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Hunting for Financial Literacy

By

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Submitted in partial fulfillment
of the requirements for the degree of
Master of Arts Economics, Hunter College
The City University of New York

May 19th 2016

Thesis Sponsor:

05/19/2016

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1. Abstract

This paper summarizes and explores the results of a survey conducted at Hunter College of the City University of New York that surveys 211 students. It examines the relationships between the students' individual characteristics, previous personal finance education and the levels of financial literacy of the Hunter College population. Survey responses are analyzed using multiple regression analysis, logistic regression analysis, and subgroup analysis. The results indicate that students who have taken a Personal Finance class in High school, students who have taken ECO 100, 200 and MATH 102 at Hunter College are more financially literate than their counterparts that have not taken any of these classes. Students with higher income expectations and student loans as well as Masters and Junior/Senior /Bachelors students have higher levels of knowledge. The majority of the students supports that Hunter should offer mandatory or elective classes in Personal Finance.

2. Introduction

Several years after one of the most severe financial crises in United States history, numerous surveys indicate that Americans of all ages exhibit suboptimal financial practices. According to an international study released by OECD in 2013 (PISA 2012), testing the financial literacy skills of 15-year-old students, the U.S performs consistently slightly under the average of the 13 participating countries. The results are not encouraging for adults either. In 2014, the American College of Financial Services conducted the Retirement Income Literacy Survey (RICP 2014), that revealed that the vast majority of the respondents, almost 80%, scored less than 60 out of 100 when asked questions about retirement. Consequently, only 20% of the participating adults received a passing grade or greater. Moreover, even though older adults aged 55 plus scored a mean 3.3 correct answers out of 5, survey seniors did not seem to have kept abreast of developments and thus need updates on Personal Finance topics. Policymakers publicly emphasize the importance of personal finance education in school as well as later in life (Bernanke speech, 2012).

“... Financial education supports not only individual well-being but also the economic health of our nation. As the recent financial crisis illustrates, consumers who can make informed decisions about financial products and services not only serve their best interests but, collectively, they also help promote broader economic stability. Smart financial planning--such as budgeting, saving for emergencies, and preparing for retirement--can help households enjoy better lives while weathering financial shocks. Financial education can play a fundamental role in getting to these outcomes.” ...

... “While it is important to begin teaching financial skills to children and teenagers, achieving and maintaining financial know-how is a lifelong undertaking. The types of financial decisions that people have to make--from paying for school to buying a home to planning for retirement--vary through the course of their lives, and thus we need to ensure that access to financial education is readily available at all stages of life. Moreover, relevant, accurate, and reliable financial information must be readily available to consumers at the time they are making their decisions. ...”

The continuation of personal finance education in college is of great importance since the majority of college students lacks the ability to make informed decisions about their finances and future investments (Mandell, 1997-2009, Jones 2005, Peng 2008).

The contradictory and worrisome nature of the aforementioned results calls for further analysis and action. Are personal finance mandates in high school sufficient? How financially literate are college students who have taken personal finance classes? How prepared are they for what lies ahead for a lifetime of financial well-being?

This study will serve four purposes. First, it will assemble a summary of the financial literacy and financial choices of Hunter College students. Second, it will examine the factors contributing to some students being more financially literate than others and thus, identify patterns and relationships between personal finance knowledge and various socio-demographic characteristics. Additionally, it will determine the relationship between Financial Literacy and Financial behavior practices. Lastly, it will discuss implications of the findings, possible explanations and will suggest remedies.

3. Literature Review

In the 1970s, the United States Government deregulated the U.S Financial Services industry which permitted the proliferation of pioneering financial products and the controversy that followed them. Even before then, however, researchers have been examining financial knowledge and practices and their implications on society. The evolution of research in the field and the main conclusions of influential research studies are presented below in chronological order.

Preliminary studies on high school students started as early as the late 1960's. Bakken (1967) unveils the lack of knowledge of personal finance fundamentals while Langrehr (1979) finds that high school students who take consumer education or economics have higher consumer economic competence and the tendency to involve generally in business. At the same time, the National Assessment for Educational Progress (NAEP, 1979) evaluates the 17-year-old students' consumer education in 8 topics as inadequate to "operate and think in the marketplace". Almost a decade later, Danes and Hira (1987) survey 323 students at Iowa State University. Participants answer questions on several topics on financial management knowledge such as loans, credit cards, insurance, record keeping and general financial management. The results paint a grim picture of the participants' overall level of knowledge in money management. According to Danes and Hira, male students are more knowledgeable in insurance and loan related topics than females, while married students seem to be more knowledgeable overall in personal finance matters.

In the years that follow, many private and nonprofit organizations conduct studies on adult professionals, to evaluate their good command on investments and personal finance. KPMG (1995) surveys 1,183 employees on their saving habits and retirement planning. The results indicate that employees do not maximize their benefits potential and do not save enough for a secure retirement. A PSRA (1996) survey amongst 1,001 investors has an astonishing result, finding only 18% of the participants financially literate; while an Oppenheimer Funds/Girls Inc. (1997) survey, reveals that 56% of the adult women participating in this study are not knowledgeable about investing.

Meanwhile, Chen and Volpe (1998) study 924 college students and find that only 53% of the participants answer questions on personal finance correctly. Murray (2000) emphasizes the excessive and irresponsible use of credit cards by college students and Reed (2008) sheds light on the

ballooning student loans and the inadequate financial knowledge of the students who use financial aid programs.

The period between 1997 and 2008 the Jump\$tart Coalition for Personal Financial Literacy runs six nationwide surveys targeting senior high school and college students. Mandell, (1997-2009) shows in this study that the levels of financial literacy amongst college students are higher than these of high school students and in fact increase with every additional year of college. However, the findings do not establish a direct positive impact of a financial literacy course on economic behavior; these findings are not consistent with the conclusions of Bernheim, Garret, and Maki (2001) who discover that mandates significantly increase exposure to financial education and elevate the rates at which individuals save and accumulate wealth.

Volpe, Chen and Liu (2006) conclude that working age adults fail to showcase adequate knowledge levels in financial matters and Lusardi and Mitchell (2006) using the 2004 HRS, have similar conclusions when surveying adults over the age of 50; they estimate that adults in the oldest age groups, those with limited or no education and females profoundly lack knowledge in economic matters. At the same time Lusardi and Mitchel (2007), on research examining the effect of financial education on retirement, conclude that retirement seminars have a positive impact on wealth accumulation primarily on low to moderate-income (LMI) individuals and those lacking higher education.

Meanwhile, according to a Sallie Mae (2009) national study of undergraduate college students and use of credit cards, credit card usage and credit card debt are increasing by every additional year in college across all categories: credit card ownership, average balance, median balance, minimal (or any) and high balance. The number of students who used their credit cards for direct school expenses rose from 85% in 2004 to 92% in 2009, while the estimated charges were calculated to

\$2200 nearly double the amount spent in 2004. What is more, Cole, Paulson and Shastry (2012) proposed that high school mandates have no significant or measurable effect on practical aspects of financial behavior and thus, asset accumulation. Meier and Sprenger (2012) introduced time preferences as a significant deciding factor of whether an individual will choose to be involved and learn more about personal finance. In fact, they report that “The less the individuals care about the future, the lower the probability that they select into acquiring information on a crucial aspect of personal finance.”

Recently, the Institute for College Access and Success (TICAS, 2015), reported that almost 7 out of 10 seniors (69%) who graduated in 2014 from public and nonprofit colleges had student loan debt. The average debt per student rose from \$18,550 in 2004 to \$28,950 in 2014, whereas the percentage of indebted students increased only from 65% to 69%.

4. Sample descriptive and Methodology

Sample

The survey took place at Hunter College of the City University of New York located at 695 Park Avenue, New York. I collected data from 233 matriculated adult students over a 10-day period in March 2016 by distributing pen and pencil surveys in Hunter College classrooms, libraries and public spaces such as restaurants, sitting areas, waiting areas, lobbies, entrance, etc. Choosing such areas, where there is a continuous flow of students i.e. third-floor sitting areas and cafeteria, allowed me to approximate a representative sample of the population. While surveying students in classrooms would be a less labor intensive task, it could potentially grant the sample as biased

since it would include large groups of students with the same level and type of education. For this reason, the areas mentioned above allowed me to approach students as randomly as possible.

Thereafter, participants were asked to answer 31 multiple choice questions, including six questions on their background, seven questions on financial knowledge and behavior that have been used in previous research (Chen, Haiyang and Volpe 1998, Lusardi and Mitchell 2006, Mandell 2009, Peng 2008) and several more on their level and type of education. The full survey questionnaire can be found in the Appendix.

In more detail the procedure was as follows: I approached potential participants in a public setting where I informed them about the purpose, the length and the benefits of the survey. If potential participants agreed to participate, they were handed a consent form. Once the student signed all the necessary forms, I would then give him/her a hard copy of the survey and a pen/pencil. As a result, 98 students a total 29.6% of the 331 students approached, chose not to participate. Overall, 233 students agreed to participate (70.4% response rate) and answer the questionnaires. However, two surveys were returned blank, and 17 were discarded due to insufficient answers to several questions. After accounting for missing data and errors, a total number of 211 fully answered questionnaires were used in the study.

