Investors Behaviour and Information Asymmetry: an Experimental Research in Iran

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Abstract: Voluntary disclosure reduces information asymmetry between investors and stakeholders. In this study, to evaluate different decision-making styles, a cognitive and behavioural model is used. The field of this research are in the Processing "Brunswick Leans Model" is placed in behavioural accounting. This research uses a quasi-experimental method. The research is conducted in 2012 in Tehran Stock Exchange (TSE.). For purposes of this study, an Experimental group (176 respondents) and a control group (158 respondents) in is divided into four new ones, which represent the four dominant styles of decision-making, namely directive, analytical, conceptual, and behavioural. As an addition, investors are divided according to their brains' dominant style of decision-making and cognitive complexity so that uncertainties about the tolerance level are classified. Evidence shows that those who have their left brain as more dominant are likely to use more items, on average, to process information. As an addition, Behavioural decision-making style uses lowest items to process information than other styles. Indeed, the results show that all styles in the Experimental group have less information asymmetry than the control group. These findings support the voluntary disclosure of information by companies to reduce the level of information asymmetry that the market offers.

[Ghodratollah Talebnia; Zahra Poorzamani; Ahmad Yaghoobnezhad; Ali Bayat. **Investors Behaviour and Information Asymmetry: an Experimental Research in Iran.** *Life Sci J* 2012;9(4):447-457] (ISSN:1097-8135). http://www.lifesciencesite.com. 67

Keywords: Voluntary disclosure, decision styles, lens processing model, information Asymmetry.

1. Introduction

Information asymmetry occurs when one or more investors possess private information about a firm's value. Asymmetry creates an adverse selection problem in the market as informed investors' trade on the basis of their private information. These trading activities manifest themselves as unusually large imbalances in the observed order flow; therefore, the extent of information asymmetry among investors can be characterized as the probability that a particular buy or sell order comes from an investor with private information. In this section, a firm's choice of disclosure quality that potentially influences the level of information asymmetry is discussed. This study combines the foundations of information asymmetry, information overload theory and the decision style theory to address a current problem. The environment in which investors must make decisions is rich with complex information about numerous investment opportunities. Unstructured information environment, such as voluntary disclosure, can affect an investor's decision-making patterns. Many studies have documented the negative effects, which are resulted from a decision maker's attempt to process more information than what is cognitively possible. Another study (Barber & Odean, 2008) finds that individual investors buy attention grabbing stocks. Those are the stocks that were in the news and experienced high abnormal trading volumes as well as extreme one-day returns. The researchers theorize that investors do not have the time to analyse all investment opportunities, therefore, they filter their search to the stocks that grab their attention. Consistent with this do-it-yourself trend, a recent study on investor decision-making reveals that accounting information is the most influential factor, followed by self-image/firm-image confidence, neutral information, advocate recommendation and personal financial needs (Al-Tamimi, 2006).

One of the ways for disclosure quality to affect information asymmetry is by altering the trading behaviour of uninformed investors. According to the Investor Recognition Hypothesis (Merton, 1987), such investors are more likely to invest and trade in firms that are well known or that

they judge favourably. If higher disclosure quality increases a firm's visibility and/or reduces the costs of processing the firm's specific public information, then, higher disclosure quality will induce more trading in the firm's stock by uninformed investors. Fishman and Hagerty (1989) make a similar argument.

While a higher intensity of uninformed trading reduces the probability of trading against a privately informed investor, ceteris paribus, prior research indicates that greater uninformed trading attracts more informed trading. Kyle (1985) demonstrates that the amount of informed trading varies proportionately with the expected amount of uninformed and liquidity-based trading. The net result is that the relative amount of informed trading remains unchanged even as the expected amount of uninformed trading changes. However, to the extent that informed traders are risk averse and capital constrained, it is expected that the relative amount of informed trading will fall as uninformed trading increases. Accordingly, higher disclosure quality will be associated with relatively less informed trading, which, in turn, will reduce information asymmetry.

Prior empirical literature also suggests that disclosure quality will be negatively related to the frequency of private information events. Gelb and Zarowin (2002) as well as Lundholm and Myers (2002) find that current stock returns reflect more information about future earnings when disclosure quality is higher. These results imply that by ''bringing the future forward,'' which means that more informative disclosures reduce the total set of information about future earnings that can be privately discovered about a firm. Since there is less information available to be discovered, in addition to the reduced search incentives discussed above, it is expected that the frequency of private information events will be declining in disclosure quality. The remainder of this paper is organized as follows. Section 2 contains a literature review while the research design is outlined in Section 3. Finally, the sample selection and descriptive statistics are provided in Section 4, followed by the empirical results in Section 5.

