THE INFLUENCE OF SIMULATION PERFORMANCE ON STUDENT INTEREST

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ABSTRACT

Previous studies examine the potential benefits of using classroom games and simulations, finding that their use generally increases knowledge and interest level. However, few (if any) of these studies examine whether performance in such simulations is relevant to these outcomes. Particularly in investments, where trading simulations are common, the performance relative to peers and the market can be objectively determined based on portfolio return. Thus, we extend the existing literature by studying the impact of portfolio performance on knowledge level and interest in the profession. We find that simulation performance has no significant influence on the students' feelings with regard to their knowledge attainment or their level of interest in the discipline. This "non-result" is actually particularly meaningful, as some professors have either not used simulations or have avoided in-class performance comparisons for fear that a poor performance will persuade students to avoid a career in the field. Our results suggest that such fear is unwarranted.

INTRODUCTION

Traditional classroom instruction (i.e., lecturing) is generally considered to be highly effective in terms of transferring knowledge and, as such, has steadfastly remained the dominant method in higher education, particularly for those areas that are considered more quantitative. For example, studies have shown that the "chalk and talk" method of instruction is still most popular in finance courses (e.g., Saunders, 2001; Farooqi & Saunders, 2004; Iqbal, Farooqi & Saunders, 2006), as well as courses in related disciplines such as economics (Becker & Watts, 1996; Becker & Watts, 2001).

An argument could be made that one of the primary objectives of higher education is preparation for a professional career upon graduation. There is naturally more to this preparation than knowledge attainment. The application of this knowledge to "real world" situations is a skill that has historically been largely left to the students' own devices, and often insufficiently. However, in recent years, there has been much discussion on the use of classroom games and simulations as a way to fill this gap.

The use of games in instruction is far from a new concept, as there is evidence as early as the 1940s (e.g., Chamberlain, 1948) of their use in Economics courses. However, Holt (1999)

shows there has been much more emphasis over the last couple of decades, due in large part to the rapid rise in technology, which allows easier integration into the classroom. In addition, part of the reasoning behind the low levels of use was there was little research documenting a benefit in student learning from classroom simulations; however, recent works, including Cebula & Toma (2002), have addressed this latter issue, finding a positive influence from "bringing course material to life." More generally, Harter & Harter (2010) find that stock market simulations can significantly increase financial literacy among high school students, and Moffit, Skull & McKinney (2010) find that students completing an equity trading game believe their knowledge levels have improved, as has their interest in the topic.

However, to our knowledge, none of the existing studies document whether performance in such games (beyond just their simple use) impacts these outcomes. In particular, do students who perform well (i.e., earn an above average return) in such portfolio simulations have a greater interest in the field than those whose performance lags either their peers or the market? This question is particularly relevant, as anecdotal evidence suggests that some professors have been reluctant to implement such games for fear that a poor performance will dissuade students from pursuing a career in the field. Recent research (e.g., Waggle & Moon, 2011) finds that only approximately 30% of all undergraduate investment analysis courses use some type of stock market simulation as an aide in understanding the material being taught. Although this is the particular issue on which we focus, we believe our study provides other contributions as well.

First, there is surprisingly little research done on the use of classroom games in finance courses, whereas there is abundance in the area of economics and other disciplines. This is particularly interesting given the nature of finance, in that it lends itself readily to the real world application these games are designed to provide. Second, several previous studies examine games in general and in often very short-term (a single class period, for example) situations. The simulation examined in this study is a very realistic setting that covers an entire semester and should therefore provide more accurate real-world exposure.

The final contribution of the study revolves around the students' perspective of such games. From the instructor's perspective, the increased entertainment value could result in more favorable instructor evaluations as the games enhance student learning and make the class more enjoyable. However, we examine an alternative option for benefit-- the clarification of student perception of the discipline. In addition to questioning the student on knowledge increase as a result of the course, they are also queried on their interest levels in working in the profession. While both of these overlap with previous studies, we also survey students on their interest in managing their own money later in life. Since courses are often taken as electives by students with different majors, we believe this question gets more at the heart of the impact of the use of games.

