Investor sentiment, optimism and excess stock market returns. Evidence from emerging markets

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We test the existence of a contemporaneous relationship between sentiment/optimism indexes and returns at the aggregate market level in eight emerging markets, namely: Brazil, China, India, Mexico, Poland, Republic of South Africa, Russia and Turkey. We use sentiment and optimism Thomson Reuters MarketPsych Indexes that are based on scanning media coverage for relevant text reflecting particular moods and opinions. We find that there is a positive relationship between investor sentiment index / investor optimism index and the excess stock market returns in Brazil and China, respectively. We also notice that excess returns are more sensitive to changes in investors moods during periods of negative sentiment/optimism index values in four out of eight researched markets, namely: Brazil, China, India and Mexico. Additionally, this relationship we find positive.

Introduction

The behavioral approach to asset pricing assumes that market reacts not only to information digested by rational investors, but it may also be driven by noise traders' sentiment. Noise traders are defined as irrational market participants that make their decisions based on vague information, biased perception of reality, unstable preferences, and various emotions. There is a number of ways in which rationality of decision makers might be biased. Behavioral finance often undertakes individual analysis of particular biases. However, a more general concept of investor sentiment has also been proposed, as a notion reflecting overall mood of the market. Barberis, Shleifer, and Vishny (1998) introduced a theoretical model explaining how swings in investor sentiment drive asset pricing. However, their model allows only for two patterns of investor sentiment, i.e. either extrapolation of a trend or expectation of a reversal. Other aspects and factors influencing general mood of investors are not captured by the BSV model.

Empirical research targeted to confirm connection between investor sentiment and actual asset returns or market volatility runs into a major problem of finding a good proxy reflecting mood of irrational traders in the form of aggregated variable. Some studies attempt to explore the foundations of sentiment and connect stock returns to "mood variables" such as the level of sunshine (Hirshleifer and Shumway 2003), the amount of daylight (Kamstra, Kramer, and Levi, 2003), the event of an aviation disaster (Kaplanski and Levy, 2009), and whether a country's soccer team is eliminated from an important tournament (Edmans, Garcia, and Norli, 2007). The argument is that these variables affect mood, which, in turn, causes investors to view stock market prospects overly favorably or unfavorably.

Early studies use also consumer indexes assuming the sign of equality between the mood of consumers and the mood of individual investors. Fisher and Statman (2003) offer

evidence showing that monthly changes in consumer confidence indexes (composed by the University of Michigan (MS) and Conference Board (CCI)) and S&P500 stock returns exhibit a positively *contemporaneous* relationship. Lemmon and Portniaguina (2006) document that a measure extracted from the same consumer confidence indexes forecasts *future* returns on small stocks and those stocks with low institutional ownership in the US market. Further, Kremer and Westermann (2004) use aggregate Eurozone-wide data on consumer confidence, household spending and stock market movements in Europe. Schmeling (2008) offers an evidence on forecasting ability of consumer confidence in eighteen industrialized countries. Ho and Hung (2012) in their international study employ a measure which is a mixture of consumer indexes, the Investors Intelligence sentiment index for the US market, and the Economic Sentiment Index for European markets. Jordanov and Valentini (2013) go similar path and use Industry, Services, Consumer, Retail and Building confidence indicators as well as a general Economic Sentiment Indicator in seven European countries, including two emerging markets (Romania and Bulgaria).

Generally, earlier studies provide evidence of positive *contemporaneous* relationship between consumer/investor sentiment and aggregate stock returns and negative relationship between consumer/investor sentiment and *future* aggregate stock market returns on average across countries. When confidence (sentiment) is high, current stock returns tend to be high, but future stock returns tend to be lower and vice versa.

There is an obvious limitation of the approach based on the use of consumer confidence as a proxy for investor sentiment as not all consumers are investors. Willingness to spend money on consumption goods does not necessarily go together with willingness to invest in the stock market.

One of new directions of research that addresses that problem depends on employment of semantics in analysis of news and media reports. It is generally known that media plays a great role in building perception and creating opinion of investors on various matters. Based on the style of language used in social and public communication proxies of investor sentiment might be constructed. We follow this avenue and use MarketPsych indexes offered by Thompson Reuters[1]. We attempt to find the connection between investor sentiment (understood as mood created by media coverage) and market returns.

Nooijen (2013) conducts similar analysis trying to predict returns in major developed stock markets. We extend his work by focusing in our analysis on eight emerging markets that potentially might be more surprising for investors and where shifts of sentiment might be higher due to local factors.

On the basis of the results of earlier studies we state the following three hypotheses.

