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THE MISINFORMATION EFFECT IN FINANCIAL MARKETS – AN EMERGING ISSUE IN BEHAVIOURAL FINANCE

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Abstract

The following paper is a theoretical introduction of the misinformation effect to behavioural finance. The misinformation effect causes a memory report regarding an event or particular knowledge to become contaminated with misleading information from another source. The paper aims to describe possible impact of the aforementioned phenomenon on the interpretation of stock market data, as well as the consequences of misinformation on investment-related decisions and the effective market hypothesis.

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Introduction

Behavioural finance, unlike classic economic models, allows the thought that human behaviour in financial markets is not entirely rational, and that markets need not be effective (Zielonka, 2003). Pioneer publications on behavioural finance appeared as early as 1979 (Kahneman and Tversky's critic of utility theory) and 1985 (DeBondt and Thaler's famous paper "Does the stock market overreact?"), yet we are still far from a complete psychological model of market behaviour. Moreover, as Sheila Dow wrote in a recent paper (2011), incorporation of psychology into behavioural finance is still weak, serving just as an explanation for anomalies not fitting into conventional economic models. Therefore psychological theories of market behaviour need to be more than just arguments against the effective market hypothesis. The study on the impact of psychology on financial markets has yielded several important phenomena, heuristics and cognitive errors related to investment decisions, recently broadening its area of interest to social psychology and herding behaviour (e.g. Andreassen, 2009). The area of memory-related phenomena has not yet been widely analysed by researchers of behavioural finance. The aim of this paper is to introduce yet another psychological phenomenon capable of severely affecting investors' behaviour on financial markets – the misinformation effect.

Various economic theories have concentrated on the distribution of information among the investors as either the base of an efficient (e.g. Fama, 1970), coherent (Vaga, 1990) or inefficient (e.g. Majewski, 1999) market. Very few theories acknowledge the possibility that the information need not be delivered equally to various groups of subjects, and even fewer theories acknowledge that more experienced investors are able to utilize the information better than beginners (with the effective market hypothesis stating that there are no differences between them at all). There is yet another problem most theories fail to acknowledge – the fact that the

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subjects' understanding of data can be affected or impaired by prior or following information, which may come from outside official sources, and thus need not be valid.

The misinformation effect is a phenomenon that a memory report, regarding a certain event, becomes contaminated with information coming from another source (Polczyk, 2007). Although Polczyk's definition, due to being oriented towards forensic psychology, suggests the effect to alter the reproduction of "certain events", it occurs for any type of memory material – episodic as well as declarative. In the first study regarding the misinformation effect (Loftus, Miller and Burns, 1978), subjects witnessed a recorded car accident, then were exposed to an inaccurate description of the event. In a subsequent test, many of the participants confused details coming from the description with the original ones, resulting in lower amount of correct answers. Another research paradigm used in studies on the misinformation effect is a two-step procedure (e.g. Gudjonsson, 1997; Eisen and Carlson, 1998), in which the misinformation is embedded in the final test (i.e. false alternatives, leading/suggestive interrogations or affirmative questions). For the purpose of this paper, however, we shall concentrate on the three-step procedure described above (Loftus et al., 1978), as it fits into a broader range of situations. Since the primary area of research on the misinformation effect is forensic psychology, at first glance it seems of little to no interest to behavioural finance and/or economics. However, being a general memory-related (Metcalfe Eich, 1982) decision-making (Gudjonsson, 1986) or social (Polak, 2012) phenomenon, it can occur in any situation and in relation to any type of material. Research in other areas, e.g. education (Swenson and Schneller, 2011; Goodfriend, Ferguson and Pearson, 2006) and health care (Polak and Wolski, in preparation) shows that the misinformation effect appears in those areas as well. There are also studies on the misinformation effect in general cognitive psychology, with the use of random verbal material (see the DRM paradigm - Roediger and McDermott, 1995). Since financial markets are an environment where information is key, the notion that the misinformation effect may influence investors' choices is both very possible and important for behavioural finance. The presented paper shall explain the theoretical possibility of the misinformation effect occurring in financial markets, possible forms it can take, and the consequences of its existence for behavioural finance.

The misinformation effect in behavioural finance

Relevance of the misinformation effect to financial markets becomes understandable when we take into account the amount of data delivered every day from economies around the world. As Michael Mauboussin (2007) noted, receiving more and more information is of little to no gain for investors, as they *don't properly weight information, rely on unsound samples, and fail to recognize what the market already knows*. One could even expect the abundance of information to have an adverse effect on the investors' decisions. As access to stock market information becomes increasingly easier, thanks to the abundance of news programs and finance-related websites, so does access to incorrect information. This is especially true of various interpretations and analyses – although raw financial values are usually the same regardless of source, the perceived consequences of those values differ between analysts and commentators. In short, the misinformation effect can occur wherever there are several sources regarding the same situation, and at least one of those sources is possibly inconsistent with the other ones. Thus, apart from commentaries and opinions, the misinformation effect may appear in technical or fundamental analysis, recommendations, transactional systems and market-related literature. One could even find an instance of the misinformation effect in financial data themselves: every month, the ADP report (published by Automated Data Processing, Inc.) delivers estimated information in the change in employment in the U.S. Two days later, investors receive the

official, non-estimated information. The two sources, although usually consistent, happen to significantly differ at times, making a great example of misinformation in raw economic data. Should an investor succumb to the misinformation effect, they will confuse the official data with incorrect ADP data (even if they know it to be less important and less correct than the official information), possibly resulting in lower or higher expectations regarding economic growth in the U.S. – and therefore less accurate investment decisions. Let us bear in mind that the misleading information need not be deceptive on purpose, just as a co-witness may deliver false information just due to their inability to remember correctly, despite their best efforts.