Summary Statistics

Table 1 summarizes some the participants' characteristics; 80.1% of the students (169 participants) are between 18-24 years old, 11.85% (25 participants) are between the ages of 25-34 years old, 5.69% (4 participants) are 44-55 years old and only one participant was over 55. What is more, the sample is almost equally balanced between male and female participants with male students

being slightly higher at 50.71% (107 male participants) and female at 49.29% (104 female participants). The vast majority of the students 84.83%, when asked about their status in the United States, stated that they are U.S. Citizens; 29.38% of the sample is of Asian, 25.12% of Hispanic and 20.38% and 19.91% of Caucasian and African American heritage respectively.

As shown in Table 1, a surprising 38.86% (82 participants) have a Major or Minor in a relevant field (Economics, Math, Accounting, Finance, Business) while 66.36% of the students have 0 to 2 years of work experience. An eye-opening 71.09% of the students have a GPA of 3.1 or higher, 20.85% have a GPA between 2.6 and 3.00 and 8.02% have a GPA below 2.5. Only 5.69% of the sample are high school graduates, 15.17% have an Associate's degree, 35.07% are Freshman-Sophomore, 31.75% are Junior-Senior, 10.90% are Master's students and 1.42% Doctorate students. A cumulative 67.77% of the participants lives in a household with a total household income lower than \$99,999, 15.64% over \$100,000 and under \$199,999 and only 4.27% lives in a household with a combined household income over \$200,000. Lastly, only 34.6% report that at least one of their parents has a 4-year degree while a cumulative 48.34% report that at least one of their parents has a high school diploma or a 2-year degree and 8.53% that none of their parents has finished high school.

Following, Table 2 presents more on the financial profile and characteristics of the sample. A large part of the sample, 143 students (67.77%) does not have a student loan, while a little under a third 28.91%, already has or is in progress of getting a student loan. Credit cards and credit card debt are more popular with 33.65% of the students having one credit card, 26.07% two or three cards and 2.84% more than three cards. The majority of the sample (62.56%) reports that they do not have any type of investments neither personal nor joint accounts with parents/siblings/spouse and

that their parents are the most influential figures in Personal Finance matters (48,34%). Only 35.07% report to have taken a Personal Finance class in high school and a similar 33.18% to have taken Economics ECO 100, ECO 200 or MATH 102 offered by Hunter College.

Table 3 synthesizes the success rate in the five Financial Literacy questions results and the conditional results on answering the previous questions correctly. Provisional results are significantly lower than the ones presented by Lussardi, Mitchell and Curto (2010) who used the same inflation, risk diversification and interest rate questions included in the Wave 11 NLSY. It also presents the findings on the behavioral questions results on a scale of 1-5, where 1= Always and 5= Never and the answers on the question regarding the stress caused to the participants by their finances.

More importantly, Table 3 presents the summary of the answers to the question:” If Hunter College was offering guidance in Personal Finance in what form would you prefer it to be?”. This is a question that has not been asked in previous research and/or Hunter College students specifically. The findings indicate that 27.96% of Hunter College students think that Personal Finance classes should be offered as an elective class on campus and 32.2% as mandatory classes while seminars and an office of Personal Finance score 20.85% and 12.80% respectively. Interestingly enough, only 6.16% of the students asked has no interest in the subject and would do not like Hunter to change its current curriculum and policy.

5. Empirical Analysis

5.1 Multiple Regression Analysis

I used multiple regression analysis to estimate the effect of changing one variable X_{1i} on total financial literacy and behavior score Y_i , given that the other regressors X_{2i} , X_{3i} , X_{4i} and so forth remain constant. Using the answers on the Personal Finance questions from each questionnaire, I calculated a total Financial Literacy Score (TTLFLFBSCORE100) in a 0-100 scale. In that way a student, who has answered all five Personal Finance questions (FLQSCORE) correctly gets a multiple of 18 for every correct question. Analytically, the Sum of the score will be: $18*(1+1+1+1+1) = 18*5 = 90$ plus a perfect financial behavior score equal to $(5+5) = 10$, summing up to 100. The intuition behind this calculation was that I needed to utilize a continuous variable with a greater range than just the Sum of correct answers (7) that would also combine both the scores for Financial Literacy and behavior. Moreover, that calculation is emphasizing the results of the FLQSCORE without excluding the results of the FB_SCORE for the following reason: the total FLQSCORE is a number assigned by me in the programming stage, 0 for a wrong and 1 for a correct answer with a maximum of 5 for 5 correct answers. However, the FB_SCORE is a number that the students believe that best represents their behavior (always=5, most of the time=4, about half the time=3, sometimes=2, never=1 for both the Budget and Income and Expenses questions) and consequently impossible to measure accurately. Variables such as EDUCATION or PAR_EDU are coded in ascending order; for example, a high school graduate's EDUCATION variable will be coded as 1, 2 if the student holds an Associate's degree and so forth. For PAR_EDU and parents' education level I coded the variable accordingly; 1 for the students whose parents have not finished high school, 2 for parents who have a high school diploma, 3 for parents who attended college but have no degree etc. The choice not to use dummy variables for

educational categories was deliberate since such coding could potentially result in loss of information. Below, is the complete list of variables used in all the regressions:

<i>FLQSCORE</i>	=	The total score in the Financial Literacy questions (1- 5)
<i>TOTALFLFBSCORE</i>	=	The SUM of the scores in the Financial literacy and behavior questions (0-100)
<i>FB_SCORE</i>	=	The total score in the Financial behavior questions (1-10)
<i>AGE</i>	=	The age group that best describes the participant's age
<i>GENDER</i>	=	The student's gender
<i>EDUCATION</i>	=	The highest level of education that the participant has completed
<i>REL_EDU</i>	=	Whether the participant has a Major or Minor in Economics, Math, Accounting or Business
<i>PAR_EDU</i>	=	The highest level of education that at least one of the participant's parents have completed
<i>PAR_REL_EDU</i>	=	Whether the student's parents have education in a Relative field
<i>TTHI</i>	=	The total household income of the participant
<i>MAR_STATUS</i>	=	The participant's marital status
<i>CC_DEBT</i>	=	The participant's amount of credit card debt
<i>LNAMNT</i>	=	The participant's debt in student loans
<i>SMOKE</i>	=	Whether the participant is a smoker or not
<i>GPA</i>	=	The participant's GPA
<i>WORK_EXP</i>	=	The participant's work experience
<i>INC_EXPECT</i>	=	The participant's income expectations
<i>EFFECT</i>	=	The effect that debt and finances have on the participant's life (school and/or work performance)
<i>PF_CLASS</i>	=	Whether the participant has taken a Personal Finance Class in High school
<i>ECO_MATH</i>	=	Whether the participant has taken ECO 100/200 or MATH 102 at Hunter College
<i>INVEST</i>	=	Whether the participant has taken is an investor
<i>PF_HELP</i>	=	Who has mostly helped the participant so far with his/her financial questions

My dependent variables Y_{ji} are given by the linear function:

$$Y_{ji} = \beta_{j0} + \beta_{j1}x_{j1} + \beta_{j2}x_{j2} + \dots + \beta_{jn}x_{jn} + u_i, \quad i=1,2,3, \dots, n \text{ and } j=1, 2, 3$$

Under the assumptions that there is a linear relationship between the dependent and independent variables and that this relationship is additive. Hence, the function above will take the following form for FLQSCORE:

$$\begin{aligned}
 FLQSCORE = & \beta_0 + \beta_1 (AGE) + \beta_2 (GENDER) + \beta_3 (RACE) + \beta_4 (EDUCATION) + \beta_5 (REL_EDU) + \beta_6 \\
 & (PAR_EDU) + \beta_7 (PAR_REL_EDU) + \beta_8 (TTHI) + \beta_9 (MAR_STATUS) + \beta_{10} (CC_DEBT) + \beta_{11} (LNAME) + \beta_{12} \\
 & (SMOKE) + \beta_{13} (GPA) + \beta_{14} (WORK_EXP) + \beta_{15} (INC_EXPECT) + \beta_{16} (EFFECT) + \beta_{17} (PF_CLASS) + \beta_{18} \\
 & (ECO_MATH) + u_{1i}
 \end{aligned}$$

And for TTLFLFBSCORE100:

$$\begin{aligned}
 TOTALFLFBSCORE100 = & \beta_0 + \beta_1 (AGE) + \beta_2 (GENDER) + \beta_3 (RACE) + \beta_4 (EDUCATION) + \beta_5 (REL_EDU) + \\
 & \beta_6 (PAR_EDU) + \beta_7 (PAR_REL_EDU) + \beta_8 (TTHI) + \beta_9 (MAR_STATUS) + \beta_{10} (CC_DEBT) + \beta_{11} (LNAME) + \\
 & \beta_{12} (SMOKE) + \beta_{13} (GPA) + \beta_{14} (WORK_EXP) + \beta_{15} (INC_EXPECT) + \beta_{16} (EFFECT) + \beta_{17} (PF_CLASS) + \\
 & + \beta_{18} (ECO_MATH) + u_{2i}
 \end{aligned}$$

In order to test the relationship between the independent variables above and Financial Behavior,

I additionally used as a third dependent variable Y_{3i} FB_SCORE where:

$$\begin{aligned}
 FB_SCORE = & \beta_0 + \beta_1 (AGE) + \beta_2 (GENDER) + \beta_3 (RACE) + \beta_4 (EDUCATION) + \beta_5 (INVEST) + \beta_6 (PF_HELP) \\
 & + \beta_7 (PAR_REL_EDU) + \beta_8 (TTHI) + \beta_9 (EFFECT) + \beta_{10} (CC_DEBT) + \beta_{11} (LNAME) + \beta_{12} (SMOKE) + \\
 & + \beta_{13} (GPA) + \beta_{14} (WORK_EXP) + \beta_{15} (INC_EXPECT) + \beta_{16} (PF_CLASS) + \beta_{17} (ECO_MATH) + u_{3i}
 \end{aligned}$$

For the dependent variable FB_SCORE I have used a smaller number of independent variables.

