How does the investors' sentiment influence the development of financial markets?

A comparative analysis between developed and emerging economies

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Abstract

The focus of my paper is the effect of investor sentiment on securities return. I present a literature comparison of developed and emerging markets and empirically test this effect in the case of Kazakhstan. In developed markets an increase in a given sentiment index is associated with a decrease in returns in subsequent periods. For emerging markets the evidence of this effect is mixed. To test it in Kazakhstan, I use principal component analysis to create a sentiment index based on return on equity, return on assets, traded volume and volatility. The results using OLS, firm fixed effects and random effects show that an increase of 1 point in the sentiment index can be associated with an increase of security returns of 0.13 to 0.4 KZT.

Table of Contents

Introduction

In this paper I try to compare international evidence on how investor sentiment can affect returns of securities in emerging markets. Besides, I contribute to the literature by trying to identify if this phenomena also happens in Kazakhstan. Using data from the National Bank of Kazakhstan, OECD and the KACD, I use several sentiment proxies, like trading volume, volatility metrics, with several controls, like industrial production index and the inflation rate to measure the effect of sentiment on security returns in Kazakhstan.

In the literature review chapter, I briefly discuss the main papers on the relationship between investor sentiment and stock returns. The previous studies, maybe due to the availability of data, focused on developed markets, mainly EU and US. The result of these studies generally show that an increase in sentiment index is followed by mispricing of stocks and then to a decline in returns. Subsequent studies, using data on emerging markets, found that this channel of causality may not be that clear or linear for emerging markets. Liquidity constraints, limits to arbitrage and other market characteristics may lead optimistic and pessimistic waves to have heterogeneous effects depending on the country and industry.

I then proceed to the data chapter. It includes the description of the main variables, the reason why they were chosen and the datasources. To build the sentiment index, I use return on equity (*ROE*), return on Assets (*ROA*), traded volume (*TV*), and volatility (*Vol*). These proxies should be enough to characterize firms' performance and market behavior. To transform them into an index, I use the principal component analysis technique. Besides the local sentiment index, as we will see in the literature review, the global sentiment can also impact local markets, so to isolate the effect of the local sentiment, an index of the global sentiment is included as well as several macroeconomic variables.

The two hypotheses of this research are: first, that sentiment has a predictive power; and the second, that sentiment positively impacts on securities return. In the methodology chapter,

I explain how my model and estimation strategies should provide evidence to test those hypotheses and which data transformations were necessary. To deal with possible firm specific effects, I estimated the model using pooled OLS, firm fixed effects and random effects.

Finally, my results show that both hypotheses cannot be rejected. The sentiment index indeed has a predictive power on security returns and an increase of 1 point in the sentiment index is associated on average to an increase in the securities return from 0.13 to 0.48 KZT, depending on the model. Besides, contradicting what was found in other papers, the global sentiment index does not seem to be relevant for predicting security returns in Kazakhstan. I then end the paper with a discussion on the limitations of the results and how they are related to the literature.

Literature review

Classical finance theory focused on the statistical properties of financial products and how rational agents choose their products to optimize returns and decrease risks. Even irrational investors, in this framework, would have their impact on prices limited by arbitrageurs. However, a growing field of research has been producing evidence indicating the limits of classical finance theory and it has drawn attention to behavioral biases agents may present. Baker and Wurgler (2006) in a seminal paper use a proxy for investor sentiment to test if it can affect stock returns. As a proxy they create a composite sentiment index based on several proxies available in the literature. Their main finding is that investor sentiment can have a more pronounced effect on returns on more volatile, newly listed and high return companies. When investor sentiment is at a low level, firms with these characteristics tend to have higher subsequent returns. This pattern tends to reverse when sentiment is high. Using data from developed economies and panel fixed effect regressions, Shemelling (2009) found a relevant negative impact of investor sentiment on stock returns and the direction of the effect is similar to that found by Baker and Wurgler (2006).

Investor sentiment level has been regarded as a predictor of movements in the market, usually in the opposite direction in developed markets. When investor sentiment is low, an increase in the returns is expected in a given period. This correlation may be the same or the opposite in emerging markets. Using data from Muslim countries, Bialkowski et al (2012) investigated the possible effect of investor sentiment during Ramadan and stock returns and found that during the Ramadan, stocks have returns above average and volatility below average.