We find that the experience of taking the course had a positive influence on student interest, knowledge, and experience; however, in contrast, we find no consistent relation between simulation returns, market returns, or market volatility and changes in interest, likelihood of

future management of money, or knowledge levels. Thus, the prevalence of benefits documented in prior literature, combined with the lack of negative side effects from poor student performance on such simulations, suggests that the use of such investment simulations is warranted.

In ancillary results, we do find that males experience a larger increase in interest in the material than females. The same is true for graduate students relative to undergraduate students. Finance majors experience a larger increase in their likelihood of continuing to manage their own (real) money in the future, and students with higher course grades are likely to have higher changes in experience levels and knowledge attainment.

LITERATURE REVIEW

The literature relevant to the history of games in the business classroom is large and developed, particularly with respect to economics courses. Chamberlain (1948) is credited with the first application of games in a classroom setting. Specifically, Chamberlain, using doctoral students at Harvard, allowed the students to circle the room and negotiate trades with others. Some individuals were designated buyers, while some where sellers; the interaction of the two groups led to further understanding of how markets work. Others, including Smith (1962), quickly built upon this, and the use of games in economics courses became relatively widespread. Davis & Holt (1993) and Kagel & Roth (1995) survey the work done on the topic to that point. Brauer & Delemester (2001) extend the survey by completing a more comprehensive review of the existing games for Economics courses.

Fels (1993) brings to light the fact that, although not unusual, the use of games prior to the mid 1990s never became common-place. The two reasons suggested by Fels (1993) were high costs of creation and relatively low documentation of significant student benefit in terms of increased knowledge attainment. The first issue has been largely overcome due to the rapid rise in technology and related computer-based simulations available at reasonable costs. The implementation of easy-to-use simulations such as the Stock Market Game (SMG) has led to the more evolved and involved electronic simulations available today. Also, the ease of use of such programs make the opportunity cost for the instructor minimal. See Wood, O'Hare & Andrews (1992) and Bell (1993) for early examinations of SMG. Complete information on the program can be found at www.stockmarketgame.com.

The second issue is more involved, but it too has been largely resolved, with the dominant conclusion that classroom games do provide benefit for the students. Frank (1997) found that students who experienced a classroom environment using games performed better on multiple choice tests than did counterparts in classrooms without games. Dickie (2006) finds evidence that also supports this contention. Gremmen & Potters (1997) and Biel & Delemeester (1999) find that students that experienced games learned more about the economic model than those who did not. Mullin & Sohan (1999) and Yandell (2004) find no significant difference in

test results dependent upon the use of games; however, they find that students generally are more satisfied with the course if there is a game involved.

Fraas (1980) finds that the student's pre-course level of knowledge was a significant contributing factor in the effectiveness of the games. Students that had little prior knowledge received more benefit from the games than those students with higher starting knowledge levels. Tsigaris (2008) suggests there is a double dividend from experimental games. The instructor, assuming they are utility maximizers, should perhaps incorporate games in order to increase their course evaluations. In addition, the students may benefit from increased knowledge the real-world application of material provides. Tsigaris (2008) also states that the intensity of the simulation is an important element in the effectiveness of the classroom game. Cebula & Toma (2002) find empirical support for both of these notions.

While evidence on experimental games in economics courses is abundant, the same is not true in finance. Unfortunately, until recently the use of such games in finance courses has been much less examined, due in part to the slow acclimation of the discipline to computer-based simulations. In fact, Clinebell & Clinebell (1995) show finance courses were often slow to use computers in their instruction despite being available, yet Devasagayam & Hyat (2007) find evidence that supports the use of computer simulations as a pedagogical device in a cross-disciplinary study of finance and marketing courses. Foster et al. (2004) and Helliar et al. (2000) find more specific evidence that a market-share game can improve student learning in undergraduate finance courses.

Some examples of past literature in the area are only peripherally related to the finance classroom. For example, Breen & Boyd (1976) present an early programming guide for creating simulations that would be applicable in money and banking classes. Also, Bell's (1993) version of the uncomputerized SMG was primarily designed for investment analysis, as stated by the author. There is also very little evidence on the effectiveness of these experimental games in helping students clarify their opinions on disciplines as a whole, perhaps as a viable career option. An exception is Sherman, Sebora & Digman (2008) who find that the use of experimental methods generally increase the impact of the course on students choice of becoming an entrepreneur.