2. Literature Review

2.1. Information Asymmetry Studies

It is often argued that firms might find it advantageous to provide additional pieces of information (i.e., voluntary disclosure) to investors and analysts through annual reports. This statement is based on the notion that information asymmetry between firms and (potential) investors, due to a low level of disclosure, increases cost of capital by introducing 'adverse selection' between buyers and sellers of the firms' shares. The practice of 'adverse selection' tends to reduce liquidity in firms' shares (Copeland & Galai, 1983; Glosten & Milgrom, 1985). In order to attract investors, firms with limited liquidity must issue shares with a (substantial) discount. This discount reduces funds firms receive from the issue, and, thus, increases the cost of capital. By disclosing more information, firms are likely to reduce information asymmetry and, hence, attracting extended interests (liquidity) in the firms' shares, which leads to lower cost of capital (Diamond & Verrecchia, 1991). Higher liquidity is regarded as an indication that a firm's shares has become a more popular investment object due to the higher level of information disclosed by firms (Leuz & Verrecchia, 2000). In this respect, it is desirable for a firm that its shares are liquid, so the firm is not constrained in its use of the stock market (Healy, Hutton & Palepu, 1999; Lang & Lundholm, 1993). Furthermore, empirical research indicates that increased liquidity results in lower information asymmetry and cost of capital (Botosan, 1997; Botosan & Plumlee, 2002; Diamond & Verrecchia, 1991; Leuz & Verrecchia, 2000).

Botosan and Plumlee (2002) create three disclosure indices based on information from the annual report, other publications and investor relations. They find that, which is contrary to expectations, the overall disclosure level is not associated with a lower cost of equity capital. However, the coefficient on the annual report score is significantly negative.

Sengupta (1998) measures the cost of debt over a three-year period, averaging the score for three consecutive years. He provides evidence that firms with high disclosure quality ratings from financial analysts enjoy lower costs of issuing debt. Using a sample of 173 new private debt issues, Mazumdar and Sengupta (2005) find that companies with consistently high ratings for voluntary disclosures have lower cost of debt. Healy et al. (1999) analyses whether firms benefit from expanded voluntary disclosure, by examining changes in capital market factors associated with increases in analysts' disclosure ratings for 97 firms. Their findings suggest that a higher disclosure rating is followed by increases in stock liquidity, stock returns, institutional ownership and analyst following.

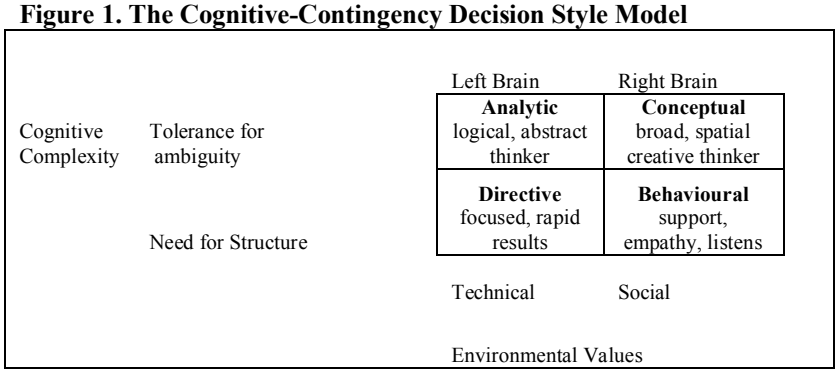
Finally, Bailey, Karolyi and Salva (2005) evaluate the economic impact of the increased disclosure faced by non-U.S. firms when they list their shares on the U.S. markets. They find that there are increased volatility and volume reactions to earnings announcement after their U.S. listings. In addition, they find that individual firms' disclosure environment, rather than changes in its market liquidity, ownership or trading venue, explains their findings. In conclusion, relevant studies based on

U.S. data, generally, indicate a negative association between the level of disclosure and estimates of the cost of capital. The studies on European data indicate that the level of disclosure is negatively associated with proxies for information asymmetry and cost of capital.