With data from central European economies, Corredor et al.(2015) found that the impact of investor sentiment is more relevant in those countries than compared to more developed European markets. Considering stock returns from 2001 to 2011, the authors found that global investor sentiments have the expected impact on stock returns, but local investor sentiments

have no effect at all. They also found, as mentioned in other papers, that this effect is more prominent in stocks harder to price, like more volatile stocks or stocks from newly listed companies.

Given its economic relevance, the Chinese stock market has also become a focus of researchers trying to identify the effect of investor sentiment. Using data from 2006 to 2008 period, Cheema et al. (2020) ponder that the effect of investor sentiment is relevant, but only in pre and post bubble periods, and that they have a different effect in the Chinese market from what is commonly seen in the developed markets.

Besides the effects of investor sentiment on returns in general, its effects have also been studied in specific markets. Chen et al. (2021) found that investor sentiment impacts not only return but also volatility on the Chinese energy futures market. Creating a new sentiment index, based on the Baidu internet search index, and using a GARCH-M model, the authors found that an increase in the sentiment level has a negative effect on volatility, while a decrease has the opposite effect.

Apart from measuring investor sentiment with the common proxies mentioned in the literature, with the availability of methods, data and computational power, some new measures have been tried. Still on the Chinese market, using data from social media, newspapers and internet news, Xu et al.(2021) found a great forecasting ability of sentiment indexes based on social media to predict stock returns. What is interesting about their findings is that on optimistic periods, social media-based indexes have a better capacity to predict stock returns, according to authors, because less professional investors tend to pay more attention to this information, while on pessimistic times, the prices tend to be determined by institutional investors, who consume more internet news and less information from social media.

Besides its known effects on the market, investor sentiment can also have heterogeneous effects on specific types of firms. Chen et al (2013), using panel data of 11 asian countries from

1996 to 2010, identified that a local wave of optimism increased short term returns of materials, telecom, and services stocks. For global sentiment waves, only tech and utilities were affected.

Regarding the mechanism by which the investor sentiment affects stocks, the literature has usually considered the noise traders as the main responsible for these irrational movements. Devault et al (2019) showed that the commonly used sentiment metrics measure institutional investors' behavior, rather than individual ones. During the optimistic waves, institutional investors try to increase returns and when the wave is reversed, they reorganize the portfolios in order to decrease risks.

Theoretical Framework

In this section I would like to discuss, first, the logic of the choice of the variables, second, two hypotheses, which I would like either to confirm or reject in this work.

First, the analysis of investor sentiment is extremely limited to the availability of the data, thus rather than gathering the data of the variables introduced in Baker and Wurgler's works, the analysis of the types of the variables used as proxies for sentiment was executed.

To sum up, two types of the proxies were used: proxies which reveals the companies' performance in the market, and second, variables, which contains the information on the condition of the financial market itself. For the first type of the proxies return on equities and return on assets were chosen. Brigham and Houston (2015) give the definition of ROE and ROA as the fraction of the returns to the equities and assets, respectively. In other words, these two variables show the share of the net income to firm's assets, the only difference is that in ROE the debt is considered. Calamar suggests that ROE is the efficient criterion to show the potential of the company as long-term performer (Calamar, 2016). Higher ROE can reveal the companies with higher long-term potential due to its ability to generate higher returns relative to its capital. However, the existence of the debt is not always negative aspect of firm, the ability to borrow money and utilize them in production drives the economy. Thus, in order to evaluate how efficiently company uses its assets ROA is sufficiently informative (Brigham and Houston 2015).

To capture the financial market performance, I chose Volatility and Trading Volumes, which is in line with Baker and Wurgler's work.

Considering everything that discussed above, the hypotheses of this work are following

Hypothesis 1: Sentiment has predictive power

Hypothesis 2: Sentiment positively impacts on securities return

Data

In this paper I investigate the effect of the investors' sentiment on the development of financial markets in emerging and developed economies. To narrow down the scale of research I focus on the data of Kazakhstan, which is considered as emerging market economy using the national and global databases as primary sources. The list of Kazakh national databases included KASE (Kazakhstan Stock Exchange), KACD (The Central Securities Depository Joint-stock Company), Agency of Strategic Planning and Reforms of the Republic of Kazakhstan Bureau of National Statistics, and National Bank of Kazakhstan.

In order to gather trading information two main resources were used. First, established in November 1993 Kazakhstan Stock Exchange, first named as "Kazakh Interbank Currency Exchange", is the national exchange which monitors the stock and currency markets. The website includes the trade information, reports and publications and the information of the members of trading, which allows it to gather most of the data used in the research. Second, KACD is The Central Securities Depository Joint-stock Company which serves as allocation for national and international identificatory for securities and payment agent. Since KASE does not include the information of the full set of firms used in this research, KACD was utilized. Similar to KASE, the website of the company provides the data of transactions, particularly dates and volumes traded.

