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ADVANCE DECLINE RATIO AND STOCK RETURNS IN KAZAKHSTAN STOCK MARKET

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ABSTRACT

Purpose of the research is to identify whether there is a significant relationship between the advance-decline ratio (ADR) and returns on KASE index.

Research methodology – least squares regression analysis was performed using weekly data for 2019-2023 period.

Originality/value of the research – although market breadth is widely implemented in developed financial markets, to the best of our knowledge, there are no studies on analysis of the relationships in Kazakhstan stock market particularly, this study adds to the existing knowledge base by examining the relationships in Kazakhstan equity market.

Findings – our findings suggest that there is a weak, but significant relationship between returns on KASE index and ADR, provided the low beta and R^2 of 0.22, in line with other studies and practical observations, suggesting that ADR is not a driving factor for the stock price moves but rather an accompanying signal which can be used to strengthen the conclusions about potential stock market trends, specifically, investors should pay attention that any uptrend in the stock market is associated with improving ADR leading to more robust and longer trends rather than short term weak price spikes.

Keywords: asset pricing, herding, market breadth, spurious regression.

INTRODUCTION

Market breadth indicators are employed to analyze intrinsic strength or weakness of a market at a given time and when used along with other indicators they add substantial evidence in evaluating market conditions. Market breadth measures the proportion of stocks which exhibit rising prices versus stocks which drop in price in a particular period, for example during one day or week [1].

Market breadth, particularly the advance decline ratio is not a new concept, Schade (2013) dates the discovery of the ADR to September 1927 when the Cleveland Trust Company reported the first Advance-Decline Line developed by Ayres and Hughes, the concept still remains widely used and referred to by market professionals [2]. For example, the Chartered Market Technician (CMT) Association curriculum contains studies on the market breadth as part for preparation for its certificate program [3]. Recent academic studies also mention the market breadth, for example Zaremba et al, 2021, analyze the relationship between market breadth and stock performance for 64 equity markets and find that market breadth impact is robust and stronger in markets that have higher limits to arbitrage, collectivism and lower past returns [4]. Valadkhani and O'Mahony mention that stronger market breadth lead to higher level of stability and lower volatility [5]. Allam et al study herding behavior based on sectors of the Egyptian Stock Exchange [6] whereas Zareie et al analyze the effect on the Tehran Stock Exchange [7].

Although widely used in developed financial markets and being studied on a general scale, we have detected no research devoted to calculation and analysis of the ADR in the Republic of Kazakhstan and relatively few studies in context of emerging markets. Given the importance of this measure, the contribution of this paper is to document the relationship between returns on KASE index and herding factor, specifically, quantifying the relationship and suggesting approach to the metrics in analyzing the markets. This may shed light on potential usage and how to use the ADR in investment decisions within the scope of market timing strategies in Kazakhstan stock market as well as the need in publishing of related periodical statistics.

The rest of the paper proceeds as follows. In Section 2, we thoroughly describe the existing literature on ADR and stock indices. Section 3 is devoted to data collection and methodology for our research hypothesis. Section 4 elaborates on data analysis. Section 5 concludes the paper with potential extensions for future researchers.

Literature review. According to Schade (2013), research on the ADR started in 1927 with the first calculation of the Advance-Decline Line [2]. Literature review regarding market breadth was found to be not too extensive, however some researches shed light on what may be hypothesized about relationship between market breadth and stock returns.

Zakon and Pennypacker in 1968 examined advance-decline line as predictor of S&P 500 returns and found significant relationship between the variables. However, given that signals arrive at the same time, they concluded that it is not possible to use the advance-decline line as a leading indicator of future price moves [8]. Zaremba et al analyzed ADR as an indicator of herding behavior as attributable to the market breadth characteristics and revealed that it had strong effect on stock returns [4]. Frey pointed that the advance-decline line goes in unison with the movement of the major market indices and is a useful technical measurement of the underlying strength and/or weakness of the market as a whole [9]. Qi and Zhao in 2008 examined predictive power of market breadth on equity market returns using a longer sample period and suggested a positive relationship between the two variables [10].