2.2. *Decision Style and Lens Model and behavioural accounting Studies:*

Rowe & Boulgarides (1983) defined a cognitive and behavioural model which indicates four decision styles, which are determined by classification into two dimensions: high cognitive complexity (thinking) or low cognitive complexity (action) and brain hemisphere dominance (either task or people orientation). Cognitive complexity measures a person's capacity to cope with information. Cognitive complexity has also been equated to tolerance for ambiguity because these individuals are able to deal with information that is not sorted or structured. The other dimension in decision style according to this model is the brain dominance or the side of the brain with which people process the information. Brain dominance research helps towards the understanding of the dimension of decision-making style. The left side of the brain is the logical hemisphere. It focuses on the more technical aspects of the world. Conversely, the right side of the brain concentrates on the spatial, visual, or social aspects of our environment (Figure1).

Figure 1. The Cognitive-Contingency Decision Style Model



Rowe & Boulgarides (1983)

Vasarhelyi (1977) uses an instrument of his own design to classify subjects between analytic and heuristic. He defines cognitive style as how a person organizes information. He uses a panel of judges to review the subject's analysis of financial planning cases in a laboratory experiment. He finds that the participants in a group, which he calls analytics, use more information in their decision process and enjoy using the computer for planning more than the group, which he calls heuristics. However, both groups perform equally well.

Pratt (1980) criticizes the study by McGhee, Shields, and Birnberg (1978) because of its adverse findings. They point out several problems with the study, including the fact that the sample size is very small, which is only 24. Furthermore, they point out that the subjects have to make a large number of decisions in an unreasonably small amount of time. In addition, because the order of cue presentation is not randomized, the time pressure may have caused the first cues to be more heavily weighted than the latter cues (Payne, 2010).

Most of the early behavioural decision making research in accounting was conducted using lens model paradigm. Using the Brunswick (1952) lens model as an analytical framework, human judges have been viewed as making decisions, judgments, or predictions based on a set of explicit cues or pieces of information. These judgments are made in an environment which is probabilistically related to a relevant environmental event or criterion (Libby and Lewis [1977]). Such studies examine subject's abilities to combine multiple cues into an overall judgment. For example, Ashton (1974) investigated the cue utilization, consistency over time, and consensus of auditors' judgment of hypothetical internal control systems. In this study 63 participating auditors were asked to judge the strength of an internal control in a payroll system based on six preanswered questions (cues) related to internal control evaluation. The experiment was conducted twice. The time interval between the experiment administrations ranged from forty-three to ninety-four days. Ashton concluded that the judgments of the sixty three auditors were found to exhibit a fairly high level of consensus and consistency over time. Ashton and Brown (1979) and Ashton and Karmer (1980) replicated Ashoton (1974) study.

That led the two authors to suggest that if the objective of the research is to study judgment in general for the purpose of facilitating and improving such judgments in practical situations, then using

students as surrogates is justifiable. However, if the objective of the research is the direct implementation of judgment policies, then it's desirable to use actual auditors as subjects. Other studies have used similar research design to investigate other issues. For example, Boatsman and Robertson (1974), Moriarity and Barron (1976, 1979), Hofstedt and Hughes (1977), and Firth (1980) examined materiality judgments of auditors. Joyce (1976) analysed auditor's allocations of time to categories of audit work related to accounts receivable. Krogstad et al. (1984) investigated materiality assessments for a proposed adjustment to the allowance for bad debt of a hypothetical company.

The introduction of lens model and policy capturing research in the mid 1970's has been a significant contribution to the auditing literature. This line of research has introduced new research techniques and methodologies to the literature and played a major role in the acceleration of the behavioural research in auditing. However, lens model and policy capturing studies have been criticized of focusing on the overall judgment while ignoring the mental processes that produce this judgment and the alternative information processing methods. Therefore, one major flaw of this line of research is that it views decision maker as a "black box" . It assumes that the decision maker consider all available information in his judgment. However, the implication of different mental processes associated with different decision strategy can be an important factor that influence the decision outcome. For example Payne (1975) examines the hypothesis that people in response to complexity employ a simple non- compensatory decision strategy. Payne found that when subjects faced with two alternatives, they are more likely to employ search strategy consistent with compensatory decision process. However, when they are faced with six or eight alternatives, they are more likely to employ search strategy consistent with conjunctive or elimination by aspect decision process.

