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The impact of investors' sentiment divergence on stock market efficiency

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Abstract

This paper focuses on the relation between divergence of sentiment and stock market efficiency. Analysing 960,808 economics blogs' posts during a 5-years time period (from March 1, 2008 to August 31, 2013), we construct two Economics Blogs Sentiment Divergence (EBSD) indices. Our findings confirm the importance of investors' opinion divergence in the stock market. In particular, we find a negative relation between divergence of blogs sentiment and stock market efficiency.

Keywords: Economics blogs; Divergence of opinion; Investor sentiment; Text analysis; Stock market efficiency

1. Introduction

In literature studies about the relation between investors' opinion divergence and stock prices have provided mixed results. On the one hand, in presence of frictionless markets and consequently unrestricted short-selling, the greater the disagreement among investors about the value of a stock, the lower its market price relative to its true value and, thus, the higher its future return (Williams, 1977; Mayshar, 1983; Barry & Brown, 1985; Varian, 1985; Merton, 1987; Epstein & Wang, 1994; Anderson et al., 2005; David, 2008; Banerjee & Kremer, 2010). This view considers that divergence of opinion should reflect information asymmetry or information uncertainty and therefore it should lead to a positive risk premium. Some evidence in favor of this view is provided by Cragg & Malkiel (1968, 1982), Friend et al. (1978), Harris (1986), Doukas et al. (2006), Carlin et al. (2014), Sprenger et al. (2014). For example, Carlin et al. (2014) measure the level of disagreement among Wall Street mortgage dealers about prepayment speeds. They relate their proxy with expected returns, return volatility, and trading volume in the mortgage-backed security market. They find that increased disagreement is associated with higher expected returns.

On the other hand, in presence of market frictions, divergence of opinion leads to higher current price than the intrinsic value of the firm, and thus lower future return (Miller, 1977; Chen et al., 2002; Johnson, 2004; Atmaz & Basak, 2018). According to this view, divergence of opinion is priced at a premium, because in presence of short-sale constraints, when markets disagree on value, the most optimistic investors set stock prices. Some evidence supporting this view is provided by Lee & Swaminathan, 2000; Boehme et al. 2006; Chen et al., 2002; Diether et al. 2002; Goetzmann & Massa, 2005; Park, 2005; Ang et al., 2006; Berkman et al., 2009; Avramov et al. 2009; Yu, 2011; Chen et al., 2015). For example, Chen et al. (2002) use breadth of mutual fund ownership as a measure of the magnitude of disagreement among investors. In detail, they define breadth as the number of investors with long position in a particular stock. They provide evidence that reductions (increases) in breadth of ownership lead to lower (higher) future returns, a finding consistent with Miller's hypothesis.

Overall, according to both views, divergence of opinion leads to current stock prices to be far away from fundamental values, and thus from a condition of stock market efficiency. In this paper, we aim

to investigate the role of investors' opinion divergence in stock market efficiency. In particular, we investigate divergence of sentiment, used as proxy for investors' opinion divergence, and its effects on stock market efficiency. Coherent with the literature, we predict that higher divergence of sentiment leads to lower stock market efficiency.

We define divergence of sentiment a condition of balance between the degree of pessimism, optimism and neutrality. In substance, it represents a condition of equilibrium between overly pessimistic and optimistic expectations. In this paper, we develop new measures of investors' expectation divergence about future dynamics of the stock market based on mass media content. The underlying hypothesis is that high mass media pessimism is associated with low investor sentiment, resulting in downward pressure on prices. Instead, high mass media optimism is assumed to be associated with high investor sentiment, that results in upward pressure on prices. Mass media neutrality is assumed to result in no pressure on prices.

In particular, we capture divergence of sentiment from economics blogs. Farina et al. (2017) validate the Economics Blogs Sentiment (EBS) Index by showing that the level of sentiment on blogs is positively related to other sentiment indexes, including the well-known monthly University of Michigan Consumer Sentiment Index. We use the same source, that is the daily posts of all economics blogs indexed by Palgrave Econolog[1] to reveal divergence of sentiment as proxy for investors' opinion divergence. By considering daily posts classified as positive, negative and neutral, we construct two indices of blogs sentiment divergence.