This is due to the fact that when using the same regressors as in TOTALFLFBSCORE100 and FLQSCORE the R^2 and Adjusted R^2 were significantly lower and almost all of the variables statistically insignificant. For this reason, I had to further analyze the nature of the variable FB_SCORE and try to find the regressors that would best explain and predict the regressant.

In order to examine the linearity of the models above, how well they predict the Y variables and the behavior of the residuals, I have used the following tests: a scatterplot of Y and \hat{Y} , a Kernel density estimate test, a histogram of the residuals, a standardized normal probability plot and Quantile normal plots of the residuals. Results for the three multiple linear regression models above can be found in Figures 1-14. All graphs indicate that the models seem to be predicting FLQSCORE, FB_SCORE and TOTALFLFBSCORE100 accurately.

5.2 Logistic Regression Models

I further examined and analyzed the differences between the various subgroups of students by using logistic regression analysis; logistic regression analysis is traditionally used in statistics for discrete data analysis since it works efficiently as a classifier. The model is based on classifying the participants in two subgroups using the median percentage of correct answers of the sample on the financial literacy questions (FLQSCORE) as well as the economic behavior questions score (FB_SCORE), summing up to one score (TOTALFLFBSCORE).

Students with a percentage of correct answers that is less or equal to the mean (8.208531) are classified as less knowledgeable or FINLITERATE=0. Likewise, students with a percentage of correct answers that is higher than the mean are considered somewhat knowledgeable or FINLITERATE=1.

According to the logistic regression model:

$$\log \frac{p(x)}{1-p(x)} = \beta_0 + x * \beta$$

If we solve for p:

$$p(x; b, w) = \frac{e^{\beta_0 + x * \beta}}{1 + e^{\beta_0 + x * \beta}} = \frac{1}{1 + e^{-(\beta_0 + x * \beta)}}$$

$$L(\beta_0, \beta) = \prod_{i=1}^n p(x_i)^{y_i} (1 - x_i)^{1-y_i}$$

In the logistic regression model I used as independent variables age, gender, race, education, relative education, total household income, work experience, parents' education, parents' relative education etc. The coefficients depict the effect of each subgroup relative to a reference group for each variable. For instance, the variable GENDER is coded as 1 if the participant is male and 0 if the participant is female, the variables ECO_MATH and PF_CLASS are coded as 1 if the participant has taken ECO 100, 200, MATH 102 or a Personal Finance class in high school and 0 otherwise, etc. As a result, the model will take the form:

$$\log \frac{p(x)}{1-p(x)} = \beta_0 + \beta_1 (AGE) + \beta_2 (GENDER) + \beta_3 (RACE) + \beta_4 (EDUCATION) + \beta_5 (REL_EDU) + \beta_6 (PAR_EDU) + \beta_7 (PAR_REL_EDU) + \beta_8 (TTHI) + \beta_9 (MAR_STATUS) + \beta_{10} (CC_DEBT) + \beta_{11} (LNAME) + \beta_{12} (SMOKE) + \beta_{13} (GPA) + \beta_{14} (WORK_EXP) + \beta_{15} (INC_EXPECT) + \beta_{16} (EFFECT) + \beta_{17} (PF_CLASS) + \beta_{18} (ECO_MATH) + \beta_{19} (INVEST) + e_i$$

Where p is the probability of a student being relatively more knowledgeable in Personal Finance (Financially Literate) and implementing that in everyday life.

6. Results and Analysis

6.1 Analysis of results by regression

Table 4 outlines the results of the three multiple linear regressions I run for this study. The first regression has as a dependent variable FLQSCORE (Financial Literacy score from the five questions on a 1-5 scale). Results indicate that students with one parent or none of their parents educated in a relative field are likely to score -1.24 and -1.30 points respectively, relative to the students who have both parents with education in a relative field, at a 1% significance level. Likewise, students who have taken a Personal Finance Class in high school and students who have taken ECO100/200 or MATH102 are likely to score 0.44 and 0.51 points higher than their counterparts who have never taken these classes, at a 1% significance level. For every \$5000 increase in student loan amount, students score 0.17 points more at a 5% significance level, and students with relative Education (Major, Minor in Business, Economics, Accounting, Math) score 0.38 points more than students without a relative Major/ Minor, at a 5% significance level. Freshman/Sophomore Students, Junior/ Senior, and Masters students score 1.01, 1.24 and 1.28 more points respectively, relative to students who have just graduated high school at a 1% significance level.

When examining the results for the total Financial literacy and Behavior Score in a 1-100 scale (equation (2)) age, gender, status, race, GPA, work experience, parents' education and credit card

debt are not statistically significant. This contradicts the findings of Chen and Volpe (2000) who find that age, gender, and work experience are significant predictors of financial literacy. All regressors that were statistically significant in equation (1) remain statistically significant with a few additions. Students with the highest income expectations (over \$80,000) score 21.18 points more, while students who expect to make between \$50,000 and \$79,999 score 17.37 points more than the students with the lowest after graduation income expectations (\$1- \$24,999), at a 1% significance level.

Participants who have taken a Personal Finance Class in high school or an ECO100/200 MATH 102 at Hunter College score 8.06 and 9.51 points more respectively compared to students who have never taken these classes. Students with a combined household income over \$200,000 score 17.64 more points than their counterparts who have the lowest total household income (\$1-\$49,999). As mentioned above, in equation (3) a different number of explanatory variables were used. The regressant FBSCORE tests financial behavior only in a scale of 1-10. Variables GPA, INVEST, EFFECT, ECOMATH, and TTHI were significant predictors of FBSCORE. Empirically, for every \$50,000 increase in total household income students score 0.33 more points, while for every half a point drop in their GPA students' scores 0.42 less, at a 1% significance level.

Students with individual or combined investments score 1.25 more points than students without any investments, at a 0.1% significance level. Taking the class ECO 100/200 or MATH 102 results in 0.58 more points at a 5% significance level and for every additional decrease in the stress level caused by debt, students score 0.42 points less at a 1% significance level. Lastly, it is important to mention that FLQSCORE is a significant predictor of FB_SCORE, as for every additional point earned in the financial literacy questions students score 0.52 more points in the financial behavior questions, at a 0.01% significance level.

Table 5 summarizes the results of the logistic regression for the dependent variable FINLITERATE. The estimated odds that a student is financially literate are 1.91 higher if a student is of African American heritage and 1.82 higher if the student is Caucasian, at a 1% significance level. More importantly, the probability that a participant is financially literate is 1.43 times higher if he/she has taken ECO100/200 or MATH 102 at a 1% significance level while it is 1.33 times higher if the participant has any type of investments, at a 5% significance level.

6.2 Potential issues

It is important at this point to discuss potential issues in the models' predicting ability. Endogeneity is said to occur in a multiple regression model if there is correlation between one of the predicting variables and the error term, where:

$$E(X_j u) \neq 0, \text{ for some } j = 1, \dots, k$$

In this particular study, endogeneity could be caused by simultaneity, a problem that occurs when the dependent and independent variables are jointly determined. Analytically, in the models used in this study one could claim that there is a loop of causality between certain variables such as credit card debt (CCDEBT) or loan amount (LNAMEOUNT) and the dependent variables financial behavior (FB_SCORE). In other words, it is difficult to determine whether a student who has a student loan or credit card debt exhibits a wiser financial behavior or whether the higher level of involvement in personal finance and its everyday aspects makes a student more confident to take up more debt in the form of student loans or credit cards. The models used in this paper are structured under the assumption that there is a one-way relationship between all of the independent

and dependent variables. These models are not perfect estimators of financial literacy and behavior, but they provide some suggestive evidence. However, the circuit of causality described above challenges the bias assumptions of multiple regression analysis. When presenting his views on endogeneity and simultaneity, Sørensen (2012) commented: “The problem with such endogeneity problems is that no amount of control variables will address them”.

For the purposes of understanding endogeneity, it is important to analyze and interpret the effect of variables LN_AMNT and CC_DEBT on financial behavior. It can plausibly be argued that accumulation of credit card debt is a characteristic of a rather compulsive behavior not necessarily correlated with total household income or Personal Finance Education. On the other hand, student loans are directly correlated with total household income while acquiring a student loan is a rather meticulous, time consuming and complex procedure, that enhances your knowledge in Banking and requires consistently good financial behavior.

