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MISINFORMATION ABOUT DIVIDEND PAYOUTS INFLUENCES TRANSACTION PRICES IN EXPERIMENTAL ASSET MARKETS

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Abstract

AIMS: The paper investigates the effects of misinformation regarding dividend payouts on bubble formation, asset pricing and individual investment returns in experimental asset markets, when correct information about the expected dividends and their probabilities is also available.
METHOD: In two experiments, totaling34 Smith-Suchanek-Williams type double-auction continuous experimental markets (238 subjects), participants were exposed to misinformation regarding dividend payouts in a previous game, with the correct dividend matrix also provided. The misinformation stated the dividends in the previous game to have been much lower or much higher than according to the expected value function. The misinformation was either homogenous for all participants or provided to only half of the investors in a market (heterogeneously).
RESULTS:Homogenous misinformation stating that the last game's dividend payouts were high, led to larger overpricing throughout the game, as compared to baseline (no misinformation) and homogenous misinformation stating that the last game's dividends were low. In informationally heterogeneous markets, where half of the participants received "high dividends" misinformation and half remained non-misinformed, transaction prices were the lowest compared to the aforementioned treatments. It was also discovered that agents receiving the 'high dividend' misinformation had lower returns than non-misinformed participants in the same heterogeneous market.

JEL classification: D53, E03, G14
Keywords: experimental markets, misinformation, insider trading, informational heterogeneity

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Introduction

Individual investors constitute between 12-30 per cent of the market cap on the Warsaw Stock Exchange, and nearly half of them have little or very little experience investing (Kliber, Łęt & Rutkowska, 2016). In other countries, such as China, individual investors may even constitute a majority of the market. Moreover, according to the OLG (overlapping generations) models (e.g. Garleanu & Panageas, 2015; Gali, 2016; Domeij & Ellingsen, 2017), investors enter and leave the market based on their lifecycle, meaning that there are always new, inexperienced investors present in any financial market. Inexperienced investors may be the ones responsible for the generation of market bubbles (Greenwood & Nagel, 2009; Gong, Pan & Shi, 2016; Xie & Zhang, 2016). It is also individual investors, especially inexperienced ones, who are the most at risk of manipulation, trying to make them the 'greater fools' (e.g. Levine & Zajac, 2007). One type of manipulation which can be effective in changing investors' preferences is injecting misinformation into the market, which may prompt investors to either buy or sell shares at unfavorable prices, or at least may generate noise and informational heterogeneity in a market. This paper investigates the effects of misinformation on transaction prices and individual investment returns in the context of experimental markets.

Continuous double-auction asset markets (Smith, Suchanek & Williams, 1988. Hereafter SSW) are one of the fundamental research paradigms in experimental economics, used by numerous researchers (e.g. Paich & Sterman, 1993; Porter & Smith, 1995; Hussam, Porter & Smith, 2008; Lahav, 2011; Friedman, Harrison & Salmon, 1984; King, 1991; Lei, Noussair & Plott, 2001) to delve into how economic agents behave in conditions similar to those present in real security markets. A traditional SSW market consists of 10 or 15 periods (e.g. Palan, 2013; Porter & Smith, 1994) lasting 120-180 seconds (a notable exception being a 200 period market by Lahav, 2011), during which participants engage in a real-time double-auction in which one type of asset is traded between them. The fundamental value of an asset is determined by dividends paid after each period with probabilities known to the participants. For example, instructions may state that after each turn there is an equal 25% probability that the dividend will be 20, 15, 10 or 5 dollars per share. In such an example, the fundamental value of an asset (according to Pascal's EV model) is simply the mean dividend multiplied by the number of remaining periods (or remaining dividend payouts). The dividend probability matrices vary in the research, changing from the 'traditional' monotonously falling fundamental value (Smith, Suchanek & Williams, 1988), to flat or rising (Stoeckl, Huber & Kirchler, 2014; Noussair, Robin & Ruffieux, 2001), to non-monotonous (Noussair & Powell, 2010).