We relate our proxies with stock market efficiency, defined as a condition in which no abnormal profits are made. When a market is efficient in valuing price-sensitive information, the active traders cannot beat the passive traders. Therefore, we consider a market inefficient when the active trading opportunities exceed those of passive trading. In detail, we compute stock market efficiency following Godfrey (2017).

Our findings are consistent with the intrigusing proposal that higher divergence of sentiment could lead to current stock prices to be far from fundamental values and therefore lower stock market

[1] Palgrave Econolog is an economics blog aggregator that surveys the content of hundreds of international blogs written in English and enables to search the blogs by topic, for example, business, technology, finance, and banking. More details on http://econolog.net

efficiency.

Our research contributes to the literature in at least two ways.

Firstly, we propose new measures of investors' expectation divergence about future dynamics of the stock market, based on mass media content and in particular economics blogs. To do this, a large-scale text analysis of data from economics blogs was performed, examining about 960,808 blogs' posts during a 5-year time period. To our knowledge, this is the first study employing economics blogs to extract some disagreement indicators. Interestingly, to capture our notion of sentiment divergence, we use the Shannon-Wiener Index and the Stirling Index. These indices consider distinct dimensions of diversity, especially the balance attribute.

Secondly, thanks to our proxies, we are able to document the important role of investors' opinion divergence in dynamics of the stock market. In particular, we find that higher divergence of opinions leads to lower stock market efficiency in line with results found in literature. To our knowledge, this is the first study investigating this relation.

In addition, our findings confirm the relevant role of the characteristics of mass media information in influencing investor decisions.

The remainder of the paper is structured as follows. Section 2 presents the literature review, while Section 3 describes the data and methodology used to build the EBSD indices. We then discuss results in Section 4. Section 5 concludes this study.

2. Literature review

This paper examines the role of divergence of sentiment in stock market efficiency. Over the past five decades, stock market efficiency has been a topic of intense debate. Sewell (2011) provides an overview about the theoretical debate on market efficiency in the literature. It is traditionally focused on whether or not a market is efficient in relation to a particular information set (Jensen, 1978). According to the EMH (Fama, 1970), there are three ways in which efficiency can be classified: weak form, semi-strong form, and strong form. In weak form efficiency, the current stock price includes all information about past prices of the asset. Regarding semi-strong form efficiency, prices update

fully and immediately to reflect new underlying information released publicy. In strong form efficiency stock prices reflect all information about asset, including private information. There is mixed empirical evidence for the weak-, semi-strong and strong forms of market efficiency (see, for example, Fama, 1965,1970, 1991, 1998). In the context of the EMH, several behavioral studies provide evidence against the EMH, identifying overreaction or under-reaction to certain types of new market information, or continued price drift and delayed response to this information (Bernard & Thomas, 1989; Jackson & Johnson, 2006; Michaely et al., 1995; Poteshman, 2001). Anyway, this group of tests for the EMH is characterized by several critical points. In fact, their results depend on the model of share valuation chosen and they ignore the notion of relative efficiency, so that it is not possible to measure the efficiency of one market against another one (see Campbell et al., 1997). In addition, perfectly efficient markets cannot exist because some incentive to acquire costly information by traders could be justified only by the market inefficiency and availability of profit-making opportunities (Grossman & Stiglitz, 1980).

There is another group of tests, emerging from the idea that market efficiency is linked to random walks (Fama, 1965). Ball & Kothari (1989) and Urquhart & Hudson (2013) provide a summary of the methods used to test for random walkness. Finding the presence of characteristics contrary to a random-walk, such as serial correlation or return predictability, provides evidence of inefficiences in the price series. Worthington & Higgs (2009) find inefficiences regarding the Austrialian stock market. Lim et al. (2008) find inefficiences in particular markets and periods by examining eight markets around the Asian financial crisis of 1997 with rolling windows tests of serial correlation. Furthermore, Wang et al. (2010) use a technique of multifractal detrended fluctuation analysis, derived from studies of correlation of biological molecular chains in deoxyribonucleic acid (DNA) in order to develop a degree of market efficiency (DME). Changes in the efficiency of the Shanghai stock exchange are sensed by the DME.