3. Research Design and Methodology

3.1. The Instrument

This experiment is organized as follows. Respondents are provided with 23 items of financial and non-financial reporting of Experimental Corporation (SAIPA Co.). Saipa co. is a big car manufacturer and is accepted in Tehran Stock Exchange (TSE). Information on Saipa Co. contains 16 items about voluntary discloser and 7 items about financial statements. After completing the demographic questions, respondents are presented with background information on Saipa Co., which represents a potential investment opportunity. Then, they are allowed to choose from a menu of available information (balance sheets, statements of operations, statements of stockholders' equity, statements of cash flows, notes to the financial statements, analysts' estimates, the stock's current beta, historical stock prices and trading volumes and various financial ratios as well as other voluntary disclosure information. They are given the opportunity to view each piece of information as long as they like and return to a piece as many times as they like. They are, then, required to enter a hypothetical investment amount from $X. The instructions explain that their alternative investment is a free risk option yielding and that they should assume as if they were investing in a normal economy and a normal market. After the investment is entered, respondents are asked to rank the information pieces that they viewed according to how much these information influence their investment decision. Finally, the respondents are asked to complete the 20 questions in the Decision Style Inventory (Rowe & Boulgarides, 1983), which determine their level of intensity for each of the four decision styles.

A pilot study is conducted among the faculty and staff at Islamic Azad University, Sciense and Research branch for the purpose of determining the reliability of the data. 43 people respond to the solicitation and go through the experiment. These respondents are asked to provide feedback on any problems that they encounter in the experiment and any problems they have in understanding the questions or instructions. All suggestions from this study are addressed.

The instrument chosen is Alan Rowe's DSI. Rowe and Associates have created an instrument for classifying humans according to their decision-making styles. They call the instrument as the Decision Style Inventory (DSI). The DSI was created based on the classifications in the Cognitive-Contingency Decision Style Model. This model refines the role/operative style shift of the Driver model to style dominance. The objective of the instrument, which the authors use in studying decision styles, is to examine the factors that contribute to a job's success and, in turn, job satisfaction. The DSI is chosen because it appears to capture the importance of complexity of the environment and the cognitive complexity of the decision-maker as stated in a study by Schroder, et al. (1967). The DSI instrument has been found to have well over 90% face validity when conducting follow-up interviews of respondents (Mann, 1982, as cited in Ideation & Starbird, LTD, 1990). Furthermore, Test-Retest reliability with using of Pearson-baron rate has been reported at 73% consists with other prior

researches (Rowe & Boulgarides, 1983, as cited in Ideation & Starbird, LTD, 1990).

3.2. Subjects and sample selection

The Subjects of experiment are professionals investors in Tehran Stock Exchange (TSE), who are investing and accounting professionals (security registered representatives, stock brokers, Iranian Certified Public Accountants (ICPA), Certified Financial Planners (CFP), Chartered Financial Analysts (CFA) as well as professors of accounting and finance in the Iran universities.

$$n \geq \frac{N\, Z_{\alpha/2}^2 \times P(1-P)}{(N-1)\epsilon^2 + Z_{\frac{\alpha}{2}}^2 \times P(1-P)} = 150$$

According to kokran formula, at least 150 respondents should be selected for each experimental and control group, therefore, 595 Questioners are distributed among each member of the sample. Finally, 176 and 158 Questioners are collected from the experimental and control group respectively. Number of Questioners is summarized at Table 1:

Table1. Descriptive Statistic for Research Tool

Statistic for Questioners	Control group		Experimental group	
	percentage	number	percentage	number
Total sent	100	280	100	315
Total returned	66.43	186	67.62	213
Non-complete Questioners	5.71	16	8.89	28
Out of 3.5 standard division	4.28	12	2.86	9
Useable Questioners	56.43	158	55.87	176

3.3. Variables Measuring

Information Asymmetry Index: applied a fuzzy model

Information asymmetry of one decision-making style is an Average dispersion prices estimated by decision-makers (Piterson & plonberg, 2006).

$$AsymDisc_j = \sigma(Average(P_{is}))$$

Whereas:

P_{is} : Estimated Stock price by investors *i* with style *s*.