Therefore, one could expect to find a positive correlation between LN_AMNT and FB_SCORE (upward bias) but, a negative correlation between CC_DEBT and FB_SCORE (downward bias). Ultimately, further research and possible use of instrumental variables (IV regression) for both LN_AMNT and CC_DEBT, could possibly address the simultaneity problems and determine whether loan amount and credit card debt are endogenous variables or not.

7. Summary and concluding results

The findings as presented in detail in Section 6 of this paper, confirm my expectations that taking a class in ECO100/200 or MATH 102 offered by Hunter College enhances students’ both financial

knowledge and behavior. Conversely, taking a class in Personal Finance in high school seems to boost students' financial knowledge but fails to enhance future money management practices in college. Education level, total household income, parents' education, personal finance class in high school, student loan amount and income expectations are statistically significant additional predictors of personal finance knowledge. On the other hand, in addition to ECO_MATH classes, only total household income, GPA, involvement in investing and financial stress seem to significantly correlate with financial behavior.

These findings confirm previous research by Mandel and Hanson (2009) and Bernheim, Garrett, Maki (2000) that continuous mandates in personal finance education can indeed better financial knowledge and practices. The fact that two-thirds of the sample stated that Personal finance classes should be mandatory or elective in Hunter College, while another third stated that they would prefer seminars or an office for Personal Finance reveals a gap in supply and demand in Personal Finance education and raises questions about the practicality of higher education on money management and everyday life.

In conclusion, this research can serve as an agent for future researchers, Hunter College, and colleges all over the U.S to start using a statistical perspective to modernize their curriculum and provide additional Personal Finance services that can reform the lives of millions of students and their families.

8. Appendix

8.1 The questionnaire

Q1. What is your age?

- 18 - 24
- 25 - 34
- 35 - 44
- 45 - 54
- Over 55

Q2. What is your ethnicity?

- Asian or Pacific Islander
- Black or African American
- Latino or Hispanic
- White or Caucasian
- Other

Q3. What is your gender?

- Male
- Female
- Other

Q4. Which best describes your current education level?

- Less than high school/ high school diploma
- Associates
- Bachelors / Freshman - Sophomore
- Bachelor/ Junior - Senior
- Masters
- Doctorate

Q5. What is your marital status?

- Single
- Married/ Domestic partnership
- Divorced/Separated
- Widowed

Q6. Are you a smoker?

- Definitely yes
- Probably yes
- Might or might not
- Probably not
- Definitely not

Q7. How many years of work experience do you have?

- None
- Less than 2 years
- 2 to 4 years
- More than 4 years

Q8. What is your GPA?

- 4.1 and above
- 3.6 - 4.0
- 3.1 - 3.5
- 2.6 - 3.0
- 2.1 - 2.5
- 2.0 or below

Q9. What is the highest level of education your father or mother completed, or the highest degree he or she has received?

- Less than high school
- High school or equivalent
- Some College but no degree

- 2year degree
- 4year degree
- Graduate / Doctorate

Q10. Do your parents work in Accounting, Finance, Economics, Business, Math or Engineering?

- Both my parents
- One of my parents
- None

Q11. Approximately, how much in TOTAL did your entire household earn last year?

- \$0 - \$49,000
- \$50,000 - \$99,000
- \$100000-\$199,999
- Over \$200,000
- Do not know
- Do not wish to answer

Q12. Are your studies in any of the following fields: Accounting, Finance, Economics, Business, Math or Engineering?

- Major
- Minor
- Some classes
- None

Q13 Describe your status in the U.S.

- U.S Citizen
- Green Card / Permanent Resident
- Foreign student
- Other
- Do not wish to answer

Q14. Do you have a student loan?

- Definitely yes
- Might or might not / In progress
- Definitely not
- Do not wish to answer

Q15. If you have (a) student loan(s), what is approximately the current amount?

- No student loan.
- \$1- \$4,999
- \$5,000 - \$9,999
- \$10,000 - \$19,999
- Over \$20,000
- Do not wish to answer

Q16. Do you have credit cards?

- None
- 1 credit card
- 2-3 credit cards
- More than 3 credit cards
- Do not wish to answer

Q17. If you have credit cards, what is approximately the current TOTAL amount of your credit card debt?

- Zero
- \$1 - \$499
- \$500 - \$999
- \$1,000 - \$1,999
- Over \$2,000
- Do not wish to answer

Q18. Are you currently investing in securities, mutual funds or any other types of investments?

- Personal account
- Joint account with parents and/or siblings
- Joint account with spouse/ partner
- Both personal and joint accounts
- No investments
- Do not wish to answer

Q19. Have you ever taken a Personal Finance class in high school?

- Yes
- No

Q20. Have you ever taken ECO 100, ECO 200, MATH 102 (Math for everyday life), or a Financial Literacy workshop at Hunter College?

- Yes
- Maybe
- No

Q21. Who or what most helped you with your personal finances until now?

- Parents
- School / College
- Self-taught / on-line research
- Friend / Spouse
- Professional
- Other

Q22. How much do you think that the total amount of debt you have is affecting your performance at school and/or work?

- A great deal
- A lot
- A moderate amount
- A little
- None at all

Q23. How much do you expect to make annually when you start working after graduation?

- Up to \$24,999
- \$25,000 - \$49,999
- \$50,000 - \$79,999
- Over \$80,000

Q24. Suppose you had \$100 in a Savings account and the interest rate was 2% per year. After 5 years how much do you think you would have in the account if you left the money to grow?

- More than \$102
- Exactly \$102
- Less than \$102
- Do not know

Q25. Imagine that the interest rate on your Savings account was 1% per year and the inflation was 2% per year. After one year, with the money in the account you would be able to buy:

- More than today
- Less than today
- Exactly the same as today
- Do not know

Q26. Do you think that the following statement is true or false? "Buying a single company stock usually provides a safer return than a stock mutual fund."

- True
- False
- Do not know

Q27. Do you keep a record of your Income and Expenses?

- Always
- Most of the time
- About half the time
- Sometimes
- Never

Q28. Do you try to create and keep a Budget?

- Always
- Most of the time
- About half the time
- Sometimes
- Never

Q29. You invested a \$1,000 in a stock two years ago. The stock's trading price declined 40% the first year and rose \$40% the next. As a result, you have:

- Lost money
- Made money
- Broken even
- Do not know

Q30. What will \$1,000 amount in 2 years if it is invested in 10% p.a. compound interest, interest being compounded annually?

- \$1,100
- \$1,200
- \$1,210
- Do not know

Q31. If Hunter College was offering guidance in Personal Finance in what form would you prefer it to be?

- Elective courses
- Mandatory courses
- Seminars / Workshops
- An Office of Personal Finance
- Do not want it / I have no interest in it

Thank you for your time!

For more information on financial literacy and college students you can visit:

The American Institute of CPA's 360 degrees of Financial Literacy at:

<http://www.360financialliteracy.org/Life-Stages/College-Students>

or

The Council for Economic Education at <http://councilforeconed.org/>

9. Tables

TABLE 1
Demographic characteristics of the sample

		<i>N = 211</i>	<i>Number of Participants</i>	<i>Percentage</i>
A. Demographic Characteristics				
1. Gender				
a)	Male		107	50.71%
b)	Female		104	49.29%
2. Race				
a)	Asian or Pacific Islander		62	29.38%
b)	Black or African American		42	19.91%
c)	Hispanic or Latino		53	25.12%
d)	White or Caucasian		43	20.38%
e)	Other		11	5.21%
3. Nationality				
a)	U.S Citizen or Permanent Resident		179	84.83%
b)	Foreign / Other		32	15.17%
B. Education				
1. Academic Disciplines				
a)	Relative Education		102	48.34%
b)	Non-relative Education		109	51.66%
2. Education level				
a)	High school or equivalent		12	5.69%
b)	Associates		32	15.17%
c)	Bachelors / Freshman – Sophomore		74	35.07%
d)	Bachelor/ Junior – Senior		68	32.23%
e)	Masters		24	11.37%
f)	Doctorate		1	1.42%
C. Experience				
1. Years of Age				
a)	18-24		169	80.09%
b)	25-34		25	11.85%
c)	35-44		12	5.69%
d)	44-55		4	1.90%
e)	Over 55		1	0.47%
2. Years of Work Experience				
a)	None		39	18.48%
b)	Less than 2 years		101	47.87%
c)	2 to 4 years		40	18.96%
d)	Over 4 years		31	14.69%
D. Income				
1. Total Household Income in \$				
a)	0-49,999		49	23.22%
b)	50,000-99,999		94	44.55%
c)	100,000-199,999		33	15.64%
d)	Over 200,000		9	4.27%
e)	Do not know/ Do not wish to answer		26	12.32%