A number of studies however revealed no significant linear relationship between the ADR and stock returns [9],[1].

Other related studies examine relationship between market breadth and mutual fund performance [11]; relationship between the market breadth and the Monday seasonal effect [12]; relative significance of information and its role in herding formation among investors [13], COVID-19 implications [14]. Country-specific parameters are studied as well, for example, Allam et al, 2020 and Zareie et al, 2021 [6],[7].

As for the studies on the ADR in emerging markets, Patel, 2015, examined predictive ability of the advance-decline ratios and found that it is not effective in the Indian stock market. [15] Allam et al study herding behavior based on sectors of the Egyptian Stock Exchange [6] whereas Zareie et al analyze the effect on the Tehran Stock Exchange [7].

Provided the importance of the concept, based on numerous international studies, relative scarcity of the research on the topic in emerging markets and lack of related research on Kazakhstan stock market, this study attempts to add to the existing literature by analyzing ADR and returns on the KASE index and practical suggestions, as well as directions for future research on the topic.

The conceptual framework for the purpose of our research may be summarized as follows: higher ADR leads to more stocks participating in initial uptrend which creates a higher probability of strong or robust uptrend for the general market leading to higher returns on the index.

Data collection and methodology. We begin with description of the variables used for the estimation of our population regression model. So, our dependent variable, KASE returns, are calculated as follows:

$$KASE_t = \ln\left(\frac{P_t}{P_{t-1}}\right) \quad (1)$$

Here P_t is the value of the index in week $\boldsymbol{t}$, P_{t-1} is the value of the index in week $\boldsymbol{t-1}$.

Similarly, our independent variable, ADR, is calculated as follows:

$$ADR_t = \frac{Sum\ of\ advancers_t}{Sum\ of\ decliners_t} \quad (2)$$

where *Sum of advancers*$_t$ is the number of advancing stocks within the index during respective week *t*. *Sum of decliners*$_t$ is the number of declining stocks within the index during respective week *t*.

We utilize weekly data for KASE returns and ADR from January 2019 to December 2023. The price data are available online at www.investing.com.

As we deal with time-series data we need to control for spuriousness. A spurious regression occurs when two or more unrelated time series variables appear to have a statistically significant relationship due to trends or persistence in the data rather than any true underlying connection. In such regressions, standard statistics like high R-squared and significant t-values can misleadingly suggest a strong relationship even though the variables are independent. This often happens when non-stationary data (e.g., random walks) are regressed on each other without proper adjustments. Spurious regression can lead to false inferences about causality or predictability, posing a challenge especially in financial econometrics where persistent time series are common. Proper testing for stationarity and cointegration is crucial to avoid this issue in regression analysis.

Following Joshi and Bhavsar (2011) we use the unit root test in order to check for stationarity of ADR and KASE returns time series in addition to graphical visual presentation. In line with other studies, we perform unit root tests as follows, for ADR we employ Dickey-Fuller (DF) test while for KASE returns we use augmented Dickey-Fuller (ADF) test, which are conventional, widely used methods to test for non-stationarity.

Market capitalization of companies within the KASE index accounts for about 90% of the total market capitalization of the securities listed on the KASE which makes it a reliable benchmark for judgement about the general stock market in Kazakhstan. However there are not more than 10 issues within the index which may be regarded as a limitation due to number of counts and potentially may lead to errors.

Table 1 – List of KASE index constituents during the study period

Ticker	**Company**
CCBN	Bank CenterCredit
HSBK	Halyk Bank
KCEL	Kcell
KEGC	KEGOC
KMGZ	National Company "KazMunayGaz"
KSPI	Kaspi.kz
KZAP	NAC Kazatomprom
KZTK	Kazakhtelecom
KZTO	KazTransOil

Data analysis. While the Figure 1 demonstrates the histogram for all the variables used in the analysis, the Figure 2 visually plots the weekly behavior of those variables during the given period.