Perhaps one of the most important elements which made SSW markets popular and useful for research is that transaction prices in SSW markets may be compared to a rational *homo economicus* model carrying the assumption that prices should follow the fundamental value. In reality, SSW market prices do not always reflect the underlying value of expected dividends. A lot of research (for a review see Porter & Smith, 1994) including the seminal research by Smith, Suchanek and Williams (1988) demonstrates the participants' tendency to offer prices much higher than the fundamental value. Such an overpricing (or 'bubble') persists until the endgame, when a rapid decline in prices and underpricing ('crash') is often observed. Though a catalogue of cognitive, social and emotional biases (e.g. Shiller, 2011; Camerer, 1989; Rao, Greve & Davis, 2001; Thaler & Johnson, 1990; Depositario, Nayga, Zhang & Mariano, 2014) or speculation based on Keynes' greater fool theory are postulated as potential causes of the overpricing and underpricing, we are far from truly understanding why bubbles and crashes occur.

Procedural models of decision making clearly mark the collection, selectionand interpretation of information as one of the most important pre-decisional processes (e.g. Connolly & Thorn, 1987; Newell, Lagnado & Shanks, 2007). The quality of information one possesses determines the quality of decisions made. Researching the impact of information on economic decision making under risk and uncertainty (including experimental asset markets) is therefore of high importance and application value. Such is the case of research on insider trading. Numerous publications (e.g. Patterson, 1967; Kyle, 1985; Jaffe, 1974; Seyhun, 1986; Acharya & Johnson, 2007) show that insiders dominate the market they are in, gaining extra returns when compared to agents with average information. The same is true in SSW experimental markets (Grossman, 1976; Grossman & Stiglitz, 1980; Diamond & Verecchia, 1981; King, 1991; Plott & Sunder, 1982).

Huber, Kirchler and Sutter (2008) treated insider information as a continuous variable. In their research they created an SSW market with varying levels of information for each participant. Results indicated that agents with better information dominated their less-informed counterparts, however this was only true for the best-informed agents.

Research on insider trading clearly shows why most governments penalize the use of insider information during the purchase or sale of financial instruments, and why strict rules on public information admission are imposed on companies listed on nearly any stock exchange. However, as demonstrated in the aforementioned research by Huber et al. (2008), insider information could very well be treated as having better information than others, even if the information does not directly provide riskless returns. The other end of the continuum would be having *worse* information than others. Talk is cheap, and the Internet and media are full of recommendations, analyses and commentaries concerning nearly all financial instruments currently traded. So far very little research has been devoted to exploring the consequences of *incorrect or misleading* information provided to market agents.

Corgnet, Kujal and Porter (2007) demonstrated that uninformative announcements given to market agents may influence asset prices in experimental markets. In their research they modified a standard SSW market to include a box in which the announcement '*The price is too high!*' was shown in turns 3, 7 and 12 (out of 15). The announcement was presented regardless of the actual transaction prices made by the participants, and participants were clearly instructed that such an announcement would appear exactly in turns 3, 7 and 12. Despite such a strict manipulation, transaction prices dropped following the announcements. Corgnet et al. suggest that the uninformative announcements may *facilitate coordination of beliefs among traders* (p.7), i.e. suggest to the subjects what the behavior of others may be, or that they may *facilitate the computation of the rational expectations equilibrium* (p.7), i.e. making agents focus on the fundamental value of the traded instrument.

A discussion of incorrect information would not be complete without presenting the misinformation *effect* (Loftus, Miller & Burns, 1978) and its social-psychological counterparts – memory conformity (Wright, Self & Justice, 2000) and social contagion of memory (Roediger, Meade & Bergman, 2001). A standard misinformation procedure consists of three phases: presenting correct information (called *original information* in most research), presenting a misleading source of information on the same event/knowledge as the original information (such as an incorrect description of the original; usually called the *post-event information*), and testing the memory of the original information. A large quantity of research shows that participants exposed to the misleading post-event information tend to include incorrect details from the post-event source when asked about the original. As mentioned earlier, the quality of information possessed by an agent is critical for the quality of decisions made. Should misinformation influence decisions made by market agents, such an effect would not be eliminated by legislation forcing the stock companies to provide information to everyone at the same time. Regardless of the availability of original (correct) information, agents may still change their decisions based on misinformation coming from unofficial, and therefore uncontrolled sources.

For the reasons presented above, researching the influence of misleading post-event information on decisions made by market agents (or more specifically – on transaction prices as a direct consequence of these decisions) seems of high importance. The presented research aims to test exactly that in the context of SSW experimental asset markets.