TABLE 2
Financial Characteristics of the sample

		<i>N = 211</i>	<i>Number of Participants</i>	<i>Percentage</i>
A. Financial Profile				
1. Student Loan				
a)	Yes/ In progress		61	28.91%
b)	No		143	67.77%
c)	Do not wish to answer		7	3.32%
2. Loan Amount in \$				
a)	0		150	71.09%
b)	1-4,999		22	10.43%
c)	5,000-9,999		21	9.95%
d)	10,000-19,999		9	4.27%
e)	Over 20,000		2	0.95%
f)	Do not wish to answer		7	3.32%
3. Credit Cards				
a)	None		76	36.02%
b)	One		71	33.65%
c)	2-3 cards		55	26.07%
d)	Over 3 cards		6	2.84%
e)	Do not wish to answer		3	1.42%
4. Credit Card Debt in \$				
a)	Zero Debt		122	57.82%
b)	1-499		47	22.27%
c)	500-999		18	8.53%
b)	1,000-1,999		16	7.58%
c)	Over 2,000		2	0.95%
d)	Do not wish to answer		6	2.84%
5. Investments				
a)	Yes		79	37.44%
b)	No		132	62.56%
B. Financial Education				
1. Personal Finance class in High school				
a)	Yes		74	35.07%
b)	No		137	64.93%
2. ECO 100, 200 or MATH 102				
a)	Yes		70	33.18%
b)	No		141	66.82%
C. Real Life Financial Guidance				
1. Financial Advice/Help				
a)	Parents		102	48.34%
b)	School/College		20	9.48%
c)	Self-taught/Online Research		61	28.91%
d)	Friend/Spouse		13	6.16%
e)	Professional		14	6.64%
f)	Other		1	0.47%
D. Income Expectations in \$				
1. Expected Income after Graduation				
a)	Up to 24,999		12	5.69%
b)	25,000 to 49,999		78	36.97%
c)	50,000 to 79,999		78	36.97%
d)	Over 80,000		43	20.38%

TABLE 3
Hunter College Financial Literacy Results

Financial Literacy Survey Questions (FLQs)					
	<u><i>FLO1</i></u>	<u><i>FLO2</i></u>	<u><i>FLO3</i></u>	<u><i>FLO4</i></u>	<u><i>FLO5</i></u>
	Mean	Mean	Mean	Mean	Mean
<u>Correct Answer</u>					
a) Yes	76.30%	54.98%	51.18%	29.86%	21.33%
b) No	23.70%	45.02%	48.82%	70.14%	78.67%
Conditional on prior correct answer	76.30%	43.60%	30.80%	10.90%	5.21%
Financial Behavior					
	<u><i>Always</i></u>	<u><i>Most of the time</i></u>	<u><i>Half the time</i></u>	<u><i>Sometimes</i></u>	<u><i>Never</i></u>
<u>Income and Expenses</u> (Keep Records)	9.00%	14.69%	18.01%	36.97%	21.33%
<u>Budget</u> (Create and keep)	18.48%	35.55%	16.59%	21.80%	7.58%
Financial Stress					
	<u><i>A great deal</i></u>	<u><i>A lot</i></u>	<u><i>Moderate</i></u>	<u><i>Little</i></u>	<u><i>None</i></u>
Effect of Stress on School and/or Work	13.74%	15.17%	22.75%	20.75%	27.49%
Financial Guidance					
	<u><i>Elective class</i></u>	<u><i>Mandatory class</i></u>	<u><i>Seminars</i></u>	<u><i>PF Office</i></u>	<u><i>No interest</i></u>
What type of guidance should Hunter College Offer?	27.96%	32.23%	20.85%	12.80%	6.16%

TABLE 4
Multiple Regression Analysis

Independent variables	(1)	(2)	(3)
AGE			0.1776
AGE2	-0.1501	-2.7142	
AGE3	-0.4139	-7.2990	
AGE4	0.3652	5.8865	
AGE5	0.4888	12.0289	
GENDER	0.1159	2.2468	0.3452
MAR_STATUS	-0.1526	-3.0831	
PAR_EDU	-0.0020	-0.1792	-0.0727
CC_DEBT	-0.0010	-0.1250	-0.1064
LNAMNT	0.1653*	2.9952*	0.0277
RACE			0.673
BLACK	-0.1329	-2.1387	
HISPANIC	0.0109	0.2963	
OTHER	0.0453	0.0787	
WHITE	0.0216	0.8205	
EDUCATION			0.0127
EDU2	0.6347	10.3859	
EDU3	1.0153**	17.7876**	
EDU4	1.2442***	21.6853***	
EDU5	1.2821**	22.3103**	
EDU6	0.4744	8.4680	
SMOKE	-0.0575	-0.9873	-0.1950
EFFECT	-0.0241	-0.7754	-0.2959**
GPA			-0.4196**
GPA2	0.2527	0.0699	
GPA3	-0.0874	-2.1104	
GPA4	-0.3410	-7.7516	
GPA5	0.1524	1.2064	
GPA6	-0.5484	-12.1315	
WORK_EXP			0.0936
EXP2	0.0653	1.7145	
EXP3	-0.1418	-2.6799	
EXP4	0.1130	3.5746	
PAR_REL_EDU			-0.4220
NONE	-1.2971**	-24.1667**	
ONE	-1.2386**	-23.3756**	
TTHI			0.3287**
TTHI2	-0.0898	2.8507	
TTHI3	0.0996	-1.7732	
TTHI4	-0.1769	17.6398*	
TTHI5	-0.3278	-3.9480	
PF_CLASS	0.4445**	8.0608**	-0.0487
REL_EDU	0.3765*	6.9536**	
ECO_MATH	0.5085**	9.5072**	0.5781*
INC_EXPECT			-0.0130
EXPECT2	0.5282	10.0012	
EXPECT3	0.9376*	17.3675**	
EXPECT4	1.1640**	21.1736**	
INVEST			1.2519***
PF_HELP			0.1273
N	211	211	211
Regression	Financial Literacy 5 questions Score	Total Financial Literacy Score (1- 100)	Financial Behavior Scores

A * indicates a 5% significance level and **/** indicate 1% and 0.1% respectively

TABLE 5
Logistic Regression Analysis

Independent variables	(1)
AGE	
AGE2	0.1851
AGE3	1.0106
AGE4	-1.4068
AGE5	0
GENDER	0.6592
MAR_STATUS	-0.3060
PAR_EDU	-0.3876*
CC_DEBT	0.1134
LNAMNT	0.1080
RACE	
BLACK	1.4617**
HISPANIC	0.4066
OTHER	0.5721
WHITE	1.8259**
EDUCATION	
EDU2	-0.9105
EDU3	1.3698
EDU4	0.9460
EDU5	1.9656
EDU6	-1.0204
SMOKE	0.0468
EFFECT	-0.3761*
GPA	
GPA2	-1.6656
GPA3	-1.9566
GPA4	-3.4952
GPA5	-2.7935
GPA6	0
WORK_EXP	
EXP2	0.6795
EXP3	-0.2656
EXP4	0.3753
PAR_REL_EDU	
NONE	0
ONE	0.7071
TTHI	0
TTHI2	1.1320
TTHI3	2.5258***
TTHI4	3.1646*
TTHI5	1.1504
PF_CLASS	0.0078
REL_EDU	-0.9321
ECO_MATH	1.4326**
INC_EXPECT	
EXPECT2	
EXPECT3	
EXPECT4	
INVEST	1.3293*
PF_HELP	
<hr/>	
N	211
Regression	Financially Literate On TTLFLFBSCORE100

A * indicates a 5% significance level and **/** indicate 1% and 0.1% respectively

10. Figures

Figure 1. Scatter plot of Y and \hat{Y} (FLQSCORE)

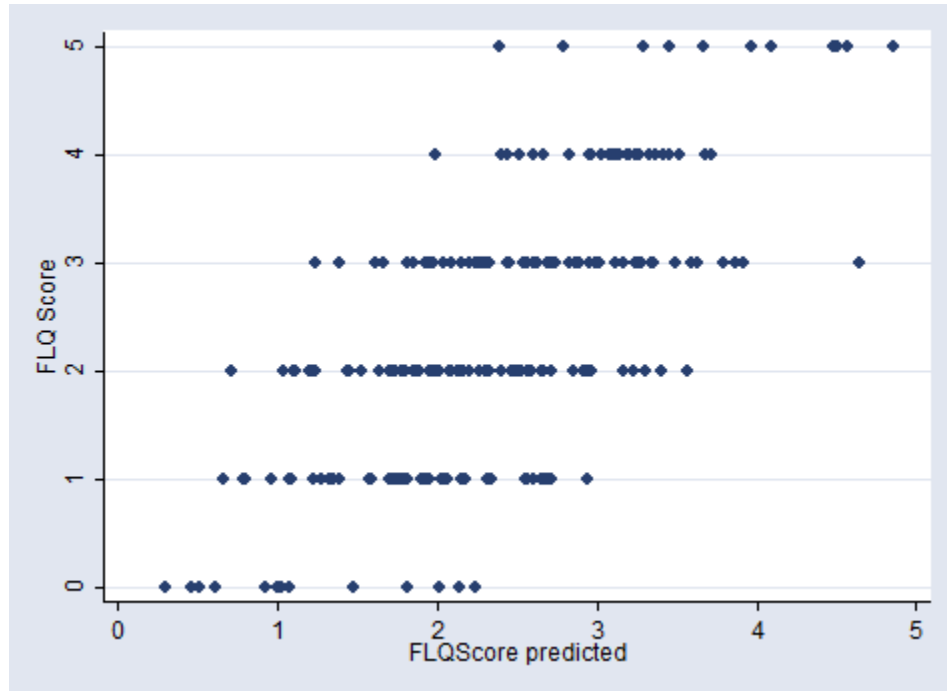


Figure 2. Residuals' Kernel Density Estimate (FLQSCORE)