We may see that KASE returns experience bell shaped distribution with slight skewness to the right side whereas ADR is skewed to the left side and mainly distributed around the value of 1. However, readers may note the extreme values of ADR ranging from 6 to 8 which are later mentioned in the conclusion.

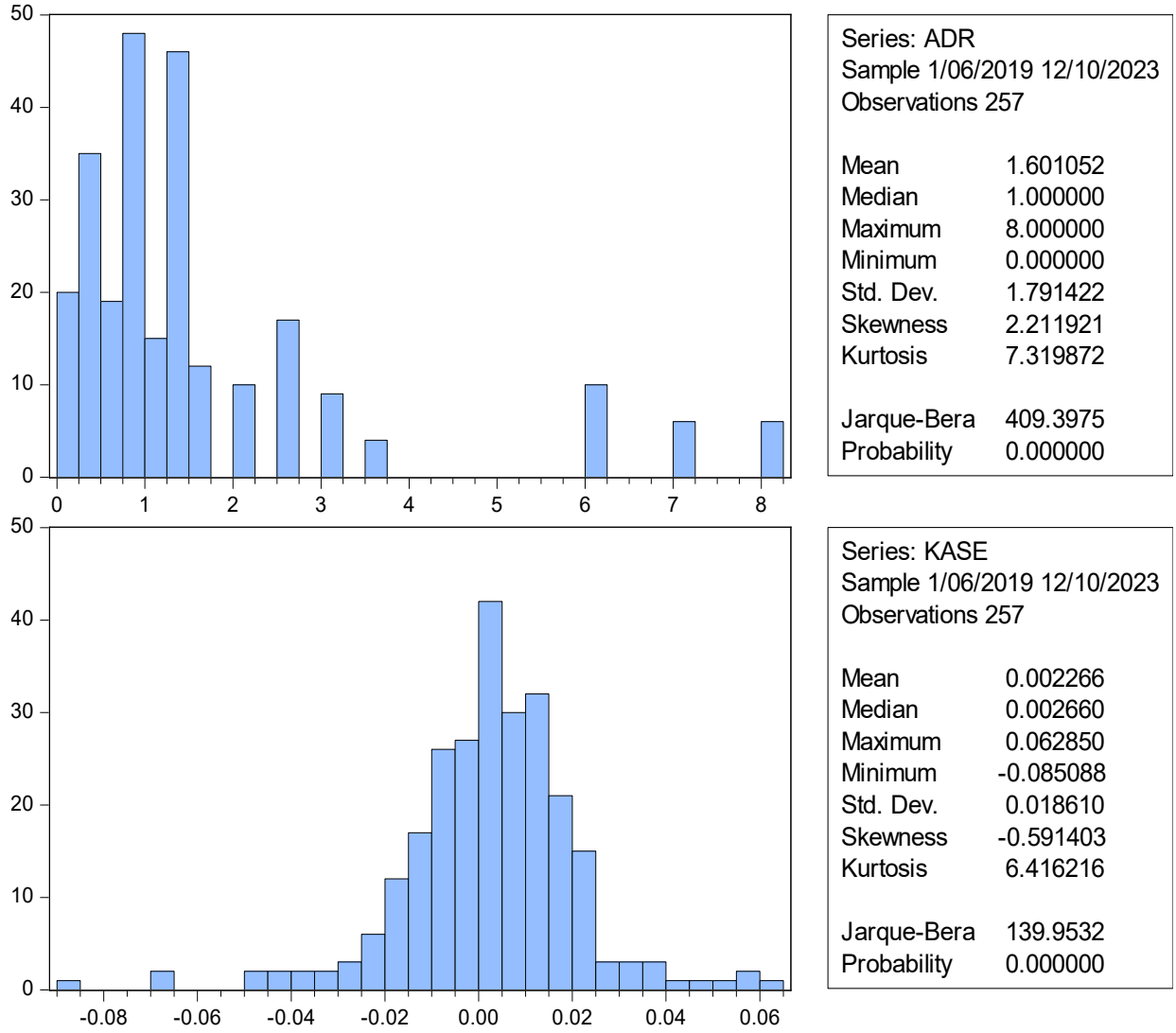

Figure 1 – Descriptive statistics for ADR and KASE returns

From Figure 2 KASE returns seem to be stationary around zero, while ADR doesn't look to be stationary. Before testing for stationarity formally, we estimate KASE returns on ADR in order to test whether there is a true or spurious relationship between the two as:

$$KASE_t = \beta_1 + \beta_2 ADR_t + u_t \tag{3}$$

Then, our initial fitted model is

$$\widehat{KASE}_t = -0.0056^{***} + 0.0049^{***} ADR_t \tag{4}$$
$$T = 257, \quad R^2 = 0.22, \qquad DW = 2.068$$

Since $R^2 < DW$, the regression outcomes in equation 4 demonstrate that there is suspicion on the spuriousness of the relationship between the two. In other words, there is a relationship between the KASE returns and ADR, but not necessarily long-term relationship. Given that the regression coefficient of ADR is statistically highly significant, ADR does have an impact on KASE returns though it explains only about

22% of the total variations in KASE returns. This implies the remaining 78% of the total variations in KASE returns is explained by the unobservable error terms in Equation 3. This goes in line with observations in other markets, suggesting that ADR should not be considered a driving factor but rather as a confirmatory factor in conjunction with other fundamental and technical information.