First, we hypothesize that in emerging market countries there exists a positive relationship between moods of investors and the level of contemporaneous excess market returns. This mean that while the investors' moods are positive the average excess market returns are higher from the times when investors' moods are negative. Second, we hypothesize that there is a positive relationship between the change in the investor's moods and the change in the level of the contemporaneous excess market returns. We suppose that an increase in positive moods (decrease in negative moods) is accompanied by positive change in excess returns, while decrease in positive moods (increase in negative moods) is accompanied by negative change in excess returns. Third, we think that investors reaction is stronger when negative moods change than when positive moods change, namely the change in the level of contemporaneous excess market returns is higher when there is a change in negative values of sentiment/optimism indexes than in the times where there is a change in positive values of sentiment/optimism indexes.

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[1] Authors thank Aleksander Fafuła from MarketPsych Data for providing the daily dataset for all emerging markets for the period of 1998-2013.

The rest of this paper is organized into the following sections. First, we present the methodology and the description of our sample. Section 3 contains the results together with detail discussion. Finally, we conclude with a summary of the main findings, identification of the limitations of our study, and suggestions for future research.

Sample description

We use a wide market price index as a proxy of market returns for each of eight selected emerging markets, namely Brazil (FTSE Brazil), China (FTSE China), India (MSCI India), Mexico (Mexico IPC (BOLSA)), Poland (Warsaw General Index 20), Republic of South Africa (FTSE/JSE South Africa), Russia (RTS Index) and Turkey (BIST National). As a risk free rate approximation, in order to maintain comparativeness, we use Thomson Reuters Datastream benchmark list derived from 10Y government bond indexes (Government Benchmark Yield time series). Both data sets were obtained from Thompson Reuters Datastream, for the period of 2005-2013.We calculate the excess stock market return (i.e. equity premium) as the difference between the wide market index return and the risk free rate[1]. Our proxies for investors' sentiments are constructed on the basis of multi-dimensional Thomson Reuters MarketPsych Indexes (TRMI) that were created by MarketPsych Data in partnership with Thomson Reuters. The data set was obtained directly from MarketPsych Data company. The software underlying the TRMI uses complex natural language processing to score sentiment-laden content in text. It scores content that pertains to specific companies, currencies, commodities, and countries. The entire content set includes over 2 million articles and posts daily from premium news wires, internet news sources, and social media. Their methodology is recognized as unique due to extracting detailed, relevant concepts from a variety of business and investment text. The MarketPsych lexicon is an extensive, expert-curated repository of simple and complex English-language words and phrases of potential interest for traders, investors, and economists. Used in conjunction with the MarketPsych lexicon, MarketPsych's natural language processing software employs grammatical templates customized to extract meanings from financial news, social media, earnings conference call transcripts, and executive interviews. MarketPsych customizes their analytics to each source type due to the vast differences in communication styles between social and news media. Compared to news, social media contains significant levels of sarcasm and irony, incomplete thoughts, misplaced or excessive punctuation, misspellings, non-standard grammar, case insensitivity, and crude language. Additionally, in social media many common words are used with colloquial meanings (Peterson, 2013).

Particularly, in this study we use the country sentiment and country optimism indexes. The country sentiment and optimism index values may vary between -1 and 1 and these are bipolar indexes. By definition it consists of the net difference between PsychVar values of equivalent meaning but opposite valence (net difference between positive and negative expressions). Although we obtained a dataset covering the period of 1998-2013, after initial statistical analysis we decided to use for the study the dataset only for the period of 2005-2013. This was due to lack of homogeneity of observations in the overall period, resulting from incorporating by MarketPsych Data since 2005 new source of input data - the Moreover Technologies aggregated news load which is currently derived from 50,000 internet news sites and spans. To avoid problems connected with analysis of daily market returns we took weekly returns calculated at Friday every week over 2005- 2013 and value of sentiment/optimism index as given on Friday as well[2]. The change of the investors mood as measured by sentiment/optimism index is depicted by the change of the index i.e. $\Delta I = I_t - I_{t-1}$.

Methodology

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[1] i.e. market's return in excess of the risk free rate, similar to Lee, Jiang and Indro (2002).

[2] We have used a weekly average sentiment/optimism index as well however all results ware of less statistical significance

We test the relationship between excess stock market returns and separately sentiment and optimism index. Three simultaneous questions to investigate are: (i) do the mean excess stock market returns differ depending on the sign of sentiment/optimism index, (ii) whether there exists an interaction between the sign of the index and the change in the index level i.e. what is the association between excess stock market returns and the change in the level of the index whether index itself is positive comparing to the situation when it is negative[1] and (iii) do the investors react stronger to the negative than to positive changes in the sentiment and optimism index depending on the sign of the index. So far the conditional volatility of excess stock market returns was tasted by Nelson (1991), Glosten, Jagannathan, Runkle (1993) and Lee, Iang, Indro (2002) all confirming the stronger investors' reaction to negative information reflected in the volatility of sentiment index and its changes. Similarly, we expect such results for conditional excess stock market returns mean and therefore to test the three stated hypotheses we have employed the factorial regression - one of the model from the wide family of General Linear Models. Factorial regression is currently applied to investigate excess returns behavior under different fundamental conditions (see e.g. Fauklender and Wang, 2006)