There are also other tests based on the concept that an efficient market leaves no opportunities for arbitrage. These tests provide evidence of inefficiences whether it is possible to find trading algorithms to be employed profitably on the price series. For example, Kang et al. (2002) find profitable contrarian and momentum strategies in the China Stock market, showing that the primary driver is overreaction to information. However, it is not possible to consider market efficient if no

profitable algorithm is found because there is the possibility to not have tested the optimal strategy. Overall, the tests based on random walkness and simulated trading are useful to find examples of inefficiences, but they can hardly offer conclusive evidence of efficient markets.

The more recent debate on market efficiency goes to the direction to relax the too restrictive dichotomy between efficient and inefficient markets. In fact, differently from the conventional view of all-or-nothing efficiency, the EMH and market inefficiency can co-exist, according to the Adaptive Market Hypothesis (AMH) developed by Lo (2004). The AMH considers market efficiency as a condition evolving over time, highly context dependent and dynamic, differently from the conventional view of all-or-nothing efficiency. There are many studies providing strong evidence of the AMH in the stock market (see e.g. Kim et al., 2011; Urquhart & Hudson, 2013; Manahov & Hudson, 2014; Urquhart & McGroarty, 2014).

In this paper, we use new measures of investors' expectation divergence about future dynamics of the stock market based on mass media content and explore its relation with stock market efficiency.

Measuring investors' opinion divergence is not straightforward. In literature, investors' opinion divergence has been captured using newspaper journalist disagreement (Hiller et al., 2018), StockTwits (Al-Nasseri & Menla Ali, 2018), Internet stock message boards (Antweiler & Frank, 2004), Facebook (Siganos et al., 2017), or proxies based on the traditional approach to finance as, for example, dispersion in analysts' earnings forecasts (e.g. Diether et al., 2002; Park, 2005; Yu, 2011), breath of mutual fund ownership (Chen et al., 2002), dispersion among dealers in their prepayment speed forecasts (Carlin et al., 2014).

In this paper, we extract a disagreement indicator using a mass media approach. Mass media represent a fundamental tool in the production and the widespread of the information, and it is still debated whether they induce, amplify, or simply reflect investors' interpretations of stock market performance (Deephouse, 2000; Fiordelisi et al. 2013; Shoemaker & Vos, 2009; Tetlock, 2007).

Financial news are found to impact on the retail investors behaviour and thus on the stock market (e.g., Carretta et al., 2011; Ferguson et al., 2011; Tetlock, 2007). Interestingly, Farina et al. (2017) find that the investors' preferences are influenced by media sentiment, measured as semantic content of the economics blog posts.

Posive and negative news are found to impact differently on people' perceptions, with negative news

causing a stronger impact than positive news (Baumeister et al., 2001; Brief & Motowidlo, 1986; Fiske & Taylor, 1991; Rozin & Royzman, 2001).

3. Data and Methodology

This section focuses on description of data and research methods used in this study. First, we developed the two Economics Blogs Sentiment Divergence (EBSD) indices, that are our proxy for investors' opinion divergence. Second, we measured market efficiency and market inefficiency, following Godfrey (2017). Finally, the econometric model used to investigate the relation between market efficiency and investors' opinion divergence is presented. To investigate the relation between divergence of blogs sentiment and stock market efficiency, we considered data in a specific time period (from March 1, 2008, to August 31, 2013).

3.1. Construction of the Economics Blogs Sentiment Divergence indices

In order to construct the two indices of blogs sentiment divergence, we considered the degree of pessimism, optimism and neutrality expressed by the posts of economics blogs indexed on Palgrave Econolog for each day of the period ranging from March 1, 2008, to August 31, 2013. Table 1 reports an overview of Palgrave Econolog's top blogs, publishers, and tags.

On the whole, we analysed 960,808 blogs posts written in English from 502 economics blogs to calculate the daily measures of blogs sentiment divergence.

Due to the nature of data and in order to allow the stability, the reproducibility, and the accuracy of the measure of pessimism, optimism and neutrality, we applied a content analysis methodology (Stone et al., 1966). We used the dictionary approach developed in Loughran and Mcdonald (2011). This "dictionary approach" has been extensively used in other similar studies (e.g., Da et al., 2015; Garcia, 2013; Tetlock, 2007; Tetlock et al., 2008).

First, we calculated the degree to which blogs posts have a positive or negative meaning.

Operationally, we count the number of words in each blog post that falls within the positive and negative categories of the Loughran and Mcdonald (2011) dictionary[2].