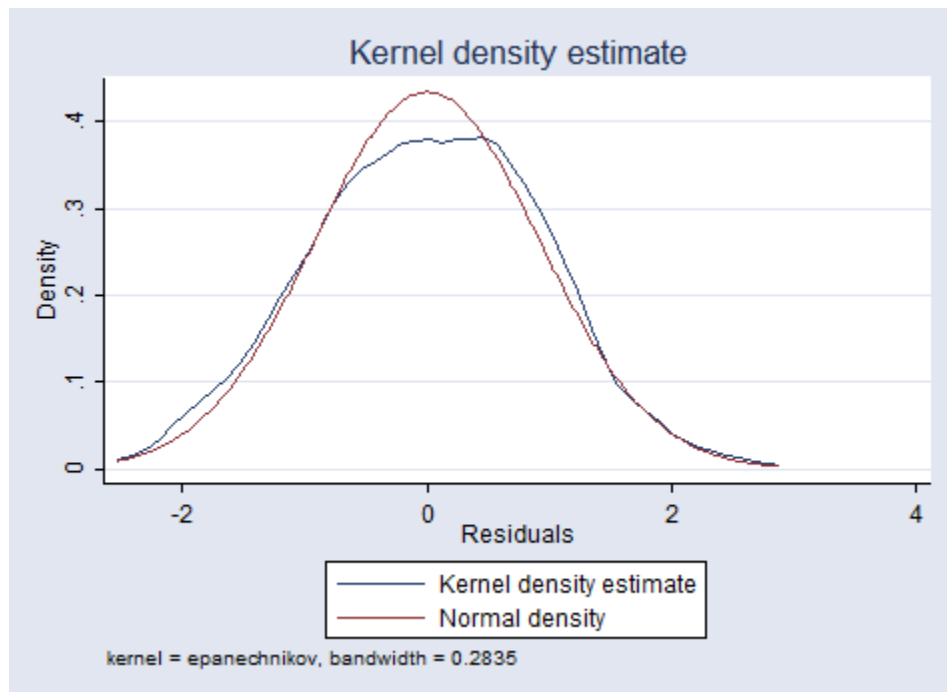


Figure 3. Residuals' Histogram (FLQSCORE)

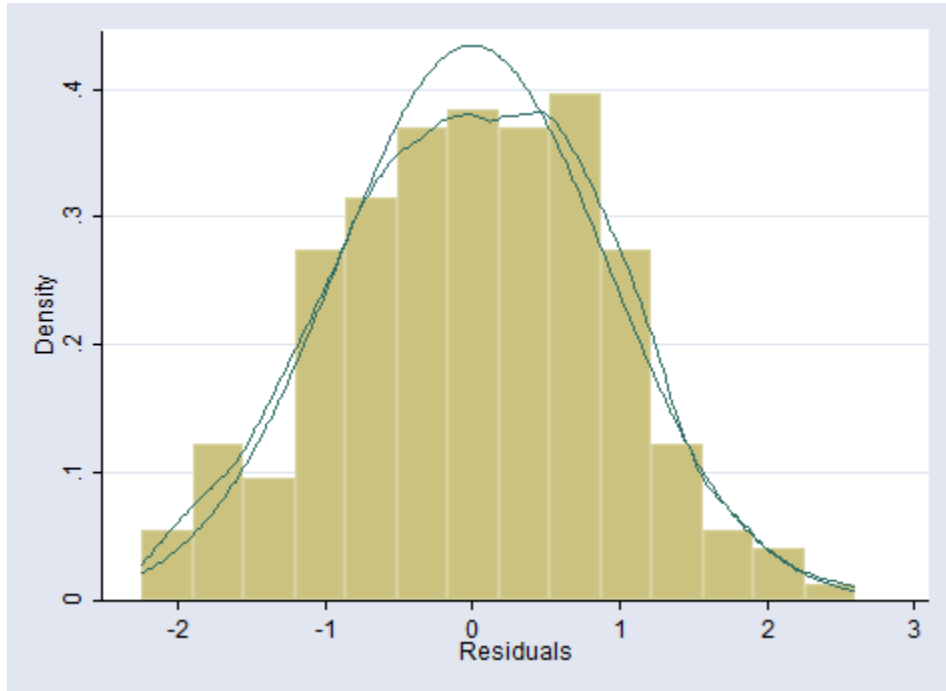


Figure 4. Standardized normal probability plot of the residuals (FLQSCORE)

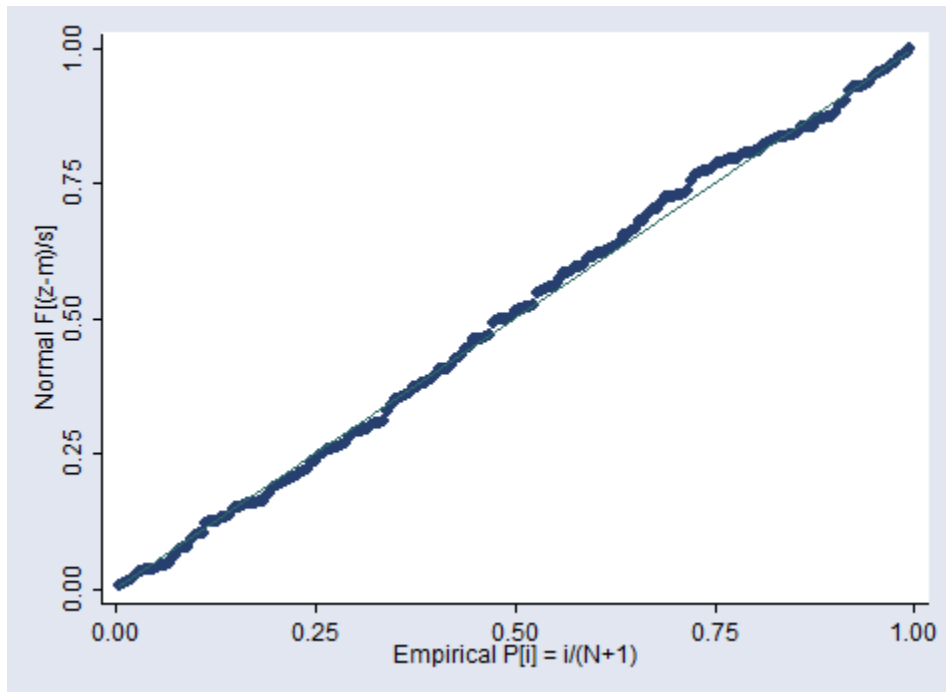


Figure 5. Quantile normal plots of the residuals (FLQSCORE)

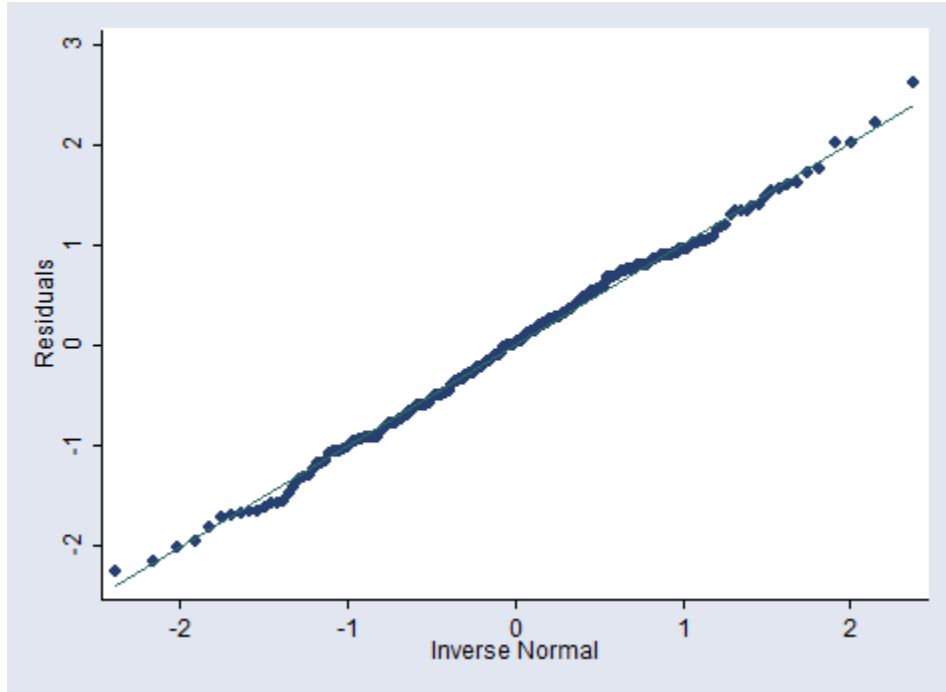


Figure 6. Scatter plot of Y and \hat{Y} (TTLFLBSCORE100)