The relevant for our study factorial regression between excess stock market returns and sentiment index has the following form:

$$R_{it} - Rf_{it} = \alpha_0 + \alpha_1 QSI_{it} + \alpha_2 \Delta SI_{it} + \alpha_3 \Delta SI_{it} \times QSI_{it} + \varepsilon_{it}$$

$$QSI_{it} = \begin{cases} 0 & SI_{ti} \leq 0 \\ 1 & SI_{ti} \geq 0 \end{cases} \tag{1}$$

Where:

R - rate of return on market index

Rf - risk free rate of return

SI - sentiment index

ΔSI - change in the level of the index

QSI - dummy variable

$\alpha_0,..,\alpha_3$ - regression coefficients

i - i-th market, i = 1, …,8

t - week no. t = 1, …N

Similarly the factorial regression for optimism index takes form of:

$$R_{it} - Rf_{it} = \beta_0 + \beta_1 QOI_{it} + \beta_2 \Delta OI_{it} + \beta_3 \Delta OI_{it} \times QOI_{it} + \varepsilon_{it}$$

$$QSI_{it} = \begin{cases} 0 & SI_{ti} \leq 0 \\ 1 & SI_{ti} \geq 0 \end{cases} \tag{2}$$

Where:

OI - optimism index

$\beta_0,..,\beta_3$ - regression coefficients

To confirm the first hypothesis we expect to receive $\alpha_0 < \alpha_1$ ($\beta_0 < \beta_1$) meaning that excess stock market returns are on average lower during the periods of negative sentiment

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[1] We have tested as well more complicated interactions adding the impact of the sign of the change in index level i.e. what if any impact on the excess return has the change in the index level whether the change is positive or negative and whether the index itself was negative or positive, however this factorial combination were statistically insignificant in all cases except Poland and Russia.

(optimism) index values from periods of positive values. To confirm the second hypothesis we expect to receive $\alpha_2, \alpha_3 > 0$ ($\beta_2, \beta_3 > 0$) meaning that there exist a positive relationship between the level of the excess stock market returns and the level of the sentiment (optimism) index. Finally, to confirm the third hypotheses we expect to receive $\alpha_2 > \alpha_3$ ($\beta_2 > \beta_3$) meaning that the change in the level of excess stock market returns is higher during the periods of negative sentiment (optimism) index values from periods of positive values.

Model parameters were estimated in STATISTICA.

The variables under consideration were summarized with the use of descriptive statistics particularly to indicate its main features. The basic descriptive measures are depicted in Table 1.

This table provides summary statistics for the variables in our sample of country-weeks stock market returns and sentiment/optimism indexes over period 2005 - 2013. Weekly log returns are calculated as ln (R_t/R_{t-1}) where R_t corresponds to weekly stock market rate of return expressed in %. Weekly excess returns are the difference between the wide market index weekly return for each country in our sample and the weekly risk free rate for that country. Sentiment/optimism index vary between -1 and 1 and stands for the net difference between positive and negative expressions. The change of the investors mood as measured by sentiment/optimism index (general notation I) is depicted by the change of the index i.e. $\Delta I = I_t - I_{t-1}$