Second, we defined the overall tone of the posts as follows:

- if P > N the tone of the post is optimistic;
- if P < N the tone of the post is pessimistic;
- if P=N the tone of the post is neutral.

where P and N are, respectively, the number of positive and negative words in news, according to the classification provided by the Loughran and Mcdonald (2011) dictionary.

Third, we counted the number of optimistic, pessimistic and neutral posts for each day of the period.

Finally, in order to construct the EBSD indices, we used two diversity indices (the Shannon-Wiener Index and the Simpson Index) developed in the fields of information theory, ecology and energy systems, also used in other research areas. For example, Reguera-Alvarado et al. (2015) use these indices to calculate gender diversity and measure its influence on financial performance. Wu & Rai (2017) apply them to primary energy source data providing evidence that the major drivers of diversity change have been the adoption of wind and natural gas. These indices capture three dimensions of diversity: variety, balance and disparity (Magurran, 2004). In detail, the Shannon-Wiener Index (Shannon, 1948) and the Simpson Index (Simpson, 1949) capture the aspects of variety and balance. Variety (or species richness) refers to the numbers of different categories or species, while balance (or relative abundance) concerns the proportions of each species among all species in a community.

We used these indices in order to capture our notion of sentiment divergence, addressing the aspect of balance between more categories (in our study each day we considered three categories: pessimistic, optimistic and neutral sentiment).

[2] In the Loughran and Mcdonald (2011) dictionary, the negative category has 2,373 words denoting a negative sense, while the positive category has 399 words with a positive sense. Using lists of words of different size could influence the skew of the distributions for posts content. However the problem is limited by considering the number of times different words of each category (positive/negative) are repeated in the text of the post.

The Shannon-Wiener Index, originally introducted by Claude Shannon to quantify information uncertainty, is given by the following equation: $H = -\sum_{i=1}^{n} p_i * \ln p_i$, where n is the number of options or categories (variety) and p_i is the proportion of option i among all options (balance). The quantity H is also knows as the information entropy. The Shannon-Wiener Index puts emphasis on variety and balance. As second index, we use the Simpson Index $\sum_{i=1}^{n}(p_i)^2$, able to measure the degree of concentration when individuals are categorized into different categories. To measure diversity, the original Simpson Index is inverted: $H'' = \frac{1}{\sum_{i=1}^{n}(p_i)^2}$, where p_i is the proportion of the ith species in a sample, as in the Shannon-Wiener equation. The modified Simpson Index (inverse of the original Simpson Index, noted simply as the "Simpson Index" from this point on in the study) places greater emphasis on the balance of a community or system to determine its overall diversity.

Based on the Shannon-Wiener and Simpson indices, we calculated respectively the economics blogs sentiment divergence (EBSD) indices as follows:

$$\text{ESBD\_1} = -\left[\left(p_{pos} * \ln p_{pos}\right) + \left(p_{neg} * \ln p_{neg}\right) + \left(p_{neu} * \ln p_{neu}\right)\right] \quad (1)$$

$$\text{ESBD\_2} = \frac{1}{(p_{pos})^2 + (p_{neg})^2 + (p_{neu})^2} \quad (2)$$

where p_{pos}, p_{neg}, and p_{neu} represent the proportion of economics blogs in each category (positive, negative and neutral), that is the daily number of blogs in each category over the total daily number of posts. The two indices behave graphically in a similar way. Figure 1 plots the daily EBSD Index based on the Shannon-Wiener Index during the period of analysis.