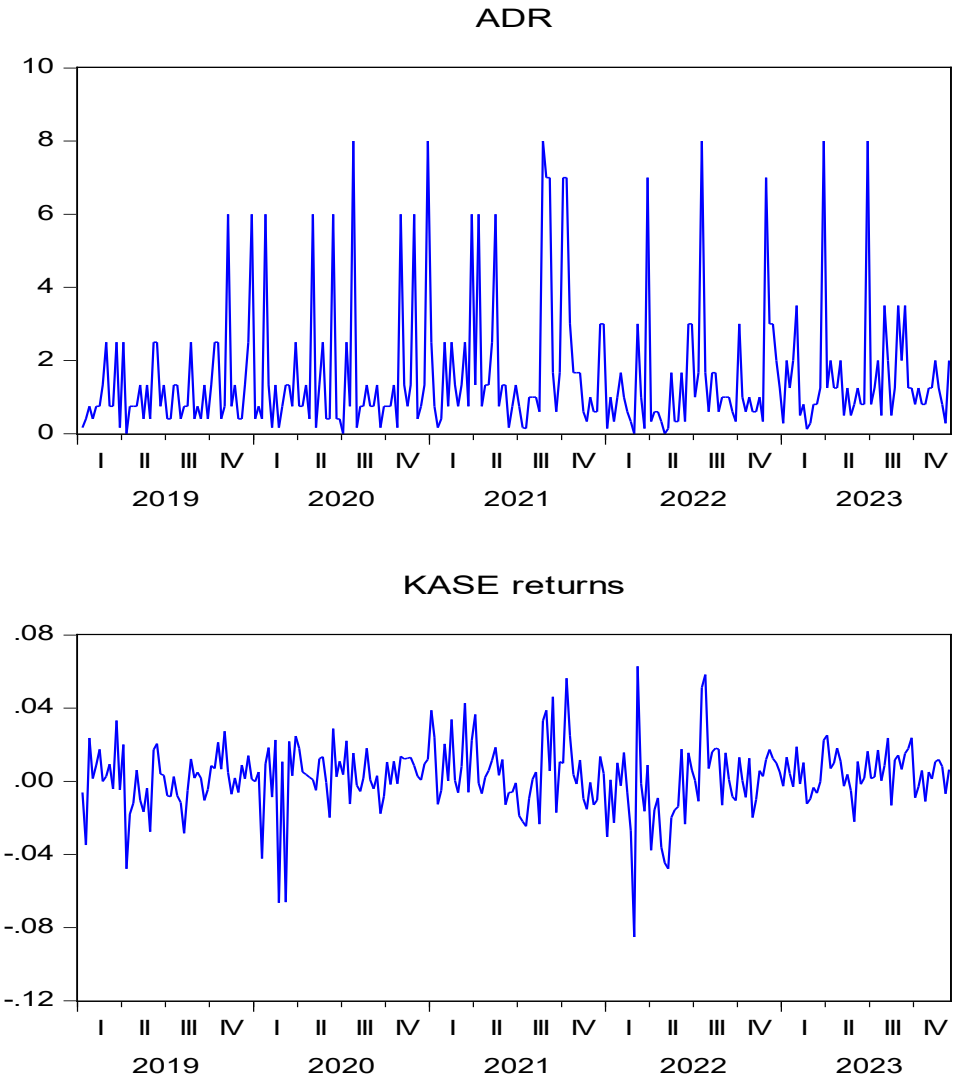

Figure 2 – Behaviors of ADR and KASE returns during January 2019 and December 2023.

Now, following Joshi and Bhavsar [1] we use the unit root test in order to check for stationarity of ADR and KASE returns time series, respectively, as:

$$\Delta ADR_t = \gamma_1 + \gamma_2 ADR_{t-1} + \epsilon_t \quad (5)$$

$$\Delta KASE_t = \delta_1 + \delta_2 KASE_{t-1} + \delta_3 \Delta KASE_{t-1} + \varepsilon_t \quad (6)$$

Here, the symbol Δ reflects the series of the first differences. That is, $\Delta ADR_t = ADR_t - ADR_{t-1}$ and $\Delta KASE_t = KASE_t - KASE_{t-1}$. For ADR we employ Dickey-Fuller (DF) test while for KASE returns we use augmented Dickey-Fuller (ADF) test. In equation 5 we test whether ADR time series are nonstationary as

$H_O: \gamma_2 = 0$ and in equation 6 we test whether KASE time series are nonstationary $H_O: \delta_2 = 0$ in equation 6, respectively. Then we obtained the following outcomes:

$$\Delta\widehat{ADR_t} = 1.494 - 0.93^{***} ADR_{t-1} \quad (7)$$

$$\Delta\widehat{KASE_t} = 0.0018 - 0.752^{***} KASE_{t-1} - 0.189^{***} \Delta KASE_{t-1} \quad (8)$$

From equation 7 and 8 we can see that both regression coefficients are highly statistically significant at 0.01 ($\hat{\gamma}_2 = -0.93$ and $\hat{\delta}_2 = -0.752$). Put it simply, we reject both null hypotheses above stating that both series are nonstationary and conclude that the opposite is true. That is, both ADR and KASE time series are stationary.