There are a few notable exceptions that are similar in nature to the current study. King & Jennings (2004) find that the inclusion of trading simulation increases student learning. Ascioglu & Kugle (2005) implement a surveying technique to examine the influence of simulations on student enjoyment and learning objectives. Lekvin (2005) examines whether there is a relationship between trading ability (i.e., performance) and academic performance (i.e., grade) and largely finds success in either is independent of the other.

Finally, Moffit, Stull & McKinney (2010) is most similar to the current study. Specifically, they examine pre-and post- simulation knowledge via testing, as well as pre- and post-surveys gathering data on the students and their opinions on the simulation. This latter is very similar to what we do in the current study. They find that students benefit from the

simulation, as grades on the post-exams are significantly higher than on the pre-exams, which suggests an increased understanding of fundamental financial knowledge. They find that approximately 60% of students in the study find the simulation a knowledge-increasing process, while over 80% find the simulation increases their interest in the subject. The Moffit, Stull & McKinney (2010) study does differ from this one in several ways. First, they examine the simulation independent of a classroom. Second, like previous studies, they do not examine the influence of simulation performance on the survey results, but rather just whether the participation influences the respondents' opinions. Third, the current study utilizes a larger sample over a longer period of time, which allows for examination of differing market conditions. Fourth, our simulation allows for trading of a wide range of securities, whereas the Moffit, Stuff & McKinney (2010) simulation allows only equity trading.

We believe the addition of investment performance is a valuable extension to the literature. For example, researchers in behavioral finance have widely documented the "snakebite effect," which suggests that investors who experience a painful loss (or otherwise unsuccessful investment) are less likely to invest going forward (Nofsinger, 2011). Thus, some professors may likely have avoided the use of such simulations, or at least not had extensive classroom discussion on the results, for fear of dissuading students with poor performance from pursuing a career. Thus, we believe the current study complements and extends the existing literature by examining this particular possibility.

DATA

Data are collected via a survey method at the beginning and end of ten courses in upper level Investment Analysis (over the course of three years) at two four-year Universities. Butler University is a private University located in Indianapolis, IN, while the College of Charleston is a public University located in Charleston, SC. The courses are very similar in nature, as both instructors use the same text, employ approximately the same teaching style, and compute grades based upon very similar components and weighting. For instance, both instructors use the simulation as a determinant of the student's grade in much the same way. Specifically, students are graded based upon completion of assignments and explanation of their trading activity, and not on their performance. Both instructors provide a very modest amount of extra credit for performance superior to that of the market (the S&P 500 over the equivalent time period). Thus, the motivation for students to participate in the simulation should be roughly equivalent between the two instructors. On the beginning survey, students were asked a sampling of questions that served as controls for the study, including class level and major. Also, and more importantly, students were asked to subjectively rate themselves (on a scale of one to ten) in four categories:

1. Interest in pursuing a career in the field of investments.
2. Likelihood of managing their own investments after graduation.

3. Level of experience with investments such as stocks, mutual funds, and options.
4. Level of knowledge with respect to investments such as stocks, mutual funds, and options.

The surveys were administered, then collected by the professors and sealed until the end of each respective course to retain anonymity. At that time, the students were again asked to rate themselves in each of the four categories above. The study then focuses on the differing levels of ratings provided by the students on the two surveys. At the end of the respective course, the instructor compiles all data from the surveys. In addition, the student's return on the simulation contest is computed. Both instructors use StockTrak, a widely-used online investment simulation company. Finally, the grade, rounded to the nearest whole percent is recorded for each student respondent. Results of summary statistics are presented in Tables 1 and 2.

Table 1 first presents averages for the total sample. The majority of students taking the courses were male, which is typical of most finance courses. In addition, approximately two-thirds of students completing the survey were seniors at the time of course completion, while a slightly higher percentage was Finance majors. The College of Charleston did not have a Finance major during the sample period. Instead, students can choose to have a Finance concentration with a Business Administration major. While admittedly not the same, the requirements for the concentration are relatively consistent with the requirements for the major at Butler University. Thus, for the sake of this study, we assume they are equivalent.