TABLE 1

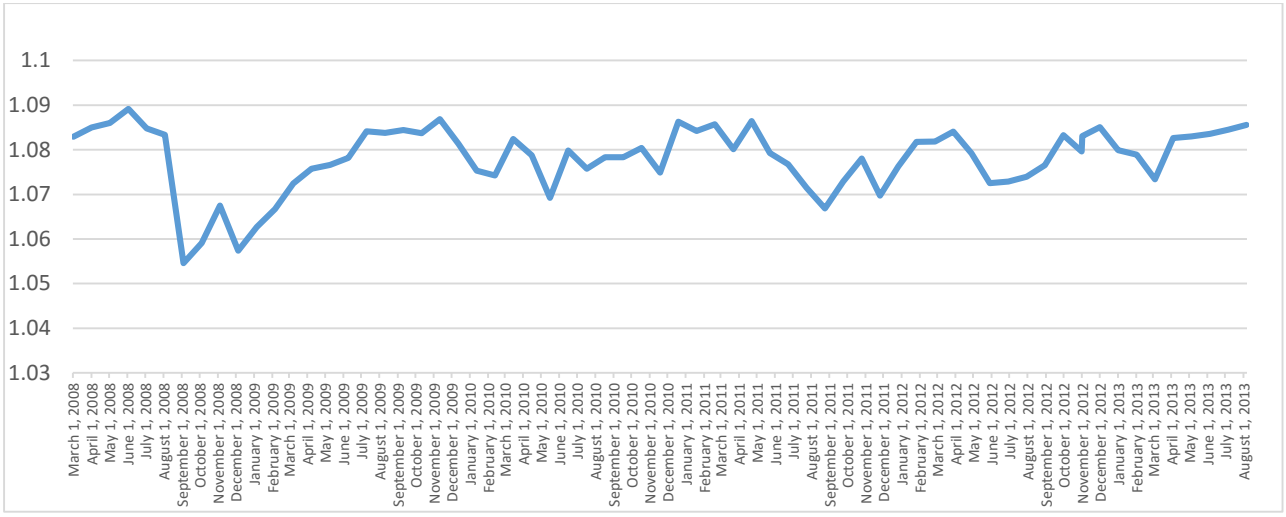
Palgrave Econolog stats overview

Top blogs	Top publishers	Top tags
1. Energy Outlook	1. Unknown	151 economics
2. Oddhead Blog	2. Wiley	150 politics
3. Slate magazine- Moneybox	3. Princeton University Press	146 China
4. The Epicurean Dealmaker	4. Oxford University Press, USA	132 education

5. footnoted.org	5. Cambridge University Press	119 inflation
6. Ending Word Poverty	6. Science	105 environment
7. Capitaò Gain and Games-Washington, Wall Street and Everything in Between	7. Basic books	104 energy
8. Economics of Selling Online	8. University of Chicago Press	97 technology
9. Stephen Kinsella, PhD	9. McGraw-Hill	94 books
10. Coyuntura Economica Internacional	10. Nature	92 regulation
11. Incentives Matter	11. Yale University Press	92 finance
12. The Greatest Game	12. arXiv	90 India
13. Carpe Diem	13. Vintage	90 recession
14. DataPoints-Dismal Scientist	14. Free Press	89 taxes
15. THE HEALTH ECONOMICS BLOG- Trends, Politics, Opinions etc. in biotech & pharma industry	15. Penguin Press HC, The	89 uncategorized
16. Economics in Action	16. Collins	84 financial crisis
17. GordonClown.com	17. Penguin (nonclassics)	83 media
18. EU Energy Policy Blog	18. Harvard University Press	83 trade
19. The Reconstruction unemployment	19. The MIT Press	83
20. Walker Economics Blog	20. Random House	81 Europe
21. RGE Monitor: RGE Analysts' EconoMonitor	21. W. W. Norton	81 oil
22. Cafe Hayek	22. W. W. Norton & Co.	80 sports
23. The Beehive with Steve Bee- Scottish Life	23. Rowman & Littlefield Publishers, Inc	78 monetary policy
24. House Price Crash News Blog	24. Simon & Schuster	77 economy
25. theRatandMouse	25. Harper	77 housing

FIGURE 1

Economics Blogs Sentiment Divergence Index (daily)



3.2. Construction of stock market efficiency measurement

Following Godfrey (2017), we exploited the relation between market efficiency and the opportunities to arbitrage profitably. In particular, we compared the optimal performances of passive trading and active tradings, arguing that in efficient markets the active traders should be not able to outperform the passive traders. Consequently, a measure of inefficiency is given by the extent to which active traders can beat the passive traders.

Given a price series, a time period, and a round-trip transaction cost, it is possible to define two types of optimal profit made by trading that price series. The first type of profit is defined *the maximum profit from active trading* (MPAT), that is maximum amount that a trader could have earned from the price movements, after transaction costs, by trading a position actively throughout that period, alternately long and short. The second type of profit is defined the *the maximum profit from passive trading* (MPPT), that is the maximum amount that a trader could have earned from the price movements, after transaction costs, by holding one position throughout the period, either long or short.