Experiment 1

The aim of Experiment 1 was to explore the influence of misinformation suggesting high- or low dividends (in opposition to the actual dividend probabilities serving as original information) on asset prices in an SSW market. It was expected that misinformation suggesting high dividends would lead to higher transaction prices than the baseline (i.e. a treatment without misleading information), and conversely that misinformation suggesting low dividends would lower transaction prices.

Method

Participants

One hundred and sixty four participants (102 female and 62 male) aged 18-38 years (M = 22,32; SD = 3,50) were recruited from a database of students (various faculties) willing to participate in research for credit. Participants constituted thirty markets of 4-7 participants, which in turn were randomly assigned to one of the three treatments: baseline – no misinformation (10 markets, N = 54), High Dividend (10 markets, N = 56) and Low Dividend (10 markets, N = 54). Participants received remuneration based on their investment account balance at the end of the market – for every 100 tokens they received 1 PLN (approx. $ 0,3). Information about remuneration was included in the recruitment ad.

Materials and equipment

The **experimental market** was programmed in z-Tree (Fischbacher, 2007) and consisted of 10 periods, 120 seconds each. Participants were given an equal initial endowment of 4 stocks and 600 tokens, which they could freely trade throughout the duration of the market, provided they had the required funds. As usual for SSW experimental markets, participants were allowed to set bid/ask offers at any price desired, as well as accept offers made by other participants. After each period, a dividend was randomly generated according to a payout matrix of 0, 5, 15 or 40 tokens per share, each with a 25% probability. Dividend payouts were immediately added to the participants' balance.

The payout matrix resulted in an average dividend of 15 tokens. The fundamental value began at 150 tokens in Period 1 and fell monotonously at 15 tokens per period, reaching 15 tokens in Period 10.

The **original information** was included within market instructions, containing the critical data about the dividend payout matrix:

The dividends are randomly generated as follows:

25 percent chance that the dividend will be 40 tokens per share

25 percent chance that the dividend will be 15 tokens per share

25 percent chance that the dividend will be 5 tokens per share

25 percent chance that the dividend will be 0 tokens per share

The **post-event information** was presented to the participants within 'another participant's description of the game'. The information was a half-page text covering the 'participant's' feelings and thoughts on the market they took part in. One critical sentence regarding dividend payouts was manipulated between conditions. In the High Dividend treatment, the sentence stated *the dividends were very high, we got 40 tokens seven times – I regretted not buying more stocks*. In the Low Dividend treatment the text stated that *the dividends were very low, we got 0 tokens seven times – I regretted not selling more stocks*. In the baseline treatment, the statement was absent from the description.

Procedure

The research was conducted in a computer lab. Participants were given instructions on paper and asked to read them thoroughly. Shortly afterwards they were given the post-event information and asked to read it, followed by a trial period of the experimental market, in order for the participants to understand it. The average total duration of the experiment was 45 minutes.

Data analysis

A major statistical problem with experimental markets is that the individual transaction prices are not independent. Moreover, the dynamic of a single experimental market, while random, acts as a non-random latent variable for all transaction prices in this market. Hence, most research in experimental markets resorts to descriptive statistics of bubble magnitude or duration as the only analysis (for an overview Palan, 2013). Such an approach does not test for statistical significance of differences between treatments, and significantly reduces data. The presented research used hierarchical linear modeling (HLM) as a solution to the above problem. HLM does not require independence of level-1 observations (Raudenbush & Bryk, 2002; Miller & Murdock, 2007). In fact, the reason for using HLM is to research data dependent on higher-level structures. A detailed explanation of HLM falls outside the scope of this article, and the book by Raudenbush and Bryk (2004) is a recommended reading on the subject.

Results

Preliminary analyses showed that participants did not significantly vary across treatments in age (Ms = 22.52, 22.89 and 21.57 years in baseline, Low Dividend and High Dividend, respectively; $F(2,161 = 2,098$, $p = ,126)$ or gender (32 female and 22 male in baseline, 38 female and 16 male in Low Dividend, 32 female and 24 male in High Dividend; $\chi 2(1, N = 164) = 2,341$, $p = ,310$). 120 participants had secondary education, 44 higher education. Four of the participants declared to have invested in a stock market. Two of the participants declared having studied economics, two declared having learned economics otherwise.