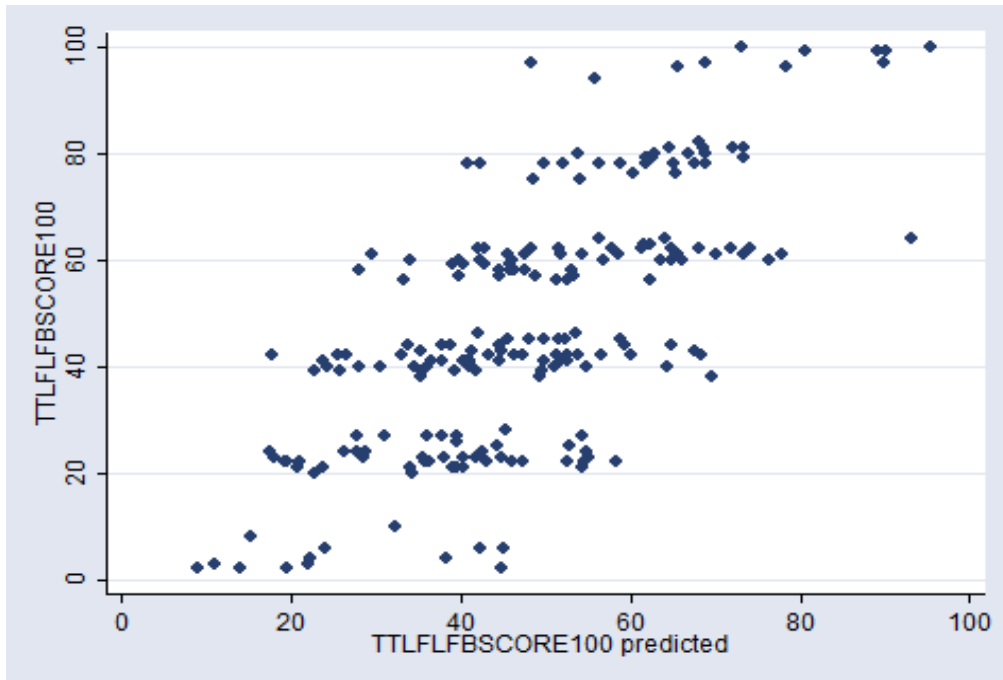


Figure 7. Residuals' Kernel Density Estimate (TTFLFBSCORE100)

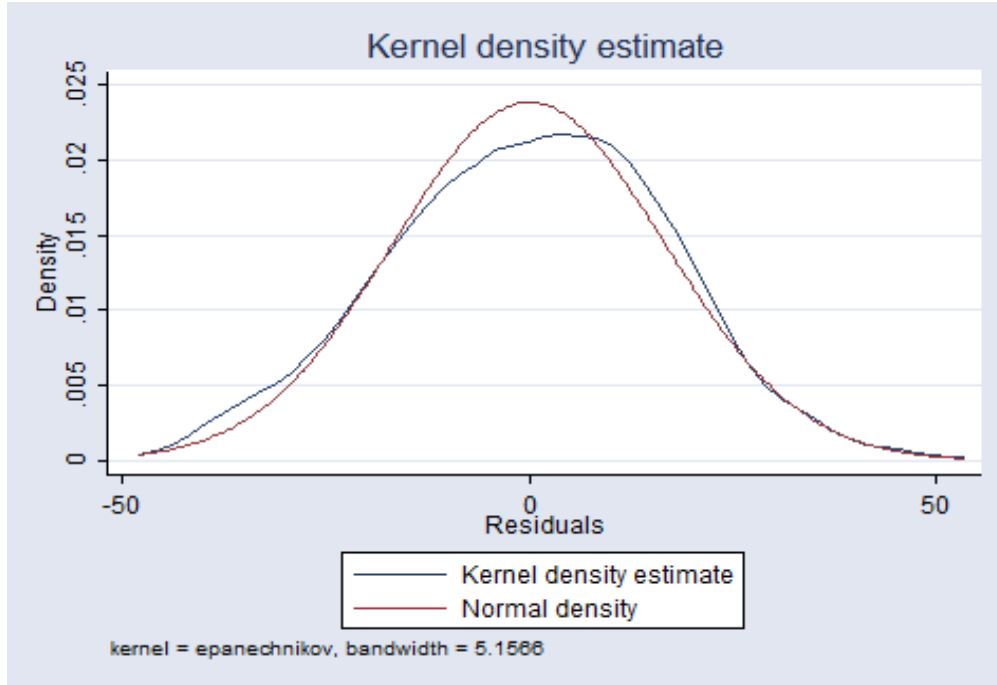


Figure 8. Residuals' Histogram (TTFLFBSCORE100)



**Figure 9. Standardized normal probability plot of the residuals
(TTLFLFBSCORE100)**

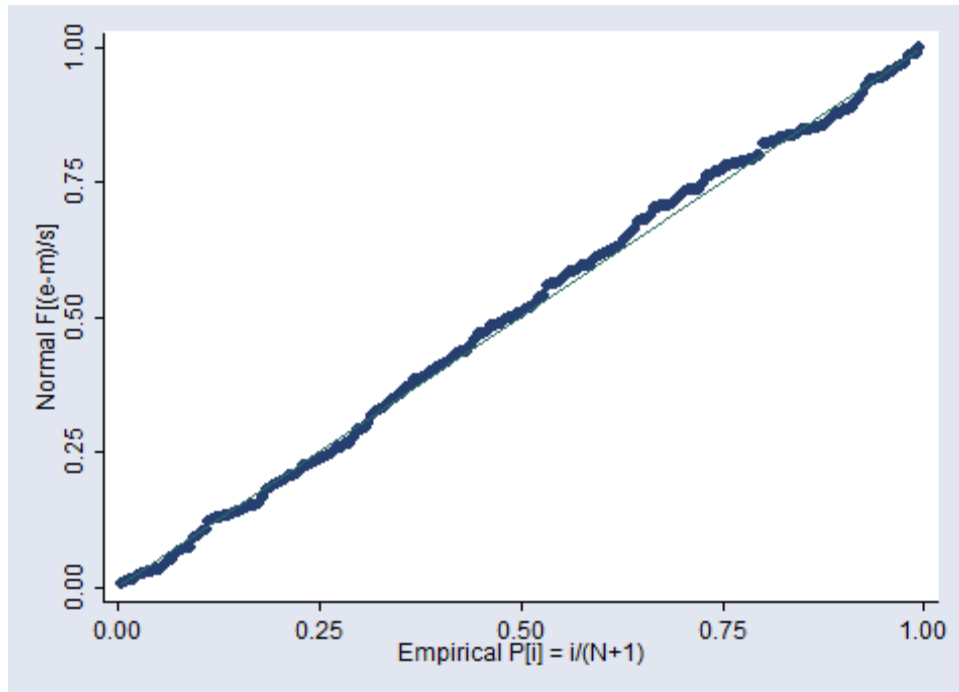


Figure 10. Quantile normal plots of the residuals (TTLFLFBSCORE100)

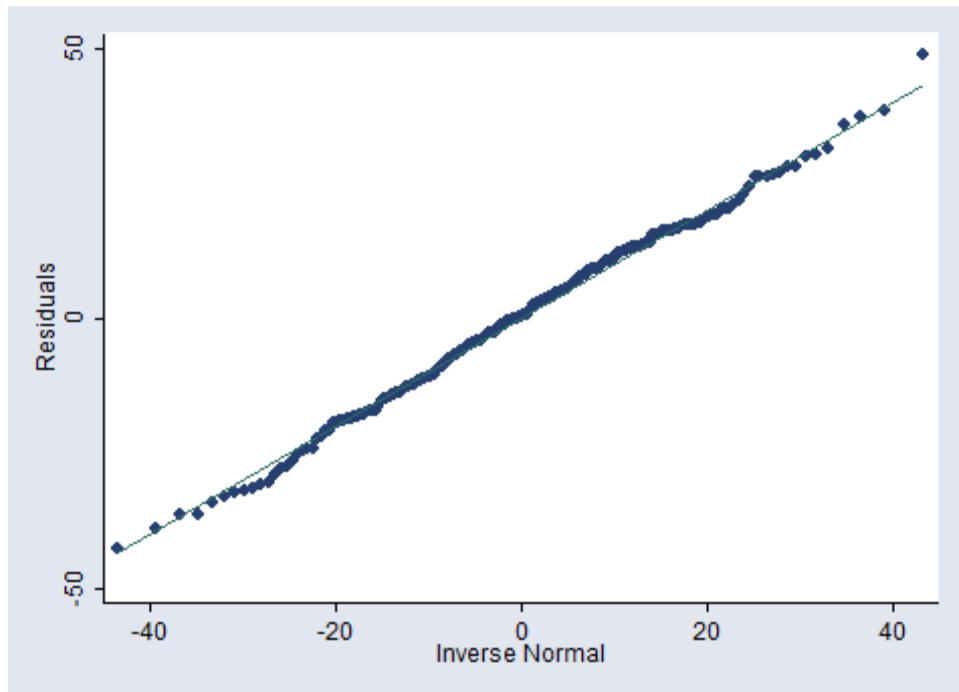


Figure 11. Residuals' Kernel Density Estimate (FB_Scores)