A fuzzy sets approach is used to estimate Information asymmetry index (Ahlers, David M., and Vithala R. Rao, 1977, 1976, and 1978). Therefore, each investor is asked on estimated three prices: high (H), mod (M), and low (L). so we will have:

for L≤Z≤M

for M≤Z≤H

All of them are defined for H-L≥2

$$\text{Average} = \frac{1}{3}(H+M+L)$$

$$\text{Variances} = \frac{1}{18}(L^2+M^2+H^2-LH-MH-ML)$$

Decision Styles

In measuring a person's decision style, DSI is used. The instrument determines one's preferences when responding to a series of 20 statements. Each question of the DSI instrument has four possible answers. The answers are most like you, moderately like you, slightly like you, or least like you. The questions are weighted exponentially. The *most like you* answer is weighted 8, the *moderately like you* answer is weighted 4, the *slightly like you* answer is weighted 2, and finally the *least like you* answer is weighted 1. Each answer can only be used once. The responses are ordered by decision style. The first response is the directive, the second is the analytic, the third is the conceptual and, finally, the fourth is behavioural. The responses are put in columns and summed to obtain the level of dominance of each style. The total for each question is 15 (sum of 8, 4, 2, 1) and the total for the whole instrument is 300 (20 times 15). The maximum possible score for any one style is 160 (20 times 8) and the minimum is 20 (20 times 1) (Rowe & Boulgarides, 1983).

4. Hypothesis and Empirical Results

4.1. Descriptive statistic

Table 2 reports the most dominant decision styles of the investors. The most common decision style is directive style, which is 36.93% and 36.08% for Experimental and Control group respectively.

$$f(z)\begin{cases} = \left[\frac{2}{H-L}\right]\left[\frac{Z-L}{M-L}\right] \\ = \left[\frac{2}{H-L}\right]\left[\frac{H-Z}{H-M}\right] \end{cases}$$

Table2: Investors by Most Dominant Decision Style

Dominant Style	Control group		Experimental group	
	percentage	number	percentage	number
Directive	34.18	54	36.93	65
Analytic	36.08	57	32.95	58
Conceptual	14.55	23	18.18	32
Behavioural	15.19	24	11.94	21
Total	100	158	100	176

Each respondent's analytic and directive cores are combined to determine the level of left brain dominance. Respondents with scores of over mean (=162) are classified as left brain dominant. Likewise, each respondent's conceptual and behavioural scores are combined to determine the

amount of right brain dominance. Respondents with a score of over 138 are classified as right brain dominant. Two of the respondents' scores are from the Experimental group while seven of the respondents' scores are from the control group and the scores for both groups are even (162/138), which means that neither side is dominant. Table 3 summarizes these numbers.

Each respondent's analytic and conceptual scores are combined together while the directive and behavioural scores are combined with each other to determine the level of cognitive complexity. A combined analytic/conceptual score of over mean (=152) is classified as more cognitively complex while a combined directive/behavioural score of over 148 is classified as less cognitively complex. Five of the respondents' scores come from the Experimental group and one of the respondents' scores is from the control group and is even (152/148), which means that neither group has high or low complexity. Table 3 summarizes these numbers.

Table3: Investors by Most Dominant Combined Decision Style

Combined Dominant Style	Control group		Experimental group	
	percentage	number	percentage	number
Left brain dominant	49.67	75	47.70	83
Right brain dominant	50.33	76	52.30	91
More cognitively complex	49.04	77	52.05	89
Less cognitively complex	50.96	80	47.95	82

Hypothesis about Information Processed by Investors

The literature has shown that the more complex decision styles (Analytic and Conceptual) and Left Brain dominant styles (Analytic and Directive) are less likely to suffer from information overload than the less complex decision styles (Directive and Behavioural). Rowe and Mason (1987) find that the left brain dominant styles (Analytic and Directive) focus on the task in a decision environment. Therefore, they perform better in the area of finance than the right brain dominant styles (Conceptual and Behavioural) so these styles process more firm voluntary disclosure than others. This premise tested in an investing environment should answer the question as to how many information pieces an investor will view before making a decision. Therefore, it is hypothesized as follows:

H1: There is a significant relationship between investor's dominant styles and mean number of firm's voluntary disclosure items viewed.

Hypothesis H1 is subtracted to three sub-hypothesis H1a, H1b, and H1c:

H1a: Analytic and Directive (Left Brain) decision styles will have a higher mean number of firm's voluntary disclosure items viewed than Conceptual and Behavioural (Right Brain) styles.