Transaction prices were analyzed using HLM creating unique identifiers for each pair of buyer-seller and unique identifiers for each market. The tested model included the treatment and period as independent variables. The HLM model was:

$$PRICE_{ijk} = y_{000} + y_{100} * TREATMENT_{jk} +$$
$$+ y_{200} * PERIOD_{ijk} + r_{0jk} + u_{00k} + e_{ijk}$$

where $PRICE$ = transaction price,

$TREATMENT$ = experimental treatment type,

$PERIOD$ = period number,

γ_{000} = level-3 regression intercept,

u_{00k} = level-3 random error, based on the k-th market,

β_{00k} = level-2 intercept, based on the k-th market,

r_{0jk} = level-2 random error, based on the k-th market and j-th buyer-seller,

π_{0jk} = level-1 intercept, based on the k-th market and j-th buyer-seller,

e_{ijk} = level-1 random error, based on the k-th market, j-th buyer-seller and i-th transaction.

Both Treatment (HLM-corrected F(2;27,083) = 4,011;

Table 1: Transaction prices across treatments

Treatment	Mean	Std. error	df	95% CI
baseline	119,42	15,63	26,96	87,35 – 151,49
LD	126,62	15,65	27,09	94,52 – 158,72
HD	176,96	15,66	27,19	144,83 – 209,08

Note: LD - Low Dividend, HD – High Dividend

Table 2: Multiple comparisons of transaction prices across treatments and periods (Experiment 1)

Period	Compared treatments		Mean diff.	Std. error	df	*p*	95% CI	
1	baseline	LD	15,48	22,72	30,12	0,501	-30,93	61,88
		HD	1,89	22,72	30,07	0,934	-44,49	48,28
	LD	HD	-13,58	22,78	30,397	0,555	-60,07	32,91
2	baseline	LD	9,78	23,05	31,88	0,674	-37,18	56,73
		HD	23,37	23,01	31,673	0,317	-23,52	70,27
	LD	HD	13,60	22,91	31,114	0,557	-33,12	60,32
3	baseline	LD	-14,52	23,13	32,351	0,535	-61,62	32,59
		HD	-15,56	23,25	32,979	0,508	-62,85	31,74
	LD	HD	-1,04	23,31	33,322	0,965	-48,44	46,36
4	baseline	LD	-10,76	23,13	32,31	0,645	-57,85	36,34
		HD	-48,23	23,37	33,685	**0,047**	-95,74	-0,73
	LD	HD	-37,48	23,60	35,051	0,121	-85,40	10,44
5	baseline	LD	-15,09	23,38	33,759	0,523	-62,62	32,44
		HD	-49,63	23,69	35,557	**0,043**	-97,69	-1,57
	LD	HD	-34,54	23,56	34,774	0,152	-82,38	13,29
6	baseline	LD	-9,34	23,27	33,126	0,691	-56,68	38,00
		HD	-69,14	23,57	34,842	**0,006**	-117,00	-21,29
	LD	HD	-59,81	23,87	36,66	**0,017**	-108,19	-11,42
7	baseline	LD	-37,74	23,26	33,06	0,114	-85,06	9,58
		HD	-104,57	23,73	35,813	**<,001**	-152,71	-56,44
	LD	HD	-66,83	23,70	35,649	**0,008**	-114,92	-18,74
8	baseline	LD	-25,39	23,61	35,078	0,289	-73,32	22,53
		HD	-88,01	23,81	36,281	**0,001**	-136,28	-39,74
	LD	HD	-62,62	23,79	36,17	**0,012**	-110,86	-14,37
9	baseline	LD	-2,11	23,75	35,929	0,93	-50,28	46,06
		HD	-100,97	24,04	37,693	**<,001**	-149,64	-52,30
	LD	HD	-98,86	24,01	37,551	**<,001**	-147,49	-50,23
10	baseline	LD	17,70	23,64	35,273	0,459	-30,28	65,68
		HD	-124,54	23,66	35,362	**<,001**	-172,54	-76,53
	LD	HD	-142,24	23,79	36,18	**<,001**	-190,48	-93,99

Note: LD - Low Dividend, HD – High Dividend p = ,030) and Period (F (9;2710,238) = 28,195; p< ,001) as well as their interaction (F (18;2699,423) = 24,099; p< ,001) turned out to be statistically significant. Means, standard errors and confidence intervals of transaction prices across treatments are shown in Table 1. Multiple comparisons of Treatment * Period are shown in Table 2.