Approximately 16% of the respondents were graduate (MBA) students, while less than 7% took the class during summer session. The average StockTrak Return was just over 9%, covering approximately 12 weeks during each semester. This represents an average of about 2 percent in excess of the S&P 500 over the equivalent period of time.

The average level of beginning ratings in the Interest and Manage categories are relatively high, at 7.6 and 8.6, respectively. This is as expected given they have enrolled in an upper level investments course, indicating a preexisting interest in the topic. Also predictably, the average beginning levels of Experience and Knowledge are relatively low at 4.1 and 5.0, respectively. The rating in two of the four categories increased, with Interest and Manage slightly decreasing. Since this value can be predictably biased by very low or high starting values, we also calculate the percentage change for each student in each category. The average of these percentage changes implies the average student experiences a substantial increase in perceived knowledge and experience, with a smaller increase in interest. The lone decrease is in the likelihood they will manage their own money in the future. This may be a result of students gaining a more complete knowledge of the time and energy involved in such an endeavor.

The remainder of Table 1 examines the sample, segmented by general return levels. For example, we segment the sample at the median return of each course. Then we combine all above and below median returns to create the subsamples. We find that students that experienced above median returns also had significantly higher ending levels of interest and likelihood of

future management. The only other significant variable is *Male*, indicating males are more likely to generate an above median return. Most importantly, it does not appear as though the percentage change in any of the four knowledge or interest levels is related to their performance in the simulation contest.

Table 1: Summary Statistics, Segmented by Return

	Total	*Segment by Median Return*			*Segment by Top Quartile Return*		
		Above	Below	*p*-value	Above	Below	*p*-value
N	194	97	97		47	147	
IntB	7.6134	7.7959	7.4271	.2132	8.2553	7.4082	.0111
ManB	8.5619	8.6633	8.4583	.3585	9.0426	8.4082	.0082
ExpB	4.1392	4.3265	3.9479	.2319	4.3617	4.0680	.4395
KnowB	4.9639	5.0102	4.9167	.7356	5.2766	4.8639	.1960
IntE	7.4330	7.8980	6.9583	.0049	8.4894	7.0952	.0000
ManE	8.1856	8.4184	7.9479	.0745	8.9574	7.9388	.0001
ExpE	5.9072	6.0714	5.7396	.2260	6.3191	5.7755	.0809
KnowE	6.9175	7.0000	6.8333	.4228	7.1915	6.8299	.1178
IntCh	.0203	.0375	.0028	.3391	.0603	.0076	.2106
ManCh	-.0244	-.0040	-.0453	.2335	.0036	-.0334	.3052
ExpCh	.9708	.9238	1.0187	.6464	1.0006	.9613	.9470
KnowCh	.7126	.7227	.7024	.8974	.6626	.7286	.5581
Male	.7320	.8367	.6250	.0008	.9149	.6735	.0000
MBA	.1598	.1735	.1458	.6014	.1702	.1565	.8279
Senior	.6685	.6702	.6667	.9595	.6591	.6714	.8816
FinMajor	.6856	.7143	.6563	.3869	.7872	.6531	.0659
Summer	.0670	.0714	.0625	.8047	.0638	.0680	.9199
Grade	.8408	.8493	.8320	.1252	.8511	.8376	.3014
STRet	.0928	.2013	-.0179	.0000	.3136	.0222	.0000
ExRet	.0195	.1257	-.0889	.0000	.2390	-.0507	.0000