TABLE 1. DESCRIPTIVE STATISTICS FOR THE COUNTRY- WEEKS 2005 - 2013 SAMPLE

Country	N	Mean	Median	Min	Max	St. dev.	Skewness	Kurtosis
PANEL A: WEEKLY LOG RETURNS %								
Brazil	420	0.1437	0.2369	-20.5593	10.0996	3.5092	-0.8888	3.4653
China	420	0.2143	0.6026	-18.2903	15.3419	4.2309	-0.3020	2.1306
India	420	0.2298	0.5076	-16.3919	14.6980	3.6331	-0.5389	2.3377
Mexico	420	0.2683	0.3641	-16.8067	12.6888	3.0050	-0.6525	4.3677
Poland	420	0.0393	0.1790	-15.8498	12.6259	3.4069	-0.5250	2.1746
RSA	420	0.1424	0.4010	-9.7039	19.4134	2.8273	0.3035	5.6122
Russia	420	0.1556	0.4511	-34.2214	25.6998	4.7713	-1.2082	11.5721
Turkey	420	0.2672	0.5902	-15.9017	16.9969	3.8911	-0.6651	2.6604
PANEL B: WEEKLY EXCESS RETURNS %								
Brazil	378	-0.0559	-0.0463	-18.8728	10.3401	3.4967	-0.6937	2.8121
China	420	0.2340	0.5411	-16.7765	16.5237	4.2239	-0.0495	2.0286
India	420	0.1465	0.3591	-15.2639	15.7069	3.6137	-0.3206	2.1047
Mexico	420	0.1682	0.2431	-15.6390	13.3596	2.9899	-0.4025	3.7849
Poland	420	-0.0102	0.0837	-14.7865	13.3424	3.3840	-0.3327	1.9306
RSA	420	0.2598	0.5231	-10.0338	17.8746	2.8131	0.0222	4.3746
Russia	420	0.1156	0.3060	-29.1336	29.1573	4.6802	-0.3875	9.6087
Turkey	165	0.1131	0.3482	-12.6529	7.7383	2.9787	-0.8872	2.6307
PANEL C: SENTIMENT INDEX. SI								
Brazil	420	-0.0798	-0.0743	-0.4254	0.1700	0.0763	-0.3952	0.8251
China	420	-0.0654	-0.0616	-0.2525	0.1338	0.0559	-0.2292	0.2773
India	420	-0.1057	-0.1052	-0.2095	0.0568	0.0389	0.2487	0.7297
Mexico	420	-0.1404	-0.1430	-0.3653	0.1182	0.0718	0.1013	0.4295
Poland	420	-0.0984	-0.0995	-0.4800	0.2036	0.0979	-0.0270	0.8665
RSA	420	-0.1247	-0.1284	-0.2338	0.1409	0.0545	0.8438	1.5160

TABLE 1. DESCRIPTIVE STATISTICS FOR THE COUNTRY- WEEKS
2005 - 2013 SAMPLE

Country	N	Mean	Median	Min	Max	St. dev.	Skewness	Kurtosis
Russia	420	-0.1561	-0.1513	-0.4089	0.0041	0.0573	-0.4804	1.0098
Turkey	420	-0.1285	-0.1277	-0.4585	0.0655	0.0796	-0.3266	0.8705

PANEL D: CHANGE IN THE SENTIMENT INDEX. ΔSI

	N	Mean	Median	Min	Max	St. dev.	Skewness	Kurtosis
Brazil	419	0.0001	0.0056	-0.3476	0.2739	0.0928	-0.2250	0.4387
China	419	0.0002	0.0018	-0.1853	0.1813	0.0652	-0.1516	0.1204
India	419	-0.0000	0.0017	-0.1384	0.1354	0.0429	-0.0631	0.3320
Mexico	419	0.0003	0.0001	-0.2903	0.3530	0.0874	-0.0413	0.7271
Poland	419	0.0003	-0.0037	-0.4808	0.4471	0.1295	0.0606	0.8150
RSA	419	0.0002	0.0004	-0.2674	0.2353	0.0661	-0.0666	1.1308
Russia	419	0.0001	0.0004	-0.3003	0.2430	0.0691	-0.0929	0.9506
Turkey	419	-0.0002	0.0005	-0.2920	0.3107	0.0975	-0.0237	0.1090

PANEL E: OPTIMISM INDEX. OI

	N	Mean	Median	Min	Max	St. dev.	Skewness	Kurtosis
Brazil	420	0.0058	0.0051	-0.0414	0.0565	0.0165	0.2156	0.3338
China	420	0.0060	0.0063	-0.0254	0.0418	0.0094	0.0206	0.6544
India	420	0.0001	0.0001	-0.0240	0.0361	0.0075	0.1648	1.3199
Mexico	420	-0.0006	0.0002	-0.0629	0.0747	0.0154	0.1965	2.4652
Poland	420	-0.0014	-0.0030	-0.1733	0.1820	0.0355	0.3782	4.2418
RSA	420	-0.0016	-0.0030	-0.0485	0.0594	0.0134	0.4307	1.2977
Russia	420	-0.0032	-0.0036	-0.0438	0.0745	0.0111	0.5817	5.9303
Turkey	420	-0.0029	-0.0024	-0.0573	0.0627	0.0177	0.1249	0.9366

PANEL F: CHANGE IN THE SENTIMENT INDEX. ΔOI

	N	Mean	Median	Min	Max	St. dev.	Skewness	Kurtosis
Brazil	419	0.0000	0.0016	-0.0772	0.0704	0.0222	-0.1620	0.1720
China	419	0.0001	0.0003	-0.0321	0.0337	0.0108	-0.0331	0.1019
India	419	-0.0000	-0.0000	-0.0293	0.0313	0.0094	-0.0089	0.1499
Mexico	419	0.0000	0.0000	-0.0713	0.0774	0.0201	-0.0428	0.9901
Poland	419	0.0001	-0.0017	-0.2042	0.1924	0.0487	0.2487	2.0881
RSA	419	0.0000	0.0000	-0.0574	0.0774	0.0174	0.0445	1.2757
Russia	419	0.0000	0.0005	-0.0984	0.0691	0.0139	-0.5116	6.9115
Turkey	419	0.0000	-0.0011	-0.0640	0.0852	0.0236	0.1177	0.2069

Source: Own calculations.