It is possible to view the MPAT as the sum of two components: the first one is relative to optimal passive trading over the same period and the second one is the excess profit from active trading, that

will therefore be either positive or zero. When it is zero, the market looks efficient. When it is positive, the market looks inefficient to some degree. The extent of the excess profit available provided a measure of inefficiency.

Defined the MPAT and MPPT, the measure of efficiency (MOE) is the ratio of the maximum profit from passive trading to the maximum profit from active trading, with a special limiting case of one (100%) if both profits are zero. We can consider the MOE as the proportion of the possible active profit that is achievable through passive trading. Mathematically, MOE = MPPT/MPAT when MPAT > 0.

The measure of inefficiency (MOI) is the ratio of the excess profit from active trading to the maximum profit from active trading, with a special limiting case of zero (0%) if both profits are zero. We can consider the MOI as the excess proportion of the possible active profit that is attributable to active trading.

The sum of the MOE and MOI is always one (or 100%); therefore, the market appears fully efficient when MOE = 1 (or MOI = 0) and fully inefficient when MOE = 0 (or MOI = 1). The MPAT, MPPT, MOE, and MOI have the following properties: MPPT $\geq$ 0, MPAT $\geq$ 0, MPAT $\geq$ MPPT, 0$\leq$ MOE $\leq$1, 0$\leq$ MOE $\leq$1, and MOE + MOI = 1.

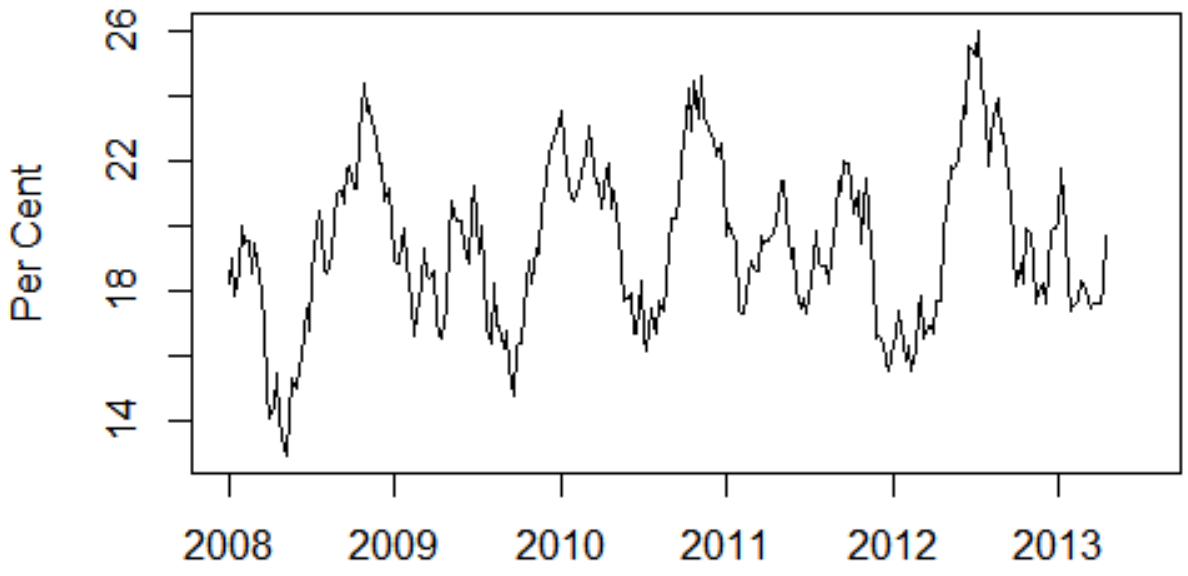
It is important to note that the measures of the MOE and the MOI can be computed from readily available price information and applied to any price series without needing to know fundamental value. In addition, Godfrey (2017) shows that the MOE increases with diversification, reduces in longer time periods and has an inverse relation with volatility.