In order to explain the misinformation effect further, let us consider an example, consistent with the experiment design by Loftus et al. (1978): in their study, the critical detail (i.e. the one which differed in the two sources, being a measure of the misinformation effect) was the colour of the car which had a crash. According to the original source (a set of slides) it was red, and the misleading source stated it to have been yellow. The participants, asked about the car in the slides, often replied that they actually saw a yellow one. We can substitute the set of slides with a set of financial analyses, and the misleading source with a (still incorrect) commentary, published in the media or on the Internet. We have no reason to believe that the misinformation effect will not occur for such data, so a significant fraction of subjects will remember information from an unskilled or anonymous commentator, possibly a private opinion or a vague hypothesis, to have been part of an analysis they trust. This in turn will affect their investment decisions, assuming they would use the analysis in the first place. If the analysis had a positive outlook and the commentary was negative, the misinformation effect would result in fewer investors deciding to buy stocks than they would if not for an anonymous Internet user's commentary.

An interesting thing about the misinformation effect in relation to behavioural finance is the fact that its existence itself is contradictory to the effective market hypothesis (Fama, 1970). As a lot of research suggests (e.g. Jagadesh and Titman, 1993; Lewellen, 1999; DeBondt and Thaler, 1985; Rozeff and Kinney, 1976; Odean and Barber, 1999; Kelly, 1996), markets are not effective or rational, rather being at least partially run by emotion and coincidence of various ideas. Susceptibility to the misinformation effect shows that even if an investor applies a rational strategy based on a rational choice of information, the data may still be distorted by memory/cognitive processes, causing the whole process to be ineffective and inconsistent with a theoretically expected outcome. What makes misinformation different in this matter than for example hindsight bias (Kozielecki, 1977; DeBondt, 1998), availability heuristic (Stephan, 1999, as cited in Zielonka, 2003) or investor sentiment (Barberis, Shleifer and Vishny, 1998) is the fact that it does not cause the investor to act irrationally; however rational they might be, the effect makes their efforts inefficient. Investors under the influence of misinformation may act according to, for example, the CAPM model (Sharpe, Lintner and Mossin, 1964; as cited in Zielonka, 2003), choosing their equity portfolio in line with their best knowledge. This knowledge is theoretically identical for all investors (excluding insider trading), so the market should be effective, yet since misinformation affects a percentage of investors, they make different transactions at different prices than one would expect (e.g. because the misinformation changes their expected index rate of return).

One might argue that as long as we have direct access to raw financial data, the misinformation effect will have little to no impact on our actual investment decisions. The rational thing to do would be to analyse the data and ignore the commentary – as the latter is useless both in the CAPM and Markowitz (as cited after Jajuga, 1996) portfolio models. However, behavioural finance shows more and more proof against a rational investor. A recent book by Maria Andersson (2009) shows that herding behaviour has a major impact on the market, and that subjects tend to herd towards

any believable information or consensus. Another reason why the misinformation effect would influence investors is the fact that some decisions need to be taken immediately. This again is a consequence of almost instant delivery of information over the Internet, and similarly instant buy/sell orders. In such situations, the lack of time to properly analyse incoming data forces investors to rely on others' possibly misleading hypotheses, being better than no knowledge at all.

The misinformation effect, although mainly considered to be a memory related phenomenon, may appear even while the original, valid information is still present. Polak (2010) conducted an experiment in which, just as with Loftus et al. (1978) original study, the participants were exposed to a video depicting an event, and subsequently to a misleading description of the event. However, during the final stage of the experiment, they were allowed to replay the video (or reread the text, if desirable) while answering the test, in order to give the best answers consistent with the original source. Surprisingly, the subjects still maintained a 50% misinformation error rate. The fact that the subjects confuse information from two different sources, even when they are present, indicates a possibility that the misinformation effect may have an impact on investors' reactions even while they have immediate access to all the required financial data.

