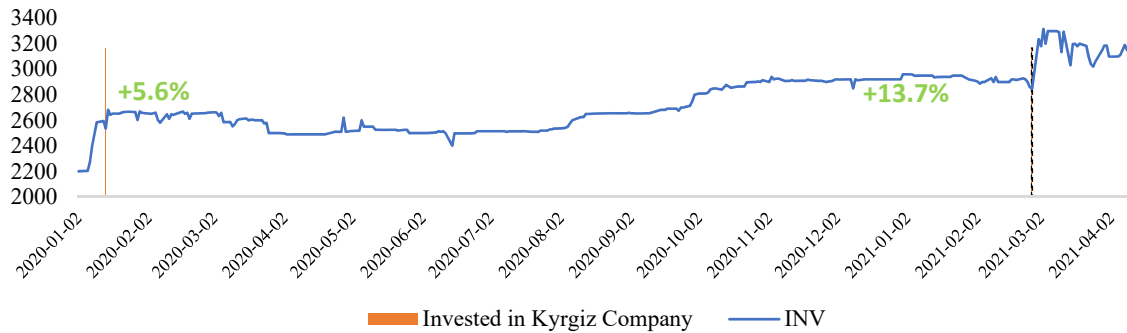
Figure 12 Event study of AARD stock price



Invescore NBFJ JSC

Inves Core Financial Institution operates in Mongolia, Japan, and the Kyrgyz Republic. Founded in 2016, the company is involved in the micro-financing market, using advanced technology and innovative services. Invescore NBFJ announced an investment in Kyrgyzstan in the 14th of January in 2020 and the stock price raised by 5.6 per cent the next day. The company announced its operational report in February of 2021, the total loan portfolio increased by 54 per cent and loan sales by 58 per cent in 2020. The total number of customers increased by 425 per cent and exceeded 56,000.

Figure 13 Event study of INV stock price



Erdene Resource Development JSC

Erdene Resources Development Corporation is a Canadian-registered exploration company engaged in exploring and developing base and precious metals in Mongolia. Erdene Likewise, the company is listed in the Canadian stock market under the name ERD and the Mongolian Stock Market under ERDN. Erdene Resources Development Corporation has more information transparency than the previous four companies. The company posts all the information on its website and attached official letter to its investors. The company announced that Eric Sprott invests in ERDN worth 15 million USD for exploration on the 23rd of June 2020. Until the investment cut off of Eric Sprott investment, ERDN stock price raised 28.6 per cent. Shares also rose 15.5 per cent in the two days following the announcement of new gold 3.5 km north of the Erdene Khundii gold deposit.

Event study of Erdene Resource Development JSC