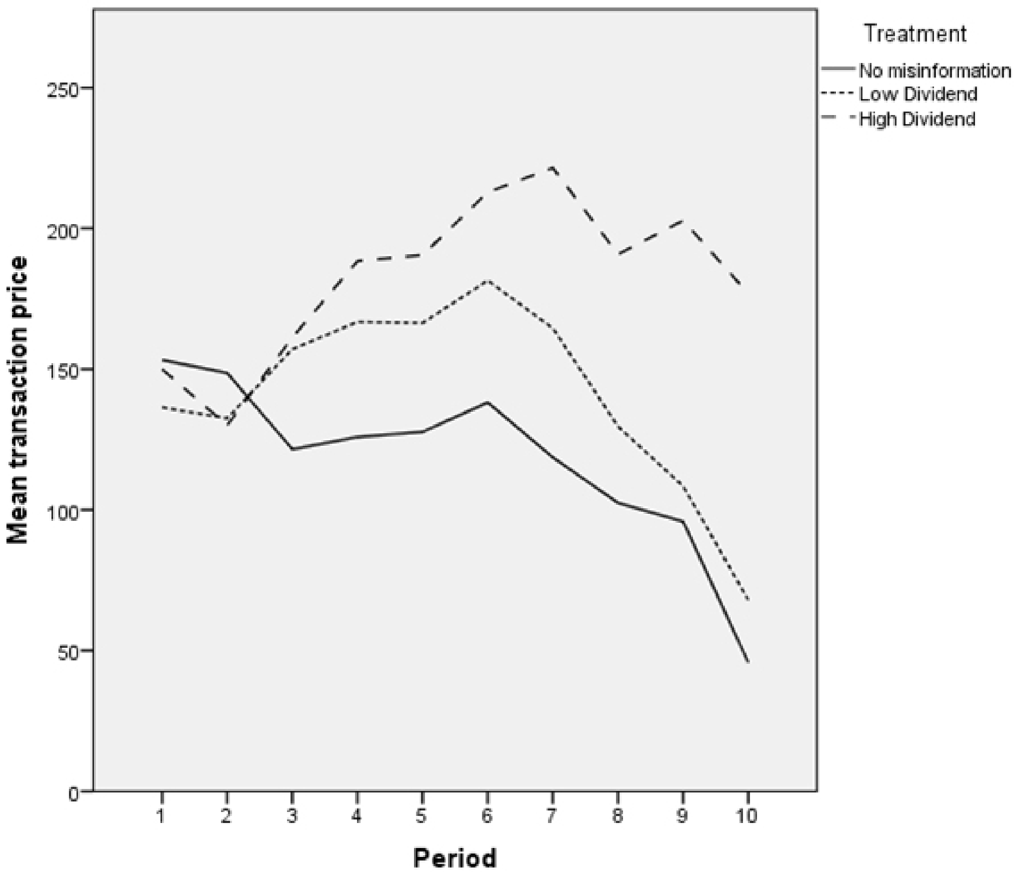
Transaction prices across treatments in all periods are shown in Figure 1. Prices in the High Dividend treatment were significantly higher than in the other treatments in Period 10. In periods 4-9 prices in High Dividend treatment were significantly higher than in the baseline. No significant differences between the baseline and Low Dividend treatments were found.

Discussion

Results of Experiment 1 were only partially consistent with the hypotheses. Higher transaction prices were observed in the High Dividend treatment, as expected, showing that misinformation suggesting higher than average dividends is considered by participants to be a useful piece of 'advice', regardless of its inconsistency with the actual dividend probability matrix. As a result, a classic bubble is observed in the High Dividend group, with prices exceeding the fundamental value in periods 3 through 10. In turns 6 through 10, prices exceeded the maximum possible remaining dividends (at 40 tokens per period). Moreover, the bubble did not burst in the final periods.