IntB (*IntE*) is the level of interest in pursuing a career in investments (on a scale of 1 to 10) based upon responses from a survey administered at the beginning (end) of the respective course. *ManB* (*ManE*) is the likelihood of managing their investment portfolio (on a scale of 1 to 10) based upon responses from a survey administered at the beginning (end) of the respective course. *ExpB* (*ExpE*) is the level of experience with investments such as stocks, mutual funds, and options based upon a survey administered at the beginning (end) of the respective course. *KnowA* (*KnowE*) is the level of knowledge with respect to investments such as stocks, mutual funds, and options (on a scale of 1 to 10) based upon a survey administered at the beginning (end) of the respective course. *IntCh*, *ManCh*, *ExpCh*, and *KnowCh* is the percentage change in the beginning and end values of each respective survey variable. *Male* is a dummy variable equal to one if the student was male, zero otherwise. *MBA* is dummy variable equal to one if the student was enrolled as an MBA student, zero otherwise. *Senior* is a dummy variable equal to 1 if the student was enrolled in their senior year, zero otherwise. *FinMajor* is a dummy variable equal to 1 if the student is a finance major, zero otherwise. *Summer* is a dummy variable equal to 1 if the course was a summer course, zero otherwise. *STRet* is the return on the simulated Stocktrak account over the investment period. *ExRet* is the excess return on the simulated Stocktrak account over the investment period, calculated as *STRet* minus the return on the S&P 500 over the same time period. *p*-values are calculated assuming unequal variances and test the differences between the Above and Below columns.

To more closely examine the issue, we also segment the sample by isolating those individuals who generated the returns in the highest quartile for each section. These are the

students one would expect to have the most positive feedback from the process. However, we again find no significant difference in the changes in any of the four categories. We do find that students with higher initial levels of interest, experience, and likelihood of managing their money to be more likely to generate the highest returns, possibly because they spend the most time actually trading in the simulation. Male students and those who have chosen Finance as their major are also more likely to generate the highest returns relative to their peers. In unreported results, the bottom quartile of returns was also segmented from the sample. It could be hypothesized that those with the lowest returns experienced the most dramatic change in the survey response categories, particularly if the "snakebite" effect is present. However, we find no significant differences in any of the variables, again indicated no relationship between simulation performance and knowledge or interest levels.

Table 2: Summary Statistics, Segmented by Student Characteristics

	Male			MBA			Senior			FinMajor			Grade		
	Yes	No	*p*	Yes	No	*p*	Yes	No	*p*	Yes	No	*p*	High	Low	*p*
N	142	52		31	163		123	61		125	59		94	90	
IntB	7.75	7.25	.14	7.16	7.70	.25	7.53	7.80	.38	8.05	6.71	.00	7.82	7.41	.17
ManB	8.68	8.21	.06	8.48	8.58	.80	8.59	8.48	.67	8.67	8.29	.12	8.74	8.34	.08
ExpB	4.39	3.44	.01	4.84	4.01	.12	4.23	3.97	.49	4.37	3.66	.03	4.19	4.09	.76
KnowB	5.16	4.42	.02	5.42	4.88	.24	4.98	5.02	.90	5.22	4.51	.02	5.05	4.92	.65
IntA	7.75	6.56	.00	7.58	7.40	.66	7.20	7.70	.17	7.78	6.49	.00	7.79	6.93	.01
ManA	8.42	7.54	.01	8.52	8.12	.23	7.95	8.52	.03	8.50	7.39	.00	8.48	7.79	.01
ExpA	6.13	5.29	.01	6.35	5.82	.10	5.78	6.11	.24	8.09	5.47	.02	6.21	5.56	.02
KnowA	7.08	6.46	.02	7.55	6.80	.00	6.76	7.23	.03	7.11	6.49	.01	7.15	6.67	.02
IntCh	.05	-.06	.08	.16	-.01	.09	.00	.01	.74	.00	.00	.92	.01	-.01	.80
ManCh	-.01	-.07	.14	.06	-.04	.12	-.06	.05	.01	.01	-.10	.01	-.01	-.05	.27
ExpCh	.88	1.21	.21	.95	.98	.92	.82	1.30	.05	.90	1.15	.33	1.15	.80	.11
KnowCh	.67	0.84	.41	.95	.67	.39	.61	.92	.14	.61	.92	.15	.84	.58	.14

Male, *MBA*, *Senior*, and *FinMajor* are dummy variables and are segmented by that basis. *Grade* is segmented by the median value. Since grades are reported rounded to the nearest whole percentage, there are several grades at the median, which are excluded from this analysis. *p*-values are calculated assuming unequal variances and test the differences between the Yes and No columns.