Based on above analysis we may conclude that ADR has relationship to KASE returns, although the relationship is weak suggesting that other factors also affect KASE returns, for example, the interest rate cycles in developed markets is a commonly recognized driving factor which causes the stock markets globally to either grow or decline, leading to long-term trends. However, at the beginning stage it is not clear whether a particular trend is expected to last long and looking at market breadth indicators (for example ADR) helps investors to gauge the potential strength of the driving factors because if those are to create lasting trends on a macro level then that should cause the stocks in the broad spectrum to react with higher returns rather than just a few larger stocks or specific sectors. These findings confirm the analysis made in other markets – consistent trends in stock prices are accompanied by strong market breadth, but the market breadth itself is not a leading factor affecting stock returns.

CONCLUSION

This work is a basic look on the relationship between ADR and stock returns in the Kazakhstan stock market. Based on our analysis we conclude that ADR does have an impact on the KASE returns but this impact is weak on average, put it simply, stock market in Kazakhstan acts in the same manner as foreign markets when we consider market breadth. Results of our analysis, complimentary to previous studies and general practices, suggest that ADR is not a driving factor for emergence of new trends in the stock market but rather an accompanying signal which adds additional confidence to investors in their judgement about potential new trend emergence which can be used in conjunction with other fundamental and technical factors. For example, if investors anticipate a new uptrend based on economic factors they can wait for the ADR to show up, as additional confirmatory signal, before making their investing actions.