A more perplexing result was that transaction prices in the Low Dividend treatment were actually higher than baseline (although lower than in the High Dividend treatment). Prices in this group were expected to be lower than baseline due to the misinformation suggesting low dividends. Since the misinformation suggesting high dividends, as well as the misinformation suggesting low dividends, both resulted in an increase in transaction prices, a question arises: what do these two treatments have in common? At first glance they could be considered mirror images of each other, with the High Dividend treatment suggesting a 7/10 chance of getting the 40 token dividends, and the Low Dividend treatment suggesting a 7/10 chance of getting zero token dividends. However, both treatments carry a common element of the misinformation itself: all participants in both experimental

Figure 1: Transaction prices across treatments (Experiment 1)



treatments receive the same information regarding dividends, which can be interpreted as an increase in informational homogeneity, or a decrease in informational heterogeneity (Stiglitz, 1987; Page, 2008). As shown by Sutter, Huber andKirchler (2012), a higher informational heterogeneity reduces market bubbles as compared to informationally homogenous markets. It can be assumed that while all participants in the baseline treatment also receive the same information, the dividend probability matrix does not directly suggest a single strategy (whether buying shares is profitable), and the matrix itself can be interpreted differently by various participants, for example based on their risk preferences. Misinformation, on the other hand, explicitly stated whether dividends were high or low, and whether buying or selling shares was the better option – such information leaves less space for individual interpretation than the dividend matrix.Similar conclusions can be drawn from the paper by Corgnet, Kujaland Porter (2007) and their idea that uninformative announcements facilitate coordination between agents. If such an interpretation is true, transaction prices in a heterogeneously misinformed treatment should be lower than baseline, and lower than both the homogenously misinformed groups.

Experiment 2

The aim of Experiment 2 was to test the hypothesis that unlike homogenous misinformation, heterogeneous misinformation would lead to lowered transaction prices. Informationally homogenous groups (High Dividend and Low Dividend) and baseline from Experiment 1 would be compared with a heterogeneously misinformed group. Since the High Dividend treatment generated the highest transaction prices in Experiment 1, the strongest test of the hypothesis would be to create a group in which half of the participants would receive High Dividend misinformation, and the other half would receive no misinformation. Should misinformation not influence informational homogeneity, transaction prices in such a group would be higher than baseline.

Method

Participants

Seventy-four students of various faculties (46 female and 28 male), aged 28-30 (M= 22.3, SD = 2.57) participated in the experiment. All subjects constituted the Heterogeneous group.

Materials and procedure

The experiment was conducted using the same experimental market, the same instructions and the same materials as Experiment 1. It was also run in the same lab by the same experimenters. Within each market in the Heterogeneous group, half of the participants received post-event information identical to that presented in the High Dividend group, the other half received post-event information identical to that presented in the baseline treatment. Additionally, each subject was marked as misinformed or non-misinformed, allowing within-market analyses. Remuneration for participants was the same as in Experiment 1, at 1 PLN for each 100 tokens of balance at the end of the experiment. It was expected that transaction prices in the Heterogeneous treatment would be lower than those in baseline, Low Dividend and High Dividend treatments. It was also expected that non-misinformed subjects have higher returns than misinformed participants.

Results

Fourteen experimental markets were run on 74 participants. Six of the participants declared having studied economics or a similar subject, none of the participants declared having any experience investing. Participants in the misinformed and non-misinformed treatments did not significantly differ in age (22.61 vs. 22.00; $F(1,72)$ = .045; p = .311) or gender (20 female and 16 male non-misinformed vs. 26 female and 12 male misinformed; $\chi2$ (1, N = 74) = 1.301; p = .338).

Returns by misinformed and non-misinformed participants

The analysis was run including the number of tokens owned by participants as a Level-1 variable, nested within markets. The tested model was as follows:

$$TOKENS\_OWNED_{ij} = y_{00} + y_{10} * MISINFORMATION_{ij} + + u_{0j} + r_{ij}$$

where $TOKENS\_OWNED_{ij}$ was the average number of tokens owned by a participant throughout the market,

$MISINFORMATION_{ij}$ was a Level-1 predictor (whether a participant received the High Dividend or baseline treatment)

The difference in returns between subjects receiving High Dividend and baseline post-event information was significant (F(1;716,033) = 31.990; p< .001). The average number of tokens owned by non-misinformed participants was 1069.112, for misinformed participants – 793.720 tokens.