On the question of the remaining variables, OECD and National Bank of Kazakhstan, Agency of Strategic Planning and Reforms of the Republic of Kazakhstan Bureau of National Statistics, contains the database of main economic indicators. Table 1 shows the variables used in this research.

Table 1. Variables Description		
Variables	**Definition**	**Data Source**
Dependent Variable		
R	Return of the Securities	KASE/Central Securities Depository Joint-stock Company (KACD)
Sentiment Proxies		
ROE	Return on Equity	KASE/National Bank of Kazakhstan/ Central Securities Depository Joint-stock Company
ROA	Return on Assets	KASE/National Bank of Kazakhstan/ Central Securities Depository Joint-stock Company
TV	Trading Volume	KASE / Central Securities Depository Joint-stock Company (KACD)
Vol	Standard deviation of securities for past	KASE / Central Securities Depository Joint-stock Company (KACD)
Independent		
Global Sentiment		
SentG	G7 Consumer Confidence Index	OECD
Macroeconomic Variables		
IP	Industrial Production Index	Agency of Strategic planning and reforms of the Republic of Kazakhstan Bureau of National statistics
INF	Inflation Rate	National Bank of Kazakhstan

The full set of data consists of 45 companies with 103 underlying securities over the 5 years period from 2015 to 2020. The dataset covers the information on the securities market, particularly shares, mutual funds, corporate bonds, IFI securities, government securities and derivatives.

Dependent Variable

Dependent Variable is the monthly return on securities, *R*. Following the definition of the return on securities given by Brigham and Houston, the monthly return of the securities market is obtained from a 2 steps process. First, the raw data of the securities' prices is collected from data sources KASE and KACD for each firm out of 103 companies. Second, the return of each security is calculated as the difference of the prices between current previous months. Since the

behavior of the market varies through the time period taken, the monthly return is presented by both negative and positive values.

Sentiment Proxies

To build the independent variable of investors' sentiment in Kazakhstan, *sent_Kaz,* 4 sentiment proxies are chosen. The choice of variable is based on 2 basic principles: evaluation of the companies' performance and market behavior. The first group of proxies contains return on equity (*ROE*), return on Assets (*ROA*), while the market performance is represented by volume (*TV*), volatility (*Vol*). As mentioned above the main sources of the data are KASE and KACD.

Independent variables

Independent variables include global sentiment index (*Sent_G*) and macroeconomic variables - Industrial Production Index (*IPI*) and Inflation Rate (*INF*). To capture the investors' sentiment on the global market the Consumer Confidence Index (CCI) is used. CCI, which is collected in the OECD database, is the sentiment index calculated in counties-member in G7: US, UK, Canada, France, Germany, Italy, Japan (OECD). In addition, to isolate the varying macroeconomic conditions from country specific sentiment, *IPI* and *INF* are used and gathered from Kazakhstan's national databases: Agency of Strategic planning and reforms of the Republic of Kazakhstan Bureau of National statistics and National bank of Kazakhstan.

Table 2 lists the descriptive statistics of the variables. Table 3 provides the information on correlation between variables.

Table 2. Summary statistics

Table provides summary statistics on the 103 companies from 2015 to 2020 on monthly basis and shows the mean, standard deviation, minimum and maximum for all variables.

	(1)	(2)	(3)	(4)	(5)
Variables	**N**	**Standard Deviation**	**mean**	**min**	**max**
R	60	112.5394	78.3651	-461.2354	763.2364
ROE	6180	0.8039	0.1884	-0.0516	4.3260
ROA	6180	0.1986	0.0377	-0.0928	0.3540
TV	6180	263.8552	205.0000	2.0000	1565.0000
Vol	6180	30.2416	23.4230	4.2688	97.8558
CCI	60	0.9056	100.4919	97.7293	101.4026
IP	60	4.8919	99.7000	85.3000	116.4000
INF	60	0.0891	0.5100	0.1200	1.1700

Table 3. Correlation Matrix

Table provides the correlation of the variables for individual 103 securities. The total sample consists of 6180 securities-year observations from 45 firms over the period 2015-2020.