H1b: Analytic and Conceptual (More Complex) decision styles will have a higher mean number of firm's voluntary disclosure items viewed than Directive and Behavioural (Less Complex) styles.

Hypothesis H1a is tested using two methods. First, it is tested by comparing the mean number of items viewed by each of the two groups.

$$\begin{cases} H_0 : \mu_{left} \le \mu_{right} \\ H_1 : \mu_{left} > \mu_{right} \end{cases}$$

Before the mean compared measurer, the "Levin" test is done and Fisher'F statistic is reviewed.

$$\begin{cases} H_0 : {\sigma_{left}}^2 = {\sigma^2}_{right} \\ H_1 : {\sigma^2}_{left} \ne {\sigma^2}_{right} \end{cases}$$

Hypothesises H1a and H1b are tested using two methods. First, it is tested by comparing the mean number of items viewed by each member of the two groups. The respondents are grouped according to their brain dominance as determined by their DSI scores. An independent sample t-test, with the number of items viewed as the test variable and brain dominance as the grouping variable (Left or Right Brain), is run. The results reveal that from the 23 (16 items for voluntary disclosure) items available, the left brain dominant styles actually view more items (mean = 14.53) than their right brain dominant counterparts (mean = 13.04) (Table4). Therefore, H1a is supported and it should be noted that the difference between the two means is statistically significant, which is at 0.05 (sig=0.992).

Also, for testing H1b, cognitive complexity as the grouping variable (more or less complex), is run. The results reveal that from the 23 (16 items for voluntary disclosure) items available, the more complex styles actually do not view more items (mean = 13.77) than their less complex counterparts (mean = 13.76) (Table 4). Therefore, H1B is not

supported. However, it should be noted that the difference between the two means is not statistically significant, which is at 0.05 (sig=0.992).

Table 4: Amount of Voluntary Disclosure processed by different decision styles

Style	N	Mean	Std. Deviation	Std. Error Mean	Levene's Test F_Fisher	t	df	Sig. (2-tailed)
Left	83	14.5301	4.91225	.53919	.366	2.056	172	.041
Right	91	13.0440	4.62100	.48441				
More	89	13.7753	4.69708	.49789	.187	.010	169	.992
Less	82	13.7683	4.91734	.54303				

***, **, * Significant at 1%, 5%, 10% level respectively.

Additionally, a one-way ANOVA test, with number of items viewed as the dependent variable as well as decision style (directive, analytical, conceptual, and behavioural) as the factor, is run. The results (Table 5) reveal no significant difference between the decision style groups (sig=0.251). This lack of variance in use of information among the four decision styles fails to support hypothesis H1.

Table 5:Analysis of Variance of Number of amount of Voluntary Disclosure processed by Decision Style

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	97.641	3	32.547	1.378	.251
Within Groups	4061.245	172	23.612		
Total	4158.886	175			

Table 6 shows the results of a LSD test, which compares each style to the other three. There are no significant differences between most of groups but we have a significant difference between behavioural styles and directive and analytical styles.

Table 6:Multiple Comparisons in amount of Voluntary Disclosure processed by different Decision Styles

(I) style	(J) style	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Directive	analytical	.33103	.87770	.707	-1.4014	2.0635
	conceptual	.43125	1.04935	.682	-1.6400	2.5025
	behavioural	2.44762**	1.21969	.046	.0401	4.8551
Analytical	directive	-.33103	.87770	.707	-2.0635	1.4014
	conceptual	.10022	1.07003	.925	-2.0119	2.2123
	behavioural	2.11658	1.23753	.089	-.3261	4.5593
Conceptual	directive	-.43125	1.04935	.682	-2.5025	1.6400
	analytical	-.10022	1.07003	.925	-2.2123	2.0119
	behavioural	2.01637	1.36464	.141	-.6772	4.7100
Behavioural	directive	-2.44762**	1.21969	.046	-4.8551	-.0401
	analytical	-2.11658*	1.23753	.089	-4.5593	.3261
	conceptual	-2.01637	1.36464	.141	-4.7100	.6772

***, **, * Significant at 1%, 5%, 10% level respectively.

Since the number of observations in behavioural style test is less than 30 cases, Therefore, Kruskal-Wallis test (test H) is used to test for significant mean differences. The results of this test are shown in Table 7.