There are a few possible explanations to the above results. The first one refers to one of the most famous experiments of social psychology, conducted by Asch in 1956. In his experiment, the subjects were shown three lines of different length. Each subject was accompanied by a group of other "subjects" (who were in fact cooperating with the experimenter). The other subjects mutually agreed that line number 2 was the longest, while in reality it was line number 3. The unanimous consensus caused the true participants to agree with them and state that line number 2 was the longest one. If we compare the experimental procedure by Loftus et al. (1978) or Polak (2010) with the one by Asch (1956), we will notice that they are very similar. The only difference is the fact that the misinformation effect does not require a high level of social pressure – the tendency to conform is substituted either by submission to authority or the perceived believability of the misleading source. Another possible explanation of the experiment's results (Polak, 2010) refers to the fact that most subjects have very little understanding of the laboratory setting. Due to stress and the scarce amount of understandable rules, they are very likely to misinterpret the situation, failing to notice and obey the instructions telling them to answer according to source X in the final test. One can see that a similar situation may appear in financial markets, as investors are subject to both a huge amount of stress and a lack of necessary rules (i.e. what the main factors important for price movements of a certain stock are, and what kind of information one can ignore). This may cause the misleading source to become just as important as the original one, as every bit of information is better than none at all. (see: Polak, in press)

Factors modulating the misinformation effect

Having shown the possible relation between the misinformation effect and behavioural finance, it is important to describe several factors, which cause the effect to become stronger – ones that possibly appear in situations related to financial markets, increasing the relevance of the misinformation effect to financial markets.

Stock market data is an area particularly prone to all forms of misinformation, due to the fact that predictions made from current events always leave a degree of uncertainty, making it harder to distinguish between valid and incorrect information. Moreover, the similarity between the original and misleading source plays a major role in the magnitude of the effect – the more similar the two sources are, the bigger the chance of confusing them. This is explained by one

of the more interesting theories of misinformation effect: source monitoring errors (Lindsay and Johnson, 1989; Zaragoza and Lane, 1994). According to this concept, subjects exposed to two different sources may remember the data from both those sources, but are unable to recall which data comes from a particular source. For example, an investor planning to buy stocks of company X for a short period of time may be interested in short-term analyses only. The subject is exposed to a negative short-term analysis for the next month. Afterwards, the investor reads a long-term analysis, which takes the current negative situation as mere information noise, insignificant in the long run. The misinformation effect will cause some of the subjects to recall details from the long-term analysis as parts of the short-term one, resulting in a less accurate decision (assuming the analyses are correct). In Zaragoza and Lane's studies, 31% of misled participants claimed to have seen the incorrect detail in the original. If we use suggestive questions instead of a misleading text, the proportion of source monitoring errors grows to 42%.

The words we use to describe events can also significantly influence the subjects' memory. Loftus and Palmer (1974) conducted a study, in which they showed the participants a video recording of a car crash. Afterwards they asked the subjects to assess the speed, at which the cars were going when they smashed. Other participants were asked the same question, only with the word "smashed" substituted by "bumped", "collided", "hit" or "contacted". The results showed that if the word suggested the crash to have been serious (e.g. smashed), the subjects reported the speed to have been higher, than if the word was delicate (e.g. contacted). Some of the participants even reported to have seen broken glass on the road (which there clearly wasn't in the video). Since a single word is able to change the perception of a car crash in such a serious manner, using extreme words in relation to stock market data is to have the same effect. For example, should an analysis state that "annual GDP change shows that emerging markets are having a tough time" is going to have a smaller effect on investors' reactions than "annual GDP change shows that emerging markets are in a crisis" – even though both conclusions stem from the same data, and differ only by a single word. Should the results of the experiment by Loftus and Palmer (1974) be reproduced in such a situation, using a more severe word in the aforementioned description might even cause the subjects to recall the raw GDP figures as lower than in the other group.

One of the most important facilitating factors of the misinformation effect is the time interval between exposure to the original source, the misleading source, and the subjects' answer. According to extensive research (Loftus et al., 1978; Hertel, Cosden and Johnson, 1980; Peterson, Parsons and Dean, 2004), the misinformation effect is the strongest when there is a long time interval between the original and misleading sources, almost immediately followed by the test. This way, subjects are most likely to forget the original and rely solely on misinformation. In a financial market situation, this design especially favours misleading data containing extreme content (i.e. such that the investor is forced to act instantly, in fear of immediate losses). If the extreme content refers to some older data (i.e. a reinterpretation) and makes the investor make immediate choices, the misinformation effect is most likely to occur. If we combine that with the aforementioned results by Loftus and Palmer (1974), the probability of this particular kind of misinformation having negative impact is not to be ignored.

Another important factor is the probability of the event described in the misleading source. According to Loftus (1979) and Pezdek, Finger and Hodge (1997), it is easiest to create misinformation about events which are most probable to happen. Moreover, according to Dodd and Bradshaw (1980), the believability of the source of information itself (i.e. whether the source is blatantly biased or not) has very little to no impact on the magnitude of the misinformation effect. In theory, a statement by the most acclaimed analyst is as effective a misinformation as an anonymous post on a webpage.

Conclusions

As shown above, the misinformation effect is likely to occur in financial markets, and its potential consequences for behavioural finance are not to be ignored. While research gives us proof that the misinformation effect is capable of altering the investors' memory traces, the link between those traces and investment choices needs to be investigated empirically. Moreover, experimental research is required due to the specific type of reasoning behind investment-related decisions, and the difference between the methodology used in behavioural finance studies and the standard memory tests applied in forensic\cognitive psychology research. There is also very little knowledge on the misinformation effect which can be directly applied to financial markets, and research in that matter seems both important and promising.

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