	R	**Sent_Kaz**	**Sent_G**	**IP**	**INF**
R	1				
Sent_Kaz	0.3124	1			
Sent_G	0.0723	0.0543	1		
IP	0.2945	0.1254	0.2717	1	
INF	-0.0452	-0.0436	0.0714	0.1582	1

Methodology

The main goal of this study is to investigate the extent to which investors' sentiment influences the development of the financial market, particularly the performance of the securities market, on the example of Kazakhstan's financial market to provide a basis for comparative analysis between developed markets and the countries of emerging economies.

First, following Baker and Wurgler procedure, principal component analysis is used to construct a country and firm specific sentiment variable for Kazakhstan.

Principal component analysis (PCA) is the multivariate analysis, which serves as a tool of the reduction of dimensionality (Cadima and Jolliffe, 2016). The reduction is obtained by the conversion of original dataset to a new set of uncorrelated variables, which are called the principal component (PC) (Jolliffe, 2013). Each PC is the linear combination of weighted original variables. This technique allows to simplify the process of the analysis of large datasets with a big number of correlated variables and minimum loss of statistical information, also known as variation.

In this research, technique is utilized on a dataset of 6180 observations on 4 interrelated numerical variables for each of 103 individual securities. These values construct the matrix X, whose rows and columns are defined by security and variable, respectively, so that the vector x_{ij} is the observation of the i^{th} security of the j^{th} variable. Let's avoid index i for simplicity, so that the linear combination can be represented by

$$\sum_{j=1}^{6180} a_j x_j = \boldsymbol{Xa}$$

where $\boldsymbol{a}$ is the matrix of weights a_j.

Since the goal is capture the maximum variation of original dataset, lets denote the variation as

$$var(\boldsymbol{Xa}) = \boldsymbol{a'Sa}$$

where S is the covariance matrix. Thus, to maximize $a'Sa$, the standard form of maximization problem has to be solved

$$(\boldsymbol{S} - \lambda \boldsymbol{I_4})\boldsymbol{a_1} = 0$$

where I_4 is identity matrix, λ is eigenvalue and a_1 is eigenvector. So, the maximum variation is given by the largest eigenvalue and corresponding eigenvector is the vector of weights.

Turning now to the experimental evidence of the influence of the sentiment on performance of financial markets, the panel regression, namely pooled OLS regression, Fixed Effect and Random Effect models are utilized. I used the obtained variable *SentKaz* as independent variable, and macroeconomic indicators (*MV*), Industrial Production Index (*IPI*) and monthly Inflation Rate (*INF*), and global sentiment *SentG* as control variables. The estimation is twostep process.

Due to difference in dimensionality of dependent variable R_{it}, which includes cross sections over the securities, and global sentiment and macroeconomic indicators, first I orthogonalized the returns in a way of regression of the return of each security *i* on $SentG_t$, MV_t and Year dummy variable, took the residuals as new values of the returns ($R^{\perp}$), so that the part of the returns' variation explained by the investor's sentiments on the global market and national macroeconomic conditions is eliminated. Before the analysis all variables were detrended.

Thus, the resulted equation is:

$$R_{it}^{\perp} = \alpha + \beta * SentKaz_{it} + \eta * year + \epsilon_{it}$$

where $R_{it}^{\perp}$ is the return of the security *i* in month *t*, where *t* equals to 1 for January 2015 and, respectively, *t* equals to 60 for December 2020. $SentKaz_{it}$ represents the country-security specific.

Results

In this section I would like to present and discuss main findings of the work. First, by following Baker and Wurgler (2006) procedure principal component analysis was executed. The principal component analysis is based on the transformation of data of interrelated variables (Jolliffe, 2013). Table 4 demonstrates the correlation matrix of the underlying variables. As expected, correlation between Vol and ROE, Vol and ROA have negative sign: highly volatile companies has lower figures on ROE and ROA. The highest correlation number was shown by Trading Volume vs ROE and Volatility vs Trading Volume. The numbers confirm that companies which have higher returns on equity, or in other words, net assets have higher Trading Volume. It can be explained by the structure of securities market of Kazakhstan. In general, the trading activity is driven by companies which are considered as more stable.

Table 4. Correlation matrix of sentiment proxies.

	ROE	**ROA**	**TV**	**Vol**
ROE	1			
ROA	0.1162	1		
TV	0.3846	0.2091	1	
Vol	-0.2124	-0.2972	0.-1694	1

By following the steps described above, the PCA gives the independent variable *SentKaz* with highest eigenvalue of 4.7, as follows

$$SentKaz = 0.48 * ROE_{t-1} + 0.43 * ROA_{t-1} + 0.56 * TV_t - 0.47 * Vol_t$$

The analysis shows the expected sign of underlying variables with total variation of 49%. These results are similar to those reported by Baker and Wurglers (2006), who got the explained variation of 53%.