Kruskal-Wallis test results also confirm the statistical findings of the one-way ANOVA test. Because χ^2 and *sig* of this test are 3.970 and 0.265 respectively, the evidence to reject H0, which is based on the equal to average amount of information processed by the different styles, cannot be provided.

H1c: Behavioural styles will have a lowest mean number of firm's voluntary disclosure items viewed than other styles.

Table 7. H -test results about different styles of decision making in terms of information processing

Style	N	Mean Rank	Statistic	Amount
Directive	65	94.56	Chi-Square	3.970
Analytical	58	90.34	df	3
Conceptual	32	85.06	Asymp. Sig.	.265
Behavioral	21	69.88		
Total	176			

The Mann-Whitney Test is used to test H1c hypothesis. The results of this test can be seen in Table 8. U-test results indicate that at the 10% significance level of H0 can be rejected and the claim hypothesis is accepted. In other words, investors with behavioural style dominant use lower information than other styles in decision making.

Table 8. U - Test results about Behavioural and Other styles of decision making in terms of information processing

Style	N	Mean Rank	Sum of Ranks	Statistic	
Other style	155	91.02	14108.50	Mann-Whitney U	1.236E3
Behavioural	21	69.88	1467.50	Wilcoxon W	1.468E3
				Z	-1.790
Total	176			Asymp. Sig. (2-tailed)	.073*
***, **, * Significant at 1%, 5%, 10% level respectively					

Information Asymmetry Hypothesis

Prior empirical literature also suggests that disclosure quality will be negatively related to the frequency of private information events. Gelb and Zarowin (2002) as well as Lundholm and Myers (2002) find that current stock returns reflect more information about future earnings when disclosure quality is higher. These results imply that by ''bringing the future forward,'' which means that more informative disclosures can reduce the total set of information about future earnings that can be privately discovered about a firm. Disclosure quality affects information asymmetry is by altering the trading behaviour of uninformed investors. According to the Investor Recognition Hypothesis (Merton, 1987), such investors are more likely to invest and trade in firms that are well known or that they judge favourably. If higher disclosure quality increases a firm's visibility and/or reduces the costs of processing firm specific public information, then, higher disclosure quality will induce more trading in the firm's stock by uninformed investors. Fishman and Hagerty (1989) make a similar argument. Therefore, the following hypothesis is put forth:

H2: Before a firm's voluntary disclosure, there is no significant difference in terms of information asymmetry between different styles.

This hypothesis has two sub-hypotheses. To test these two hypotheses, there should be a sub-test of equality of variance tests ("Levin") between the experimental group and control group using Fisher's F statistic. It is noted that information asymmetry of one decision-making style is an Average dispersion prices estimated by decision makers. For example, information asymmetry theory is used to compare the style I and j group, which is designed as follows:

$$\begin{cases} H_0 : {\sigma_{i,j}}^2 \geq {\sigma^2}_{i,j} \\ H_1 : {\sigma^2}_{i,j} \prec {\sigma^2}_{i,j} \end{cases}$$

H2a: before a firm's voluntary disclosure, Analytic and Directive (Left Brain) decision styles will have a lower information asymmetry than Conceptual and Behavioural (Right Brain) styles.

H2b: before a firm's voluntary disclosure, Analytic and Conceptual (More Complex) decision styles will have a lower information asymmetry than Directive and Behavioural (Less Complex) styles.

Test results of "Levine" test for different hypotheses are summarized in Table 9.

Table 9: different styles information asymmetry t-test and Descriptive Statistics before Voluntary Disclosure processed

Hypothesis	Style	N	Mean	Std. Deviation	Std. Error Mean	Levene's Test F_Fisher	Sig.
H2a	**Left(Co.)**	83	2.0253E3	226.07537	24.81500	.521	.471
	right(Co.)	91	2.0017E3	242.13810	25.38297		
H2b	**more(Co.)**	89	2.0417E3	227.52944	24.11807	1.083	.300
	less(Co.)	82	1.9730E3	243.01851	26.83690		
***, **, * Significant at 1%, 5%, 10% level respectively.							

The results of Table 9 shows *Sig* "Levin" test for both hypotheses, which are 0.471 and 0.300 respectively. Because this figure is smaller than the 5% significance level, variance equality (H0) is not rejected. The Levine test results do not provide sufficient evidence to support the tests on H1. Furthermore, in 95% confidence level, the claim hypothesis is not accepted. Therefore, there is no significant difference between different styles about information asymmetry.