Given that the two blogs sentiment divergence indices have been developed using posts from international blogs USA driven, we constructed the measure of efficiency (MOE) and the measure of inefficiency (MOI) regarding the S&P 500 Index. We thus collected daily prices of the S&P 500 Index from Yahoo Finance. Using daily market prices of the S&P500 Index, we were able to compute the MOE and the MOI on weekly basis for the period ranging from March 1, 2008, to August 31, 2013. The calculation was based on a fixed level of transaction costs at 0.25 index units which is the minimum bid-ask spread for S&P500 futures quotes. For clarity the results were smoothed by a three-month moving average. Fig. 2 shows the intra-week measure of efficiency of the S&P500 index for the examined period. Fig. 3 shows the intra-week measure of inefficiency MOI (where MOI = 1-

MOE) of the S&P 500 index. We can see that the measure of inefficiency grows and peaks in the lead-up to the crash of October 2008. Even with the smoothing of a three-month moving average, the filtered measure of inefficiency still reaches its peak a few months prior to the financial crash.

FIGURE 2

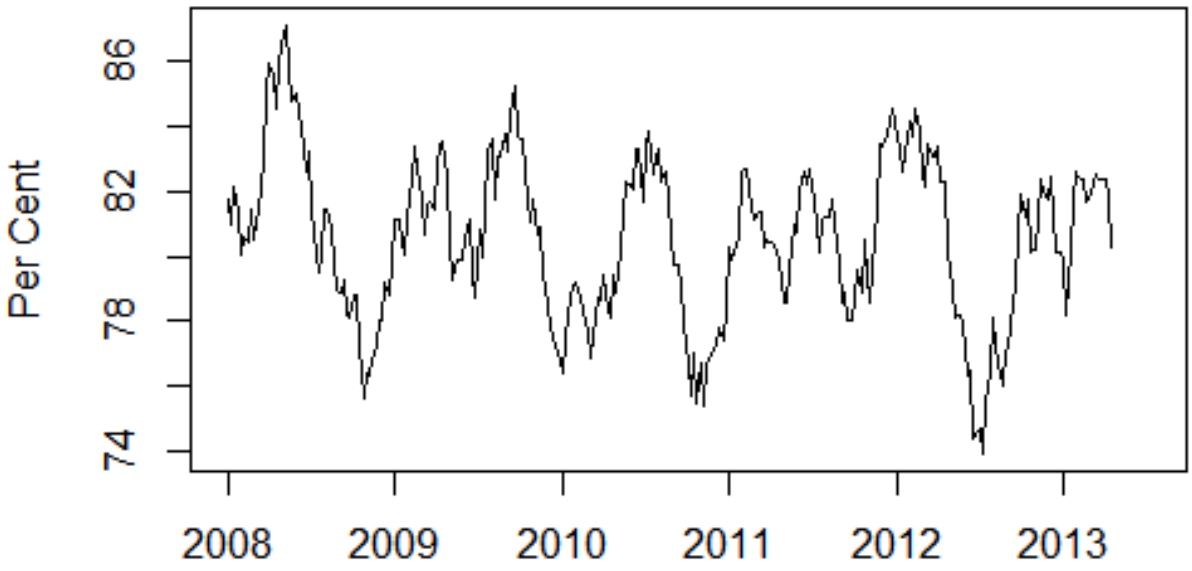
Measure of efficiency (MOE)



Measure of efficiency of the S&P500 calculated over weekly time intervals. Transaction costs are set at 0.25 index units, which is the minimum bid-ask spread for S&P futures quotes. The measure is smoothed with a three-month moving average.

FIGURE 3

Measure of inefficiency (MOI)



The measure of inefficiency of the S&P500 calculated over weekly time intervals. Transaction costs are set at 0.25 index units, which is the minimum bid-ask spread for S&P futures quotes. The measure is smoothed with a three-month moving average. Despite the delay imposed by the smoothing, the measure peaks in mid-2008 which is several months ahead of the crash.

3.3. Regression analysis

In the regression analysis we included the S&P500 implied volatility (VIX), the Economics Policy Uncertainty (EPU and the volatility of the spread between the U.S. 10-years interest rates and the U.S 3-month interest rates[3].

The VIX Index, published by the Chicago Board of Options Exchange (CBOE), records 30-day volatility implied by options written on the S&P 500 Index. It represents a measure of volatility reflecting primarily the expectations about the future.