The new constructed variable of sentiment has mean value at 97.5736, minimum value at -2.1036 and its maximum value at 806.2154. The interpretation of newly constructed variable can be problematic, but still sufficiently convenient for comparison of different periods.

The second step of the research is to Return values with eliminated effect of global sentiment index and macroeconomic variables, which reveals the overall economic situation in the country. For this goal, the returns of each security over time are regressed on control variables. The result is as follow, first, global sentiment index is not significant at 10% of significance level in 90.3% of securities. It means that the national month's price change is independent from investor's sentiment about global market. On the other hand, Industrial Production Index is significant in 70% of securities at the same significance level. It reveals the strong dependence of the price change on the industry performance. Finally, the inflation is significant in 59.2% cases with inclusion of "stable" companies, which are the main drivers of security market. Thus, we can expect that the shock on national inflation is reflected in the performance of financial sector.

Before proceeding to examine the impact of investors' sentiment, it is important to note that the new constructed Return variable has a new standard deviation of 97.8425 comparing to the previous of 112.5394.

Table 5. Pooled OLS, FE, RE regressions

Dependent variable is orthogonalized Return of securities. The estimation methods are pooled OLS regression, Fixed Effect and Random Effect models where the coefficient is the effect of country-security specific sentiment on the return of securities. Year dummies are included into all models, the results are omitted for simplicity.

	OLS	**FE**	**RE**
Constant	-0.2183*** -0.0511	-0.4104*** -0.1247	-1.3307*** -0.0277
SentKaz	0.4810* -0.0146	0.1796* -0.0388	0.1387* -0.0187
Observation	6180	6180	6180
R^2	42.08	29.32	24.87
Adjusted R^2	42.01	28.75	23.01
***p<0.01, **p<0.05, *p<0.1			

Table 5 shows the results of the 3 models, which also included time dummy variables, but omitted in the table for simplicity. It can be clearly seen that a newly constructed sentiment variable is positively effects on return of securities. However, the results show the material significance between coefficients of pooled OLS model and FE/RE models. That significant drop signals a high effect of unobservable on returns. To sum up, the common interpretation of. coefficients are that 1 point increase in investor sentiment causes 0.4810/0.1796/0.1387 KZT increase in security's return or the monthly price change. Breusch-Pagan LM and Hausman tests showed the most preferred model is FE, then RE and the least is pooled OLS. It means that random correlation between sentiment and unobserved securities individual heterogeneity takes place in the model.

Finally, based on empirical evidence I can confirm both hypothesis on positive effect of the sentiment on securities return.

Concluding remarks

As we have seen, the effects of investor sentiment may vary according to country and industry. Some specific characteristics of emerging markets, like liquidity constraints and limits to arbitrage may be important elements to explain why investor sentiment can have a different impact on stock returns.

The main channel through which investor sentiment seems to affect stock returns is risk management. As proposed by Baker and Wurgler (2006), investors join optimistic waves and switch part of their portfolios from safer to speculative securities, driving prices away from fundamentals. The reverse is also true when sentiment decreases. And far from being a consequence of the behavior of noise traders, as shown by Devault et al (2019) this phenomena can be mainly attributed to institutional investors trying to increase returns or decrease risks.

The literature on investor sentiment has found evidence that, on developed markets, an increase in the sentiment index is associated with a decrease of returns in a subsequent period. For emerging economies, the evidence is mixed. That could be attributed to the specific market characteristics. My main result shows that this is also valid for Kazakhstan. As opposed to what is observed in developed economies, in Kazakhstan an increase in sentiment index is associated with a subsequent increase in security returns.

Corredor et al.(2015) found that in Central European countries, local sentiment has a negligible effect on market returns, while global sentiment has the more relevant impact. One of the main interesting findings of this research is that this effect is the opposite in Kazakhstan.

This paper and the whole set of papers dealing with investor sentiment has a clear relevance to investors and policy makers. It became clear the relevance of investor sentiment indexes to predict short and medium term returns. It is also important to consider that many proxies can have good predictive power, from consumer indexes to social media news. Besides, this effect may change from developing to emerging markets and may also have different

impacts on different industries. For future research it could also be relevant to identify how sentiment can affect different financial products with different characteristics.

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