An Empirical Examination of the Relationship between Financial Trader's Decision-making and Financial Software Applications

Research-in-Progress

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Abstract

A study is undertaken to unveil the underlying relationship between financial traders' decision-making and their financial trading software applications. A large data set of proprietary financial transactions of 2,726 accounts and 256,674 round-trip transactions that were from November 2004 to January 2012 were examined. Another large survey data set from 178 online traders were also examined. From these substantial data sources, we expect to identify hidden relationships and technological dependencies between the traders' decision-making behaviors and their trading software applications. A preliminary data analysis and results are reported.

Keywords

financial decision-making, financial software application, decision-making behaviors

Introduction

Traditionally, trading online generally consisted of individuals visiting a webpage and manually entering their trade requests by selecting a stock and clicking a button to buy or sell an investment product. With an ever increasing number of mobile devices and rich internet broadband width, we are quickly seeing a significant change with this trading trend. Today, online traders can enter a trade within seconds, using their iPhone, by visiting their broker's website and "thumbing" a button to execute a trade Barber and Odean (2002) have found that online investor's performance, the returns they earned, lagged the market by nearly 3 percent.

Since the Barber and Odean (2002) study, we have no significant studies from both finance and information systems (IS) disciplines that have examined the current technologies and related online trading behaviors. One compelling research question that still has not received a sufficient attention is the analysis of trading-software-applications. The major advantage of using trading software applications is the fact that a standalone computer with a trading-software-application can perform trade transactions without any human intervention. A trading-software-application allows a trader to send a "trade signal" via his trading-software-application directly to his broker. It also allows the trader to write computer codes to setup an automatic trade transaction, "auto-trade," without human intervention. Briefly describing, a trader would write codes to sell a particular stock if the market hits a certain price level, the trading- software-application creates a trading signal, and a signal occurs which prompts the trader to trade, or the trading signal is electronically routed to the trader's broker, executing the trade. The trading signal can also be routed to a trader's phone or mobile device as a social network services (SNS) message, or email account.

A more recent development is that certain trading-software-application such as 'Trade Station' can send the trading signal to third parties and these third parties can transfer the information to others. Here is an example. A certain trade website, such as 'Collective2,' would allow 'Trade Station' users to send a trading signal to their websites and the trading signal is recorded on the website. The signal is then sent to other traders who subscribe to 'Collective2.' The recipient of this trading signal would link his trading-software-application to 'Collective2.'. This setup would allow the trader's broker to receive all trade signals from 'Collective2' which enables the broker to execute the transactions. In summary, a trader can have his personal brokerage account managed by another individual when his account is linked through a website such as 'Collective2.' The inquiries about technology adoption and diffusion have been one of major research streams in the field, and such inquiries involving financial trading and financial transaction software applications are rare to find. Given today's technological world, we believe there is a valuable research merit to Finance-IS cross discipline study. This study's results are expected to enlighten the understanding of financial trading-software-application impacts. Both Finance and MIS research approaches would be utilized to strengthen this cross-discipline study. The leading research question is an empirical analysis of trading-software-applications' impacts on the trader's decision-making and their subsequent behaviors.: 1) what are the impacts of different trade-signal setups; 2) what are some relationships between these trade signal setups and the trader's consequential decision-making; 3) what are the traders' trading-software-applications satisfaction and perceived usefulness levels; 4) what are the trading success rates (or "beat-the-market rate") using these trade platforms; 5) Are there any causal or reciprocity relationships between the technologies and trader's decision-making process and behaviors. A financial trading data collection and field survey with a variety of online traders are being executed for this study.

Data collection and field survey development

There are two data sets. The first set is the 2,726 accounts and 256,674 round-trip transactions that include each trader's name, account identification number, the timestamp of when the trader bought and sold securities, and the prices of buy and sell in US dollars. These are collected during November 2004 to January 2012 from a website that publishes the trades of its clients for individual equity traders. The descriptive statistical analysis is being administered and will become available in near future.

The second data set is a field survey with a group of 178 online traders. The survey items were originally crafted for this study. A total of 20 items were identified. The 20 items of the '*satisfaction*' and '*perceived*

usefulness' scale were subjected to principal components analysis (PCA) using SPSS version 19. Prior to performing PCA, the suitability of data for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients of 0.3 and above. The Kaiser-Meyer-Oklin value was 0.960, exceeding the recommended value of 0.6 (Kaiser 1970, 1974) and Bartlett's Test of Sphericity (Bartlett, 1954) reached statistical significance, $p < 0.05$, supporting the factorability of the correlation matrix.