Data in Table 1 panel A and B show that mean log returns and excess returns in all countries are around 0. At the same time median returns are on general greater than mean but not more than 0,6%. Comparing min to max returns indicates that returns vary highly during analyzed period and negative returns are in absolute value terms higher than positive indicating deeper crashes than booms appearing in general between 2008 - 2009. According to descriptive statistics weekly returns and weekly excess stock market returns distributions demonstrate almost all listed by [Cont 2001] so called *stylized facts* about the returns distributions behavior. The unconditional distributions of returns have fatter tails than those of normal distributions demonstrating extremely large negative and less often extremely large positive returns. Except RSA all unconditional distributions are skewed to the left and exhibit much more thinner and higher peak than those of normal distributions. As analyzed on the basis of ACF and PACF functions returns and excess returns on Brazilian, Chinese, Polish and Turkish market do not display significant serial autocorrelation, except at high frequency. However returns on Mexican and Indian market exhibit significant correlations at lag 2 and more, Russian at lag 4 and more and finally RSA has even a significant autocorrelation at lag 1. All absolute and squared returns are highly positively autocorrelated meaning that large returns (negative or positive) are

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followed by another large (positive or negative) returns. Moreover serial autocorrelations are significant continuously to lag 200 exhibit phenomenon of long memory in volatility.

Next panels C to E of Table 1 summarize information on sentiment and optimism indexes. In almost all cases sentiment and optimism indexes exhibit trends in pattern of random walks. Sentiment index on average was negative and in some instances like India, Russia, RSA and Turkey was negative for almost entire analyzed period. Optimism index average values differ from market to market being positive for Brazil, China and India and negative for the remaining countries. Changes in the level of sentiment index were on average positive except India and Turkey meaning that sentiment index on average has tendency to increase however as distribution of changes in the level of sentiment index is skewed to the left (except Poland) large negative changes of sentiment index exists. Change in the level of optimism index is on average positive and almost always equals 0 indicating rather stable level of the index however this index for Russia, Poland and RSA has large kurtosis indicating fat tails in the distribution of changes in the level of optimism index.

Results and discussion

To test stated hypothesis we employ factorial regression given in the equation 1 and 2. Regression estimates are depicted in Table 2. They consist of both factorial regressions calculated on sentiment and optimism index.

This table presents the results of regressing the excess stock market return $R_{it} - Rf_{it}$ on the sentiment/optimism index changes. The left part of the table consists of regression as in equation 1 design to investigate the association between excess stock market return and sentiment index changes while the right part of the table consists of regression as in equation 2 design to investigate the association between the excess stock market return and optimism index changes. Column *Parameter* stands for regression parameters, next column *Coeff.* reviles regression coefficients as estimated in our sample, followed by its estimated error (column *St. error*) and the value of t-test for regression coefficients (column *t*), finally empirical level of significance (column *p-value*) are given. The general interpretation for each parameter is connected with the data codding manner. Accordingly to equation 1 and 2 the negative sentiment/optimism index values are given 0 while positive values are given 1. Given this the regression coefficients interpretation is as follows: $\alpha_0(\beta_0)$ is an average value of the excess stock market return over periods of negative values of sentiment (optimism) index, $\alpha_1(\beta_1)$ is an adjustment on the excess stock market return occurring over period of positive sentiment (optimism) index values, $\alpha_2(\beta_2)$ is an average change in the excess return as a result of unit change in the sentiment(optimism) index occurring over periods of its negative values and $\alpha_3(\beta_3)$ is an adjustment made on an average change in the excess stock market return as a result of unit change in the sentiment(optimism) index occurring over periods of its positive values.

TABLE 2. REGRESSION RESULTS FOR THE COUNTRY- WEEKS 2005 - 2013 SAMPLE

	SENTIMENT INDEX				OPTIMISM INDEX			
Parameter	Coeff.	St.error	T	p-value	Parameter	Coeff.	St.error	T	p-value
PANEL A: BRAZILIAN MARKET								
α_0	-0.1620	0.1950	-0.8308	0.4066	β_0	-0.5177	0.3956	-1.3086	0.1915
α_1	1.5320	0.7467	2.0517	0.0409	β_1	0.5672	0.4634	1.2241	0.2217
α_2	7.8752	2.1572	3.6506	0.0003	β_2	-12.4637	16.3883	-0.7605	0.4474
α_3	-9.6047	6.6390	-1.4467	0.1488	β_3	17.1490	19.9121	0.8612	0.3897
R^2adj = 0.052 F = 7.828 p-value = 0.000					R^2adj = -0.03 F = 0.650 p-value = 0.583				