Table 2 examines the sample segmented by student characteristics. Males have higher levels of all four categories of ratings in both the beginning and end of the semester. However, the only category where the percentage change in survey answers is significantly larger is interest in the profession. Thus, it largely appears the differences based upon gender is due to the inherent nature of the students and has little to do with the experiences of the classroom. Seniors experience a larger increase in the likelihood of personal money management and experience than underclassmen or graduate students. Finance majors have higher levels of ratings in each category, but much like gender, the differences seem to predate the class experience. The only exception to this is that Finance majors see a higher increase in the likelihood of managing their own money, while non-Finance majors experience a decrease. The difference is significant and is

logical given their chosen majors. Finally, the results are interesting when segmenting by median grade. For students that earn an above median grade, their ending rating is larger in all four categories than those earning below median grades. However, there are no significant differences in the change variables.

RESULTS

To more completely examine the significant contributors to the four surveying categories, we consider two variations of the following basic model:

$$Dep = \alpha + \beta_1 STRet + \beta_2 SPDev + \beta_3 SPRet + \beta_4 Male + \beta_5 MBA + \beta_6 Senior + \beta_7 FinMajor + \beta_8 Summer + \beta_9 Grade + \beta_{10} Ins1 + \beta_{11} ClassSz + \varepsilon$$

where the dependent variable represents rating values for each of the four categories of survey questions. The first variation of the model uses traditional ordinary least squares (OLS) regression analysis with the percentage changes (i.e., *IntCh*, *ManCh*, *ExpCh*, and *KnowCh*) in each rating variable as the dependent variables. *STRet* is each student's holding period return over the StockTrak period. *SPDev* and *SPRet* are the standard deviation and return of the S&P 500 over the equivalent time period, respectively.

Male, *MBA*, *Senior*, *FinMajor*, and *Summer* are all dummy variables designed to control for student or course specific characteristics that could influence changes in the dependent variables. *Grade* is the student's final grade, rounded to the nearest whole percentage. *Ins1* is a dummy variable used to identify one of the two instructors teaching the courses in which the survey were administered and is used to control for any instructor specific impact on the results. *ClassSz* is the final control variable, measured as the number of students completing the course in which the survey was administered.

Table 3 presents results for the model above. The only significant influence on the change in interest in the profession is for MBA students, suggesting perhaps those farther along in their education career better hone in on their career aspirations. Finance majors are more likely to experience a significant increase in the likelihood of managing their investments in the future, which is another unsurprising result. On the other hand, Finance majors seem to experience a significantly lower amount of knowledge increase. This is also logical, as these students are likely to have the most pre-course knowledge and, in turn, have less of a "blank slate" than non-Finance majors who may have only had one prior Finance class.

The dependent variable that results in the most significant relations is the change in experience. Interestingly, higher levels of market returns result in lower levels of experience change, suggesting that the best learning may occur in down markets, particularly when the money lost was not your own. Males and seniors obtain lower levels of increase in experience than their counterparts. Finally, students that obtain higher grades have a larger perceived

increase in experience, which is as would be expected. Perhaps most importantly from Table 3, we find that the student's return on the simulation contest is unrelated to their change in any of the four rating categories. This suggests that students' perception of financial material and/or the Finance profession is not altered by their performance on the simulated investment environment. While this does not mean that knowledge does not increase as a result of the simulation, it is an interesting extension of the discussion of benefits from such classroom activity.

Table 3: Multivariate Regressions, OLS

	IntCh		*ManCh*		*ExpCh*		*KnowCh*	
	Coef	*p*-value	Coef	*p*-value	Coef	*p*-value	Coef	*p*-value
Intercept	-.3109	.5727	-.3521	.2837	.2353	.9028	-.3184	.8388
STRet	.0005	.7555	.0011	.2124	.0036	.4976	-.0001	.9807
SPDev	-.0104	.1122	.0011	.7817	-.0163	.4762	.0041	.8251
SPRet	-.0158	.2090	.0030	.6887	-.0797	.0701	.0045	.9450
Male	.0675	.3303	.0237	.5655	-.5078	.0372	-.2322	.2391
MBA	.1967	.0701	.0157	.8069	-.4288	.2573	.0684	.8239
Senior	.0597	.4625	-.0566	.2418	-.5858	.0400	-.2390	.3004
FinMajor	.0098	.8888	.0790	.0595	-.3217	.1898	-.5329	.0080
Summer	.1887	.1821	.0463	.5815	-.3710	.4522	-.2390	.3004
Grade	.0031	.4529	.0019	.4367	.0279	.0568	.0199	.0936
Ins1	.1185	.1556	.0424	.3931	.5029	.0851	.2112	.3721
ClassSz	.0086	.3991	.0021	.7297	.0015	.9665	-.0075	.7951
N	194		194		194		194	
Adj. R-Sq.	.0229		.0310		.0896		.0320	