As for the potential policy implications, in light of absence of the related statistics publicly available for Kazakhstan retail investors, our suggestion is to include periodical data on ADR or any other benchmark for market breadth, for example percentage of advancing and declining stocks, in publicly available data sources.

Due to availability issues our study period starts from 2019 to 2023. Note that the study period may be extended to include several business cycles to check the robustness of the relationship during economic ups and downs, for example, this research may be replicated after several economic cycles to check the robustness of the results. Also, as KASE index consists of 10 issues of the largest and most liquid stocks, the results and conclusions may be different for smaller issues listed on the exchange. Thus additional research may be done on companies that are not part of the index, with attention paid to the fact that many of those issues lack sufficient liquidity and thus are expected to have high idiosyncratic volatility.

In addition to that, as seen in Figure 3, every uptrend in prices on KASE index was accompanied by a huge burst in the advance decline ratio. This feature may be utilized by investors as an indicator of a potential new uptrend along with other market indicators. We suggest this as a potential further research using dynamic models in order to elaborate on the nature of those bursts in ADR prior and at the end of an uptrend in stock market, as well as comparative analysis of ADR with other factors, including economic and political factors.

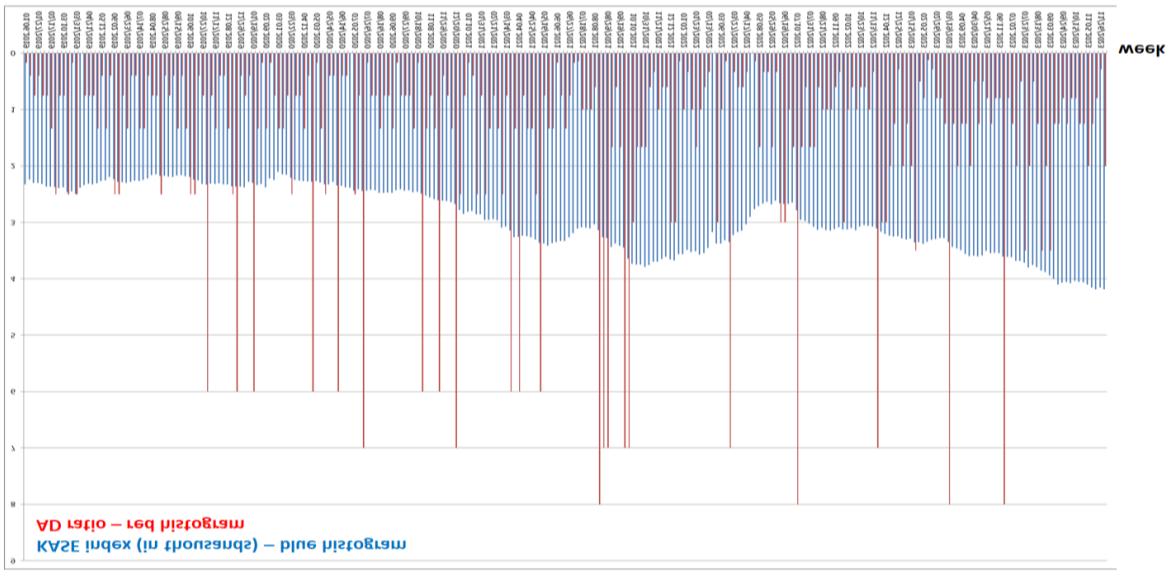

Figure 3 – Value of KASE index (in thousands) versus weekly AD Ratio (01.01.2019-12.10.2023)
Note – compiled by the authors based on the source [16]

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ҚАЗАҚСТАН НАРЫҒЫНДАҒЫ АКЦИЯЛАРДЫҢ ӨСУ/ТӨМЕНДЕУ КОЭФФИЦИЕНТІ ЖӘНЕ КІРІСТІЛІГІ

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АҢДАТПА

Зерттеу мақсаты – нарық кеңдігі көрсеткіші (advance–decline ratio) мен KASE индексінің кірістілігі арасындағы статистикалық тұрғыдан мәнді өзара байланыстың бар-жоғын анықтау.