Transaction prices in the Heterogeneous group compared to Experiment 1

To test the hypothesis that informational heterogeneity would reduce transaction prices as compared to homogenous misinformation and baseline, the three groups from Experiment 1 (baseline, Low Dividend and High Dividend) were compared to the Heterogeneous group. The HLM model used was identical as in the Experiment, including four treatments instead of three. Transaction prices were significantly lower in the Heterogeneous group than in the other groups in a majority of periods (excluding High Dividend in period 2, Low Dividend in period 10 and baseline in periods 7 through 10). Multiple comparisons of mean transaction prices across treatments and periods are presented in Table 3. Transaction prices across treatments in all periods are shown in Figure 2.

Conclusions

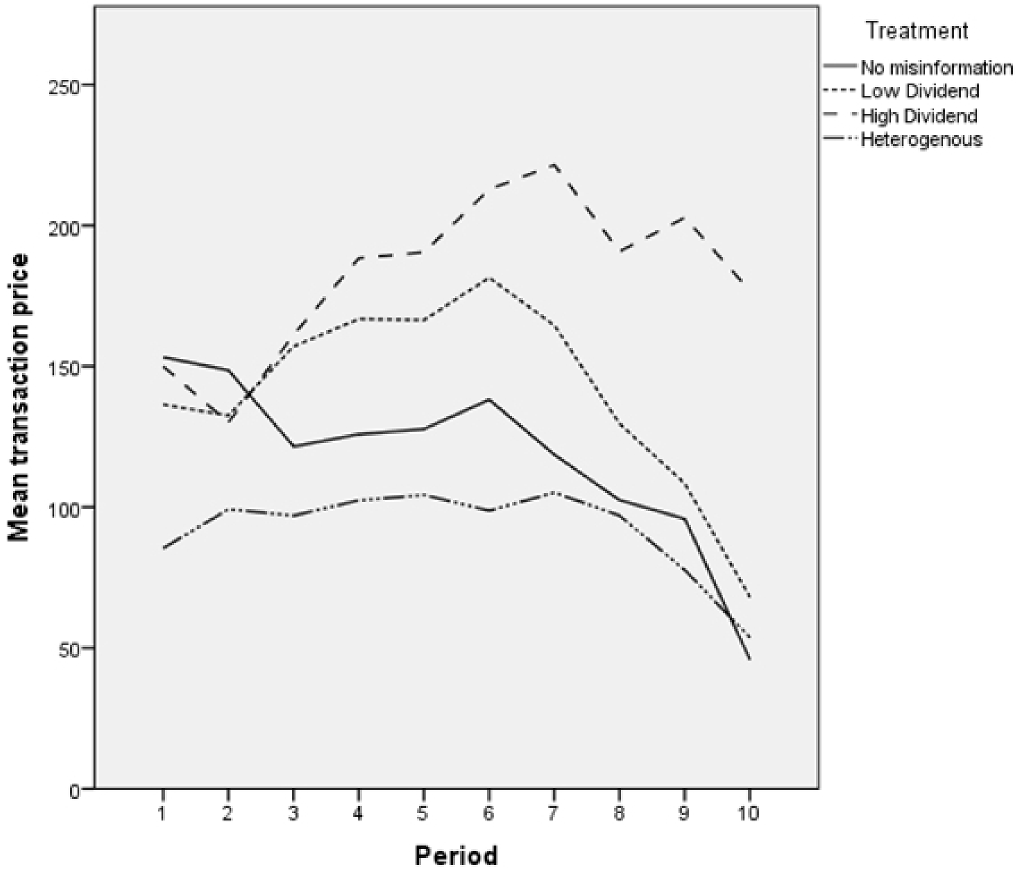
Results of Experiment 2 were consistent with expectations. Most importantly, transaction prices in the Heterogeneous group were significantly lower than in all other treatments, demonstrating that misinformation may increase or decrease transaction prices by creating informational homogeneity (High Dividend and Low Dividend treatments) or heterogeneity (Heterogeneous treatment). It is worth noting that the Heterogeneous group

Table 3: Multiple comparisons of transaction prices across treatments and periods (Heterogeneous treatment vs Experiment 1)