TABLE 2. REGRESSION RESULTS FOR THE COUNTRY- WEEKS 2005 - 2013 SAMPLE

	SENTIMENT INDEX				OPTIMISM INDEX			
Parameter	Coeff.	St.error	T	p-value	Parameter	Coeff.	St.error	T	p-value

PANEL B: CHINESE MARKET

Parameter	Coeff.	St.error	T	p-value	Parameter	Coeff.	St.error	T	p-value
α_0	0.1618	0.2152	0.7517	0.4527	β_0	-1.3504	0.5055	-2.6714	0.0079
α_1	1.6578	1.0262	1.6154	0.1070	β_1	1.9315	0.5613	3.4412	0.0006
α_2	15.5588	3.3925	4.5862	0.0000	β_2	-36.6327	40.5791	-0.9027	0.3672
α_3	-17.4578	13.5029	-1.2929	0.1968	β_3	73.7424	47.1236	1.5649	0.1184

$R^2adj = 0.057$ $F = 9.385$ p-value = 0.000 $R^2adj = 0.033$ $F = 5.796$ p-value = 0.001

PANEL C: INDIAN MARKET

Parameter	Coeff.	St.error	T	p-value	Parameter	Coeff.	St.error	T	p-value
α_0	0.1323	0.1741	0.7598	0.4478	β_0	0.0439	0.2826	0.1552	0.8767
α_1	18.8422	95.6752	0.1969	0.8440	β_1	0.3548	0.3952	0.8978	0.3698
α_2	15.9277	4.1157	3.8700	0.0001	β_2	79.0544	30.7130	2.5740	0.0104
α_3	-152.0605	877.1416	-0.1734	0.8625	β_3	-36.0951	42.1774	-0.8558	0.3926

$R^2adj = 0.034$ $F = 5.843$ p-value = 0.001 $R^2adj = 0.029$ $F = 5.151$ p-value = 0.002

PANEL D: MEXICAN MARKET

Parameter	Coeff.	St.error	T	p-value	Parameter	Coeff.	St.error	T	p-value
α_0	0.1858	0.1474	1.2607	0.2081	β_0	0.2042	0.2373	0.8606	0.3900
α_1	1.0018	2.3757	0.4217	0.6735	β_1	-0.0722	0.3313	-0.2178	0.8277
α_2	4.7768	1.7607	2.7130	0.0069	β_2	8.5468	12.0302	0.7104	0.4778
α_3	-9.0604	13.7090	-0.6609	0.5090	β_3	1.5804	16.5575	0.0954	0.9240

$R^2adj = 0.011$ $F = 2.530$ p-value = 0.057 $R^2adj = -0.004$ $F = 0.473$ p-value = 0.701

PANEL E: POLISH MARKET

Parameter	Coeff.	St.error	T	p-value	Parameter	Coeff.	St.error	T	p-value
α_0	-0.0150	0.1826	-0.0823	0.9345	β_0	-0.0393	0.2653	-0.1483	0.8822
α_1	-0.4741	0.6982	-0.6790	0.4975	β_1	0.4303	0.3833	1.1226	0.2623
α_2	1.4118	1.5427	0.9152	0.3606	β_2	7.0490	6.1528	1.1457	0.2526
α_3	3.4538	4.0327	0.8565	0.3922	β_3	-10.5654	7.9842	-1.3233	0.1865

$R^2adj = -0.001$ $F = 0.929$ p-value = 0.427 $R^2adj = 0.002$ $F = 1.330$ p-value = 0.264

PANEL F: SOUTH AFRICAN MARKET

Parameter	Coeff.	St.error	T	p-value	Parameter	Coeff.	St.error	T	p-value
α_0	0.1318	0.1408	0.9366	0.3495	β_0	-0.0393	0.2653	-0.1483	0.8822
α_1	1.0676	2.1730	0.4913	0.6235	β_1	0.4303	0.3833	1.1226	0.2623
α_2	3.2792	2.2554	1.4540	0.1467	β_2	7.0490	6.1528	1.1457	0.2526
α_3	-5.7441	15.8986	-0.3613	0.7181	β_3	-10.5654	7.9842	-1.3233	0.1865

$R^2adj = 0.000$ $F = 1.019$ p-value = 0.384 $R^2adj = 0.002$ $F = 1.334$ p-value = 0.263