Әдіснамасы – 2019–2023 жылдар кезеңіндегі апталық деректерді пайдалана отырып, ең кіші квадраттар әдісі негізіндегі регрессиялық талдау қолданылды.

Зерттеудің бірегейлігі / құндылығы – нарық кеңдігі көрсеткіштері дамыған қаржы нарықтарында кеңінен қолданылғанына қарамастан, әдебиеттерге жүргізілген талдау негізінде Қазақстанның қор нарығында олардың кірістілікпен өзара байланысын зерттейтін эмпирикалық жұмыстардың іс жүзінде жоқ екені анықталды. Осы зерттеу Қазақстанның акциялар нарығы бойынша эмпирикалық деректер қорын кеңейту арқылы аталған олқылықтың орнын толтырады.

Зерттеу нәтижелері – KASE индексінің кірістілігі мен ADR көрсеткіші арасында әлсіз, алайда статистикалық тұрғыдан мәнді өзара байланыстың бар екені анықталды, бұл бета коэффициентінің төмен мәнімен және R^2 коэффициентінің 0,22 деңгейінде болуымен расталады. Алынған нәтижелер дамыған қаржы нарықтарындағы алдыңғы зерттеулердің қорытындыларымен және практикалық бақылаулармен сәйкес келеді, оған сәйкес нарық кеңдігі көрсеткіші (ADR) баға динамикасын айқындайтын негізгі фактор емес, қосалқы индикатор ретінде әрекет етеді. Атап айтқанда, ADR көрсеткішінің жақсаруы қор нарығындағы ықтимал өсім трендінің неғұрлым тұрақты әрі ұзақ мерзімді болатынын, қысқа мерзімді бағалық ауытқулармен салыстырғанда, білдіреді.

Түйін сөздер: активтерді бағалау, нарық кеңдігі, жалған регрессия.

КОЭФФИЦИЕНТ СООТНОШЕНИЯ РОСТ/ПАДЕНИЕ И ДОХОДНОСТИ АКЦИЙ НА РЫНКЕ КАЗАХСТАНА

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АННОТАЦИЯ

Цель исследования – определить наличие статистически значимой взаимосвязи между показателем широты рынка (advance–decline ratio) и доходностью индекса KASE.

Методология – регрессионный анализ методом наименьших квадратов с использованием недельных данных за период 2019 – 2023 гг.

Оригинальность / ценность исследования – несмотря на широкое применение показателей широты рынка на развитых финансовых рынках, основываясь на нашем анализе литературы, эмпирические исследования их взаимосвязи с доходностью на фондовом рынке Казахстана практически отсутствуют. Настоящее исследование восполняет данный пробел, расширяя эмпирическую базу по рынку акций Казахстана.

Результаты исследования – выявлено наличие слабой, но статистически значимой взаимосвязи между доходностью индекса KASE и показателем ADR, что подтверждается низким значением коэффициента бета и показателем R^2 на уровне 0,22. Полученные результаты согласуются с выводами предыдущих исследований на развитых финансовых рынках и практическими наблюдениями, согласно

которым показатель широты рынка (ADR) не является определяющим фактором ценовой динамики, а выступает вспомогательным индикатором. В частности, улучшение показателя ADR сигнализирует о более устойчивом потенциальном восходящем тренде на фондовом рынке, характеризующимся большей продолжительностью и устойчивостью по сравнению с краткосрочными ценовыми колебаниями.

Ключевые слова: оценка активов, широта рынка, ложная регрессия.

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