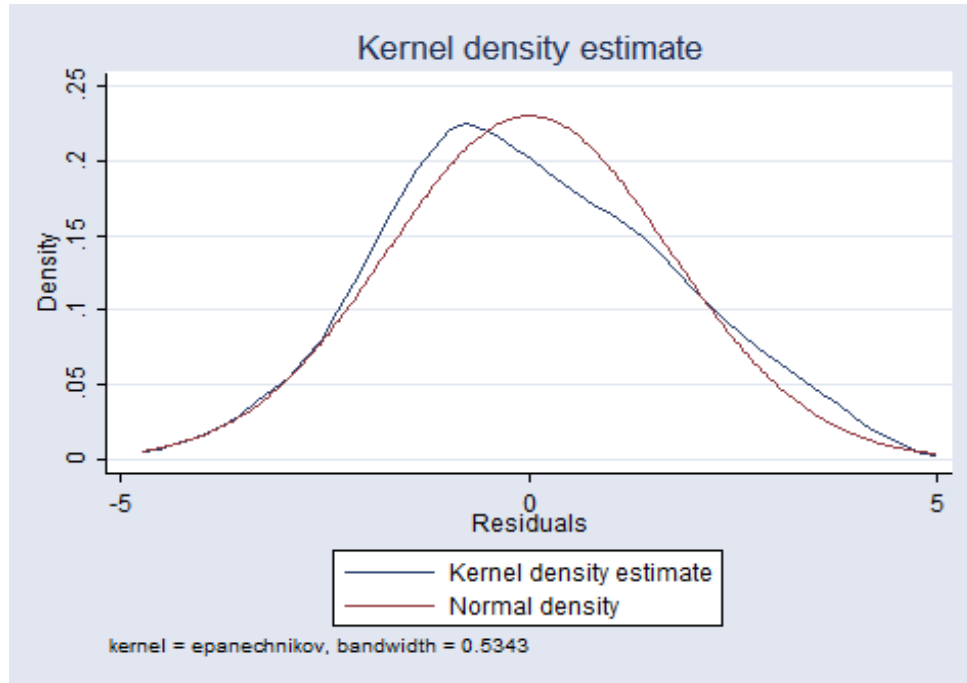


Figure 12. Residuals Histogram (FB_Scores)

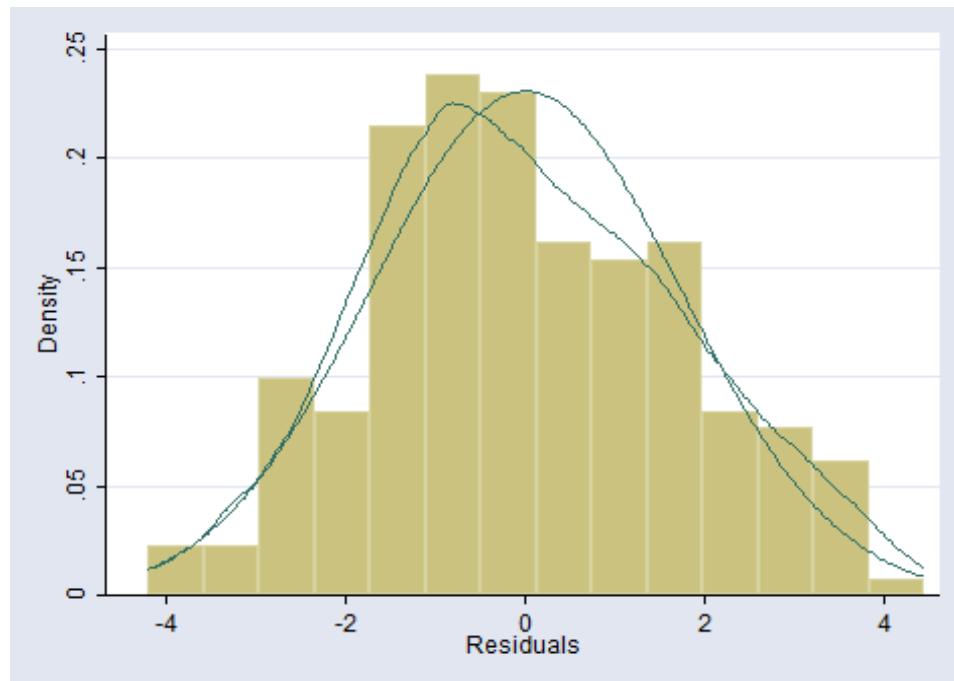


Figure 13. Standardize normal probability plot of the residuals (FB_Scores)

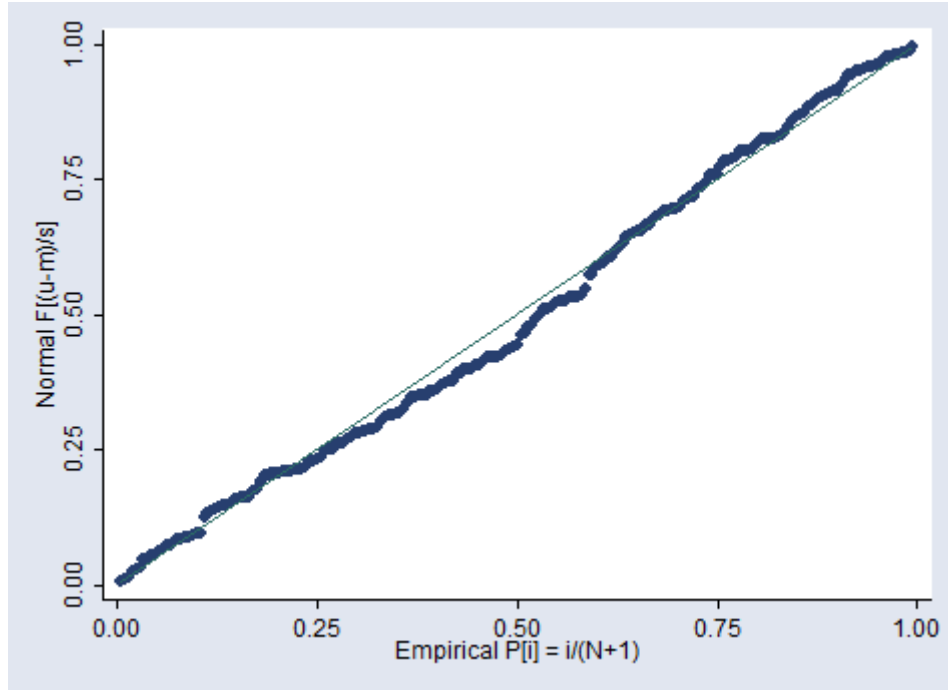
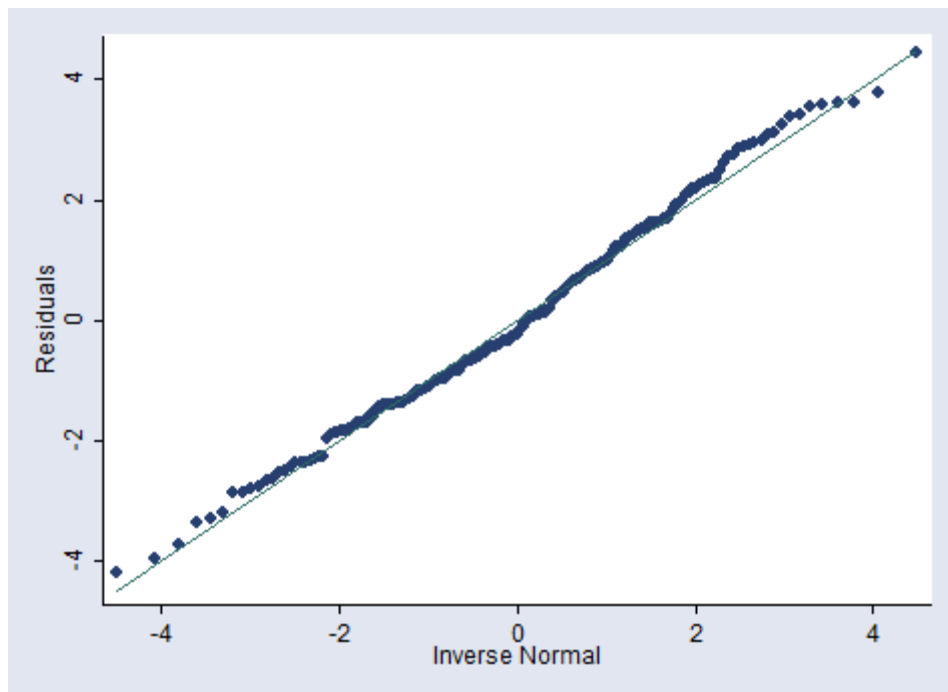


Figure 14. Quantile normal plots of the residuals (FB_Scores)



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