Principal components analysis revealed the presence of two components with eigenvalues exceeding 1. An inspection of the screen plot revealed a clear break after the second component. Using Catell's (1966) screen test, it was decided to retain two components for further investigation. To aid in the interpretation of these two components, varimax rotation was performed. The rotated solution revealed the presence of simple structure (Thurstone, 1947), with both components showing a number of strong loadings and all variables loading substantially on only one component. The 'satisfaction' items loading strongly on Component 1 (item – 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19 and 20) and 'perceived usefulness' items loading strongly on Component 2 (items – 1, 2, 3, 4, 5, 6 and 7). The item 18 was removed as it exhibited itself as an outlier; it had a value of 0.501 from the Rotated component matrix table 2. We also find redundancies in between Q1, 2, & 3, in between Q11, 12, & 13, in between Q14 & 15, and in between Q16 &17. Therefore, we used only one from each group – Q1, Q11, Q14, and Q16 - for a second round of extraction which resulted table 3.

Q 1	I intend to use my favorite trading software in the next 12 months.		.905
Q 2	I predict I would use my favorite trading software in the next 12 months		.913
Q 3	I plan to use my favorite trading software in the next 12 months.		.915
Q 4	I find my favorite trading software useful in conducting my trades		.888
Q 5	Using my favorite trading software makes it easier for me to trade.		.844
Q 6	Using my favorite trading software will enable me to accomplish trading more quickly		.801
Q 7	Using my favorite trading software would improve my performance in trading		.684
Q 8	My favorite trading software produces correct information	.739	
Q 9	There are few errors in the information I obtain from my favorite trading software.	.666	
Q 10	The information provided by my favorite trading software is accurate	.791	
Q 11	Overall, I would give the information from my favorite trading software high marks	.802	
Q 12	Overall, I would give the information provided by my favorite trading software a high rating in terms of quality	.778	
Q 13	In general my favorite trading software provides me with high-quality information.	.795	
Q 14	Overall, the information I get from my favorite trading software is very satisfying	.792	
Q 15	I am very satisfied with the information I received from my favorite trading software.	.804	
Q 16	All things considered, I am very satisfied with my favorite trading software.	.784	
Q 17	Overall, my interaction with my favorite trading software is very satisfying	.733	
Q18	It takes too long for my favorite trading software to respond to my requests	.501	
Q 19	My favorite trading software provides information in a timely fashion	.766	
Q 20	My favorite trading software returns answers to my requests quickly	.782	

Table 1. 1st round Factor Analysis

Perceived Usefulness	Q 1	I intend to use my favorite trading software in the next 12 months.		.862
	Q 4	I find my favorite trading software useful in conducting my trades		.867
	Q 5	Using my favorite trading software makes it easier for me to trade.		.835
	Q 6	Using my favorite trading software will enable me to accomplish trading more quickly		.789
	Q 7	Using my favorite trading software would improve my performance in trading		.688
Satisfaction	Q 8	My favorite trading software produces correct information	.791	
	Q 9	There are few errors in the information I obtain from my favorite trading software.	.733	
	Q 10	The information provided by my favorite trading software is accurate	.853	
	Q 11	Overall, I would give the information from my favorite trading software high marks	.846	
	Q 14	Overall, the information I get from my favorite trading software is very satisfying	.819	
	Q 16	All things considered, I am very satisfied with my favorite trading software.	.825	
	Q 19	My favorite trading software provides information in a timely fashion	.824	
	Q 20	My favorite trading software returns answers to my requests quickly	.841	

Table 2. 2nd round Factor Analysis

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.947
Bartlett's Test of Sphericity	Approx. Chi-Square	4054.296
	df	78
	Sig.	.000

Table 3. KMO and Bartlett's Test

Preliminary survey data analysis

We have conducted the test of normality on the two constructs: 'satisfaction' and 'perceived usefulness.' This would validate whether parametric analysis is acceptable or not. From the Kolmogorov-Smirnov and Shapiro-Wilk test results, table 5, the p values were significant which indicates the data set is not normally distributed and consequently the non-parametric analysis is in order.

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Perceived usefulness	.096	195	.000	.938	195	.000
Satisfaction	.127	195	.000	.940	195	.000

Table 4. Tests of Normality

One of the survey ordinal items is 'what is your preferred trading signal platform' with the choices such as email, social network services (SNS) message notification, and auto-trade. We conducted an analysis to determine if traders using one of these trading signal setups carry significantly different levels of trading-software-application satisfaction and perceived usefulness.

With the failed normality test result, Kruskal-Wallis test is a non-parametric alternative to a one-way between-groups analysis of variance (ANOVA). The result revealed that 'perceived usefulness' is significantly different, but 'satisfaction not significant. However, the result does not provide information on which group is significantly different from which group, refer to table 6. To further this analysis, we resort to another non-parametric analysis; Mann-Whitney U test to determine which group is significantly different from which group.