H3: Voluntary disclosure by firms respect to decries information asymmetry between investors with different styles.

Information asymmetry (variance of estimated prices by investors) is used between the experimental and

control group. This hypothesis has four sub-hypotheses. To test these hypotheses, there should be a sub-test of equality of variance tests ("Levin") between the experimental group and control group using the Fisher's F statistic. It is noted that the information asymmetry of one decision-making style is an Average dispersion prices estimated by decision-makers. For example, information asymmetry theory is used to compare the style I and j group, which is designed as follows:

$$\begin{cases} H_0 : {\sigma_{i,j}}^2 \geq {\sigma^2}_{i,j} \\ H_1 : {\sigma^2}_{i,j} \prec {\sigma^2}_{i,j} \end{cases}$$

H3a: After voluntary disclosure by firms' Analytic and Directive (Left Brain), decision styles will have a lower information asymmetry.

H3b: A voluntary disclosure by firms' Conceptual and Behavioural (Right Brain), decision styles will have a lower information asymmetry.

H3c: After voluntary disclosure by firms' Analytic and Conceptual (More Complex), decision styles will have a lower information asymmetry.

H3d: After voluntary disclosure by firms' Directive and Behavioural (Less Complex), decision styles will have a lower information asymmetry.

The results of "Levine" test for different hypotheses are summarized in Table 10.

Table 10:different styles information asymmetry t-test and Descriptive Statistics in after and before Voluntary Disclosure processed

Hypothesis	Style	N	Mean	Std. Deviation	Std. Error Mean	Levene's Test F_Fisher	Sig.
H3a	**Left(Ex.)**	83	2.0253E3	226.07537	24.81500	11.027	0.001***
	Left(Co.)	75	1.9534E3	357.25513	41.25227		
H3b	**Right(Ex.)**	91	2.0017E3	242.13810	25.38297	6.034	.015**
	Right(Co.)	76	1.9246E3	352.25747	40.40670		
H3c	**More(Ex.)**	89	2.0417E3	227.52944	24.11807	3.963	.048**
	More(Co.)	77	1.8864E3	260.75390	29.71566		
H3d	**Less(Ex.)**	82	1.9730E3	243.01851	26.83690	11.480	.001***
	Less(Co.)	80	1.9900E3	416.72922	46.59174		

***, **, * Significant at 1%, 5%, 10% level respectively.

The results of Table 10 show Sig "Levin" test for all of the above hypotheses are 0.001, 0.015, 0.048 and 0.001 respectively. Because these figures are smaller than the 5% significance level, variance equality (H0) is rejected. The Levine test results provide sufficient evidence to support the H1 tests. Furthermore, in 95% confidence level, the claim hypothesis is accepted. Therefore, there is a significant difference among the different styles on information asymmetry ex-anti voluntary disclosure by firms.

Discussion and conclusion:

Information asymmetry occurs when one or more investors possess private information about a firm's value. Asymmetry creates an adverse selection problem in the market as informed investors' trade on the basis of their private information. These trading activities manifest themselves as unusually large imbalances in the observed order flow; therefore, the extent of information asymmetry among investors can be characterized as the probability that a particular buy or sell order comes from an investor with private information. In this section, how a firm's choice of disclosure quality potentially influences the level of information asymmetry is discussed.

Evidence shows that people with dominant left side of the brain use more items, on average, to process information. In addition, Behavioural decision-making style uses the lowest items to process information. Indeed, the results show that all styles in the Experimental group have less information asymmetry than the control group. These findings support the voluntary disclosure of information by companies to reduce the level of information asymmetry the market offers.

This finding is consistent with other decision-making style research findings. Vasarhelyi (1977) finds, in his study, that the analytics use more information than the heuristics, but donot outperform the heurists as expected. Driver and Mock (1975) find that, when the decision environment is less

complex and rapid processing is needed, less complex decision styles will outperform more complex styles. This result also seems to support the Al-Tamini (2006) findings. He notes that, if cognitive complexity is a learnt characteristic, then, an individual's cognitive abilities should increase over time. As an addition, findings of this research about the relation between information asymmetry and voluntary disclosure are consistent with other related research findings, such as Schrand, & Verrecchia (2004) as well as Bailey, Karolyi, & Salva (2005), which state that voluntary disclosure has a negative relationship with information asymmetry.

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9/20/2012