Ins1 is a dummy variable equal to 1 if the courses is taught by one of the two instructors in which the survey was administered, zero otherwise. *ClassSz* is the number of students in the respective class in which the survey is administered. All other variables are as previously defined.

In an attempt to more precisely examine the situation, Table 4 presents logistic regression results designed to capture variables that significantly relate to a positive change in any of the four response variables. Thus, whereas Table 3 examines the dependent variables as continuous, Table 4 collapses them into dummy variables where the respective variable equals 1 if the ending value for the response variable is larger than the beginning value, 0 otherwise. There is a marginally significant negative relation between the volatility of the market and an increase in interest, which is logical if one assumes individuals relate stable conditions to positive interest. Students with higher grades are more likely to have increases in interest and perception of knowledge attainment.

Table 4: Multivariate Regressions: Logistic Models								
	PosIntCh		*PosManCh*		*PosExpCh*		*PosKnowCh*	
	Coef.	*p*-value	Coef.	*p*-value	Coef.	*p*-value	Coef.	*p*-value
Intercept	-5.7057	.0771	-2.7967	.4038	2.9451	.3277	-2.0429	.5479
STRet	.0017	.8356	.0075	.3584	.0197	.0768	-.0053	.6147
SPDev	-.0617	.0989	-.0067	.8663	-.0358	.3305	.0064	.8830
SPRet	-.0637	.3506	-.0350	.6453	-.1418	.0416	-.0395	.6270
Male	-.3659	.3484	.0615	.8872	-.1384	.7185	-.7200	.1497
MBA	.1305	.8228	-.8662	.1775	-.8150	.1951	-.2751	.7068
Senior	-.1448	.7539	-.5477	.2299	-.6252	.2148	-.1975	.7167
FinMajor	-.1671	.6691	.2756	.5209	.0533	.8937	-.8542	.0895
Summer	.9078	.2325	.8114	.3033	-.1820	.8105	-.0746	.9393
Grade	.0507	.0317	.0272	.2821	.0000	.9994	.0678	.0141
Ins1	1.1940	.0210	.2348	.6421	.4792	.2899	.4466	.3999
ClassSz	.0948	.1113	-.0171	.7859	-.0033	.9521	-.0381	.5437
N	194		194		194		194	
% Conc	69.0		64.0		67.5		68.6	

PosIntCh, *PosManCh*, *PosExpCh*, or *PosKnowCh* are dummy variables equal to 1 if the respective change variable was positive, indicating an increased level in the response variable from class beginning to end. All other variables are as previously defined.

Finance majors are less likely to experience an increase in knowledge, which is again consistent with the notion that they have a higher starting level of knowledge. Students with larger StockTrak returns are more likely to have increases in experience levels, although the level of significance is relatively small. Consistent with the results above, the only surprising result is a negative relation between market returns and experience changes. One would expect that students would feel they had a large increase in experience during positive market environments.

CONCLUSION

Using a surveying technique, we examine student opinions in upper level and graduate level investment analysis courses. The study specifically focuses on the interaction between the students' returns on an investment simulation and their responses to four variables: (1) perceived knowledge level, (2) interest level in the discipline, (3) likelihood of managing money in the future, and (4) perceived experience in the discipline. We find the levels of percentage change in each of the four are unrelated to StockTrak (i.e., simulation) performance.

As a whole, our results suggest that any concern over the snakebite effect is unfounded, as there is no link between performance and perceived interest or knowledge level. If anything, we find the opposite as a lower market return (which would generally correspond to lower

absolute simulation performance) actually is associated with an increase in perceived experience level. Thus, we suggest that simulations continue to be used and that instructors not hesitate to make full use of both rankings and performance in classroom discussion.

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