	Perceived usefulness	Satisfaction
Chi-Square	10.734	5.319
df	2	2
Asymp. Sig.	.005	.070

Table 5. Kruskal-Wallis Test on "Trading Signal"

The Mann-Whitney U test on 'Perceived usefulness' results indicated that there are significant differences between email and auto-trade, and between SNS notice and auto-trade. There is no difference between email and SNS notice. This connotes that the traders who practice auto-trade have significantly different levels of perceived usefulness on trading software applications than the two other group of traders.

	email vs. SNS notice	email vs. auto-trade	SNS notice vs. auto-trade
Mann-Whitney U	1778.500	1536.000	622.000
Wilcoxon W	6243.500	2712.000	1798.000
Z	-.038	-3.112	-2.533
Asymp. Sig. (2-tailed)	.970	.002	.011

Table 6. Mann-Whitney U Test on 'Perceived Usefulness' of "Trading Signal"

Another survey ordinal item is 'Did you beat the market using the trading platform.' The word 'beat' generally means when a trader has performed higher financially or trading wise than the market. This item is important as it is one of the prime financial goals for many traders. For the responses, there were four choices – *Yes*, *No*, *Sometimes*, and *Prefer not to mention*. We grouped each response, for example, group 1 is everyone who has answered '*Yes*' and so on. We had four groups all together: 1 = *Yes*, 2 = *No*, 3 = *Sometimes*, 4 = *Prefer not to mention*.

To determine whether there is a significant difference between these four groups, we resorted to Kruskal-Wallis test, table 7. The table reports significant differences in both constructs with '*satisfaction*' (p = 0.000) and '*perceived usefulness*' (p = 0.000). To determine which group is significantly different from which group, we followed with Mann-Whitney U test, table 8, on every group to each other in a round robin.

Table 8 provides another insight to the trader's decision-making. In the comparisons between groups of '*Yes*' vs. '*No*,' '*Yes*' vs. '*Prefer not to mention*,' '*No*' vs. '*Sometimes*,' and '*Sometimes*' vs. '*Prefer not to mention,*' all showed significant differences in both '*satisfaction*' and '*perceived usefulness*.' These results provide a number of interesting leads to the interactions between trader's decision-making and trading software applications. Some consequential questions are: Does the positive perception of trading software applications lead to a higher level of financial gain from the market? Is there a strong correlation? Is this phenomenon largely due to the trading software applications or trader's blind faith? This invites a number of different perspectives and analysis from such fields as finance, information systems, decision science, cognitive science, psychology and others.

	Perceived Usefulness	Satisfaction
Chi-Square	41.517	38.428
Df	3	3
Asymp. Sig.	.000	.000

Table 7. Kruskal-Wallis Test on "Beat the Market"

	1 vs 2		1 vs 3		1 vs 4	
	PU	SA	PU	SA	PU	SA
Mann-Whitney U	226.500	256.000	702.000	757.500	155.000	188.500
Wilcoxon W	577.500	607.000	1053.000	1108.500	506.000	539.500
Z	-4.133	-3.818	-2.205	-1.773	-4.398	-3.905
Asymp. Sig. (2-tailed)	.000	.000	.027	.076	.000	.000
	2 vs 3		2 vs 4		3 vs 4	
	PU	SA	PU	SA	PU	SA
Mann-Whitney U	909.500	844.000	659.500	700.000	597.000	557.000
Wilcoxon W	3835.500	3770.000	1605.500	1646.000	3523.000	3483.000
Z	-4.014	-4.390	-.940	-.544	-4.659	-4.915
Asymp. Sig. (2-tailed)	.000	.000	.347	.587	.000	.000

*PU = Perceived usefulness SA = Satisfaction

Table 8. Mann-Whitney U Test on "Beat the Market"

Expected contributions

This study aims to contribute on the understanding of how people are influenced from financial computing technologies in making their financial decisions and transactions. Furthermore, this study makes a call to more attention and studies to this track of information systems field.

As this is still "research-in-progress" mode, there are more data to be analyzed. From the first data set, we expect to evaluate the "over confidence," gender, system trading usefulness, risk taking behavior and

other technology and financial trading issues. From the second data set, the survey data, we have following ordinal items: How many different types of trading software do you use, How many times do you trade per month, Does the use of the trading software increase your tendency to place large orders, Have you switched trading software due to the success or failure of trading software you have used in the past, Do you change trading software based on information about other superior trading software, Do you change trading platforms because you change your trading style, Do you change trading platforms because you have changed the "type of" financial instrument you trade (e.g. switched from equities to foreign currency exchange), Do you automate trading with your trading platform through your broker, If you do not automate trading how long does it take you to execute the trade, and more.

The expected contributions of this study's results are 1) to gain deeper insights to the trader's technology-influenced trading decision-making, 2) to understand the trader's different attitudes on technology based on their trading performance using technology, and 3) to lay a ground for increasing the trader's trading performance using technology.

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