Period	Compared treatments		Mean diff.	Std. error	df	*p*	95% CI	
1	H	baseline	-58,66	5,48	4508,41	**<,001**	-69,40	-47,91
		LD	-59,64	6,66	4619,1	**<,001**	-72,69	-46,59
		HD	-62,05	17,45	34,236	**0,001**	-97,51	-26,60
2	H	baseline	-51,12	6,95	4372,24	**<,001**	-64,74	-37,50
		LD	-53,84	7,33	4597,9	**<,001**	-68,21	-39,47
		HD	-33,32	17,68	36,087	0,068	-69,18	2,54
3	H	baseline	-30,14	6,92	4372,69	**<,001**	-43,71	-16,58
		LD	-66,14	7,76	4548,94	**<,001**	-81,35	-50,93
		HD	-52,18	18,11	39,687	**0,006**	-88,78	-15,57
4	H	baseline	-23,90	6,60	4442,6	**<,001**	-36,84	-10,96
		LD	-62,44	8,05	4655,34	**<,001**	-78,23	-46,66
		HD	-80,96	18,44	42,686	**<,001**	-118,16	-43,76
5	H	baseline	-24,81	7,70	4401,29	**0,001**	-39,90	-9,72
		LD	-67,75	7,68	4494,91	**<,001**	-82,81	-52,69
		HD	-81,69	18,44	42,661	**<,001**	-118,89	-44,50
6	H	baseline	-34,21	6,76	4366,43	**<,001**	-47,47	-20,95
		LD	-65,21	8,39	4443,88	**<,001**	-81,65	-48,78
		HD	-105,18	18,69	45,077	**<,001**	-142,83	-67,53
7	H	baseline	3,10	7,42	4376,29	0,676	-11,44	17,64
		LD	-58,03	7,83	4575,58	**<,001**	-73,38	-42,68
		HD	-105,80	18,73	45,395	**<,001**	-143,50	-68,09
8	H	baseline	4,31	8,07	4352,29	0,593	-11,51	20,13
		LD	-46,75	8,38	4462,25	**<,001**	-63,18	-30,32
		HD	-92,18	18,60	44,139	**<,001**	-129,65	-54,70
9	H	baseline	-8,61	8,28	4419,35	0,299	-24,84	7,63
		LD	-35,19	8,83	4544,31	**<,001**	-52,49	-17,89
		HD	-117,11	18,89	47,003	**<,001**	-155,11	-79,11
10	H	baseline	7,47	7,74	4616,64	0,334	-7,69	22,64
		LD	-2,82	8,74	4509,26	0,747	-19,95	14,31
		HD	-125,20	18,43	42,617	**<,001**	-162,39	-88,02

Note: LD - Low Dividend, HD – High Dividend, H - Heterogeneous

Figure 2: Transaction prices across treatments (Experiment 2 + Experiment 1)



consisted of 50% baseline (non-misinformed) participants and 50% High Dividend misinformed participants. With transaction prices in the Heterogeneous group lower not only than in the High Dividend/Low Dividend groups, but lower than the baseline, heterogeneity seems to be the main factor influencing transaction prices. These results are consistent with research by Sutter, Huber and Kirchler (2012), in which informational heterogeneity reduced transaction prices. Sutter et al. explain this by stating that traders with insider information are more active, and therefore some of their information may be revealed and reflected in prices that track the fundamentals closer than in the other treatments (p.15). Sutter et al. provided clear information that participants are assigned to one of three information levels, so non-insiders were aware of the presence of insiders. This is not the case in the presented research – participants in the Heterogeneous group were not informed that other agents may have received different instructions. Such information could have been 'leaked' in transaction prices, showing that various levels of information are indeed revealed in the behavior of market agents. Noticing that other traders have different information, market participants may implement safer strategies in order to avoid exploitation by better informed traders (Sutter, Huber & Kirchler, 2012, p.15) – resulting in lower transaction prices due to risk aversion. Another explanation based on the paper by Corgnet, Kujal and Porter (2007) is that heterogeneous misinformation made coordinating agents' actions more difficult, hence generating heterogeneity in offer and transaction prices.

A very important result is that within the Heterogeneous group, non-misinformed participants traded better than misinformed ones (as reflected by the difference in the average number of tokens owned, which in the final period was 990 for the misinformed participants versus 1455 for non-misinformed ones (p = ,002). The conclusion is that misinformation is effective in reducing traders' returns. This is especially worrying when we consider that while regulatory agencies strive to eliminate insider trading and to force equal access to all information for all market agents, the potentially harmful impact of misinformation as market manipulation remains uncontrolled.

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