The Economics Policy Uncertainty (EPU) Index, used to control for macroeconomic conditions, was developed by Baker et al. (2016). It measures policy uncertainty and it is constructed by measuring the frequency of articles in 10 leading US newspapers mentioning terms such as "uncertain" and "deficit". We employed the daily US EPU from the website http://www.policyuncertainty.com/.

The daily values of the variables (EBSD_1, ESBD_2, VIX, EPU and interest rate spread) are converted into weekly value to be coherent in the analysis. In particular, we measured volatility of interest rate spread using GARCH (1,1).

Table 2 presents some descriptive statistics for variables considered in the analysis.

TABLE 2

Descriptive statistics

	N	Mean	Median	Min	Max
MOE (%)	289	20,00	19,99	14,07	26,05
MOI (%)	289	80,00	80,01	73,95	85,93
EBSD_1	289	1,08	1,08	1,03	1,09
EBSD_2	289	2,89	2,89	2,64	2,98
VIX	289	24,35	20,84	11,65	72,92
EPU	289	138,53	125,68	56,13	385,73
R_SP	289	2,57	2,53	1,37	3,77

[3] We employed the daily data about U.S. interest rates from Federal Reserve Bank of St. Louis.

4. Empirical results: the relation between divergence of blogs sentiment and stock market efficiency

We tested the prediction that divergence of sentiment is negatively related to stock market efficiency. Table 3 shows that there is a strong negative relation between the divergence of blogs sentiment and stock market efficiency. The effect is statistically significant at the 10% for the EBSD_1 (column 1) and for the EBSD_2 (column 2). Findings indicate that an increase in divergence of blogs sentiment is related to a contemporaneous daily decrease in stock market efficiency. These findings support the intrigusing proposal that higher divergence of sentiment could lead to current stock prices to be far from fundamental values and thus lower stock market efficiency.

TABLE 3

Divergence of sentiment and contemporaneous stock market efficiency

	Dependent: MOE (t)	
	(1)	(2)
EBSD_1	-33,13*** (19,05)	
EBSD_2		-19,38*** (10,13)
VIX	0,002 (0,02)	0,001 (0,02)
EPU	-0,38 (0,4)	-0,41 (0,40)
VOL (R_SP)	0,01 (0,06)	0,006 (0,06)
N	289	289
Adj. R-sq	22,31	45,58

This table shows whether the divergence of blogs sentiment, measured by the Shannon-Wiener Index (EBSD_1) and Simpson Index (EBSD_2), is related to the contemporaneous MOE. The variables EBSD_1, ESBD_2 and EPU are log-

transformed. Garch (1,1) is used for the volatility of interest rate spread. We reported standard errors, as shown in parentheses. *, **, and * indicate statistical significance at the ten, five, and one percent levels, respectively.**

However, the analysis presents some limitations. First, due to calculation of MOE, we performed the regression analysis on weekly basis. However, it is likely to find more relevant and significative evidence in daily or intraday trading. Second, the analysis could offer more evidence using a larger sample.

5. Conclusion

This study proposes new measures of divergence of sentiment, captured from economics blogs, in order to investigate the impact of investors' opinion divergence on the stock market, especially on stock market efficiency. We refer divergence of sentiment as the balance between the optimistic, pessimistic and neutral levels of sentiment. To our knowledge, our two Economics Blogs Sentiment Divergence (EBSD) indices represent the first attempt to capture proxies for investors' opinion divergence based on economics blogs. In addition, this is the first study offering empirical evidence about the relation between investors' opinion divergence and stock market efficiency.

We examine the prediction that divergence of sentiment affects negatively stock market efficiency because higher divergence of opinions leads to current stock prices to be far from fundamental values. The measure of stock market efficiency, used in this study, compares the potential profits from passive and active tradings. In efficient markets arbitrageurs cannot marke abnormal profits and the active investors cannot beat the passive traders. In inefficient markets, the active trading profit should exceed that of passive trading, and the extent of the profit offers a measure of the inefficiencies.

In line with the literature, we find a negative relation between divergence of blogs sentiment and stock market efficiency.

Our findings provide strong evidence that divergence of sentiment plays a relevant role in explaining stock market efficiency. In addition, we confirm the relevant role of the characteristics of mass media information in influencing investor decisions. However, there are some limitations in the study. We

thus leave the investigation about the relevant role of investors'opinion divergence in the stock market efficiency for future research.

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