PANEL G: RUSSIAN MARKET

Parameter	Coeff.	St.error	T	p-value	Parameter	Coeff.	St.error	T	p-value
α_0	0.0991	0.2283	0.4340	0.6645	β_0	0.0177	0.3068	0.0575	0.9541
α_1	7.4881	4.6884	1.5971	0.1110	β_1	0.0989	0.5564	0.1778	0.8590
α_2	4.9521	3.3141	1.4943	0.1359	β_2	-4.6966	23.6641	-0.1985	0.8428
α_3	-	-	-	-	β_3	21.2615	38.3265	0.5547	0.5794

$R^2adj = 0.006$ $F = 2.600$ p-value = 0.076 $R^2adj = 0.000$ $F = 0.183$ p-value = 0.908

PANEL H: TURKISH MARKET

Parameter	Coeff.	St.error	T	p-value	Parameter	Coeff.	St.error	T	p-value
α_0	0.1655	0.2423	0.6829	0.4956	β_0	0.1499	0.4112	0.3644	0.7160
α_1	-2.2052	1.4206	-1.5523	0.1225	β_1	0.0393	0.5394	0.0728	0.9420
α_2	2.6940	2.7512	0.9792	0.3290	β_2	15.8477	17.4880	0.9062	0.3662
α_3	14.4979	11.0528	1.3117	0.1915	β_3	-10.0636	22.4138	-0.4490	0.6540

$R^2adj = 0.004$ $F = 1.239$ p-value = 0.0297 $R^2adj = -0.010$ $F = 0.470$ p-value = 0.704

Source: Own calculations.

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Analyzing the results of regression given in the Table 2 one could notice that in most cases and on the majority of analyzed markets the relationship between sentiment/optimism of investors and excess stock market returns is statistically insignificant. However some significant effects and patterns exist. Therefore at this stage we shall focus on the minority of results and draw corresponding conclusions.

It seems that similar patterns exist in several groups of countries.

One could observe that the difference between the mean excess returns over a period of positive and negative moods of investors is statistically significant only in the case of Brazilian market, taking into consideration sentiment index and only in the Chinese market when we look at the optimism index. In particular, in the Brazilian market an average excess stock market return over the period of positive values of sentiment index is higher by 1.53 percentage point from average excess return realized over a period of negative values of sentiment index. From practical perspective it means that while investor sentiment is positive, the average excess return on the market is higher by 1.53 percentage point than the average excess return on the market in the period of negative sentiments. And in the Chinese market, an average excess stock market over the period of positive values of optimism index is higher by 1.93 percentage point from average excess return realized over a period of negative values of optimism index.

These results indicate that our first hypothesis on positive relationship between the level of the moods of investors and the level of contemporaneous excess market returns could be verified positively only in Brazilian market while moods are measured by sentiment index and in Chinese market while moods are measured by optimism index.

Secondly, it could be noticed that in the group of countries such as: Brazil, China, India and Mexico - in all cases over the periods of negative sentiment/optimism index values the changes in the level of the sentiment index are accompanied by significant changes in the level of excess returns (e.g. in the Brazilian market an increase in the sentiment index by 0.1 is associated with the average weekly change in the excess returns by 0.79 percentage point) This result suggests that over a periods of negative sentiment/optimism excess returns are more sensitive to changes in investors moods than in the periods of positive sentiment/optimism periods as suggested in our third hypothesis. Therefore in these markets we can state that hypothesis about stronger market reaction during the times of negative moods could be verified positively.

In the third place, interactions between positive values of sentiment/optimism indexes and contemporaneous excess stock market returns reflected in α_3 coefficient are statistically insignificant for all of the analyzed countries. But again for Brazil, China, India and Mexico the sign of the parameter (α_3) is the same. Negative regression coefficient for interaction means that e.g. in the Brazilian market over the period of positive sentiment/optimism an increase in the level of sentiment index by 0.1 is associated with a decrease in the excess return by 0.96 percentage point, while in the Chinese and Indian market the decrease is even higher. This could initially indicate that if positive investors sentiments are glooming and they become even more optimistic it is accompanied by the decrease in possible gains on the market, due to the fact that excess returns decrease. The result is opposite to our second hypotheses assuming positive relationship between the changes in the level of excess stock market returns and changes in the investors' mood. Contrary this hypotheses is confirmed during a period of negative sentiment index values for Brazil, China, India and Mexico. In these cases α_2 coefficient is positive.

The excess returns of the remaining countries: Poland, South Africa, Russia and Turkey as presented in the Table 2 exhibit no association with the sign of the sentiment/optimism index, changes in the level of these indexes or its interactions.

Achieving such a weak result stays in contradiction to the general opinion that additional behavioral information should have some predictability power over excess returns. in markets of less developed countries. It stimulated further research resulting in more complicated factorial regressions estimations. Namely, additional condition was included -

the sign of the change in the level of the index (variable Q_2OI, giving 0 for negative sign and 1 for positive sign). New factorial regressions including 8 parameters were estimated for each country. Contrary to the results of the factorial regressions of form 1 and 2 the significant effects appear in two countries: Poland and Russia and are absent in the remaining four.

Estimated factorial regression for Poland has a form of:

$$R_t - Rf_t = \underset{(0,977)}{0,01} - \underset{(0,487)}{0,55Q_1OI_t} + \underset{(0,188)}{11,17\Delta OI_t} + \underset{(0,069)}{1,44Q_2OI_t} - \underset{(0,040)}{38,45Q_1OI_t \times \Delta OI_t} - \underset{(0,604)}{0,59Q_1OI_t \times Q_2OI_t} -$$

$$- \underset{(0,008)}{77,03\Delta OI_t \times Q_2OI_t} + \underset{(0,003)}{102,73Q_1OI_t \times \Delta OI_t \times Q_2OI_t}$$

P-values plotted in parentheses below regression coefficients point on three significant interactions. First, over a period of positive optimism index values an increase in optimism index by 0.1 is associated by 3.8 percentage point decrease in excess stock market return. It indicates that Polish investors behave similarly to the group of Brazil, China, India and Mexico behavior. Second, over the periods of increasing values of optimism index (regardless of the sign of the index) an increase of optimism index by 0.1 is associated with the average 7.7 percentage point decrease in excess stock market returns. Finally, over the periods of positive optimism index values and its increasing values an increase of optimism index by 0.1 is associated with the average 10.3 percentage point increase in the excess stock market return. This result suggest that clustering periods in more homogenous groups (regimes) creates the possibility to capture an underlying process for excess stock market returns, the research path to follow in future research.

Conclusion

We investigated the contemporaneous relationship between sentiment/optimism indexes and excess returns at the aggregate market level in eight emerging markets. We used sentiment and optimism Thomson Reuters MarketPsych Indexes that were based on scanning media coverage for relevant text reflecting particular moods and opinions. Our results are not univocal. We confirm our hypothesis about a positive contemporaneous relationship between investor moods and excess returns only in Brazilian (only sentiment index) and Chinese (only optimism index) markets. Additionally, we find that excess returns are more sensitive to changes in investors moods during periods of negative sentiment/optimism index values in four out of eight researched markets, namely: Brazil, China, India and Mexico. Finally, we partially confirm our second hypothesis on the positive relationship between the changes in the level of excess returns and investors mood - the relationship may be observed in Brazil, China, India and Mexico during the periods of negative sentiment index values.

We are aware of several limitations to our study and the employed methodology. First, factorial regressions models presented in the paper describe only conditional mean of the excess returns. Although additional conditions are given and the interactions are investigated the factorial regression model does not include volatility. Observed volatility is clustered as shown by not only high serial autocorrelations of squared/absolute excess returns but as well the analysis of the errors of estimated factorial regressions. This conditional volatility needs to be included to conditional mean analysis in further research including GARCH or stochastic volatility models.

The factorial regression assumes that the sign of the regression coefficient changes in different regimes (as defined by Q_1OI and Q_2_IOI) but the magnitude of this coefficient remains unchanged what may be questionable particularly because volatility of excess returns changes associated with changes of sentiment/optimism index depends on the sign of the index - excess returns are more volatile during the periods of negative sentiment/optimism index. This than may cause the change in the magnitude of the

regression coefficients what may be investigated by multilevel regression models instead of factorial regression models.

Many other regressions, not listed in the paper, were estimated during this study and the general conclusion is that the parameters of the regressions even though are significant are not stable and vary highly under different regression specification meaning the results are not much reliable however promising for future research.

Additionally weaker relationships observed in our study than for example ones obtained by Lee et al. (2002) could result from the choice of equity markets under analysis. Lee et al. (2002) conducted a study on the basis of three global, well established, market indexes that are traded by global community of investors, namely: Dow Jones Industrial Average (DJIA), the Standard and Poor's 500 (S&P500) and the NASDAQ, while our study focuses only on emerging markets. On the developed markets news and social media information could have more significant impact on investors' decisions than on developing markets. While on developing markets there could exist other local, specific factors that are not reflected in global media (therefore are not included in MarketPsych Indexes), which could interfere statistical relationship of excess market returns with sentiment/optimism indexes.

We would like to draw the reader's attention to the fact that we studied high frequency data related to daily changes in the sentiment/optimism and the immediate reaction in aggregated market returns. Potential future research could explore the path of investigating less frequent/accumulated sets of data in order to pin down the relationship between larger/longer swings in investor moods and the excess stock returns. We also focused only on the simultaneous relationship between the sentiment/optimism indexes and the excess returns. Another extension of our preliminary study could be aimed at testing the predicting power of investor sentiment/optimism indexes over future market returns. Finally, the study could be extended by including in the analysis the relationship between sentiment/optimism indexes and market volatility.

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