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Is It Still an Econ Course? The Effect of a Standardized Personal Finance Test on the Learning of Economics

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Abstract

We study the implications of mixing economics and personal finance standards in a high school course. Using administrative, survey, and testing data on college students, we find that learning personal finance can help the learning of economics for some students and hurt it for others. We estimate that students who received more instruction in economics score almost 5 percentage points higher on our economics test. Furthermore, we estimate the effect of being assigned a certification test in personal finance as a part of this course. Taking the personal finance certification test increases economics test scores by 2.5 percentage points for the average student, but this effect is not uniform across students. The certification test significantly increases the economics scores of students with low SAT scores, while decreasing the economics scores of those with high SAT scores. Our results emphasize the potentially idiosyncratic effects of mixing economics with personal finance.

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†The views expressed here are those of the authors and not necessarily those of the Federal Reserve Bank of Richmond or the Federal Reserve System.

1 Introduction

High school students in the United States are increasingly likely to take a required course that includes instruction in both economics and personal finance. According to the 2022 Survey of the States from the Council for Economic Education (CEE, 2020), twenty-three states in the United States required a personal finance course for graduation, while twenty-five states required an economics course. Among those, Arizona, Georgia, Michigan, New Hampshire, New York, and North Dakota reported mixing personal finance into their economics courses, while Arkansas, Florida, Idaho, New Mexico, North Carolina, Texas, and Virginia similarly mix the two subjects in their standards for economics courses (CEE, 2020). This list includes three of the top four most populous states in the United States. Therefore, a mandatory high school course featuring economics alongside personal finance is an increasingly common, though not a universal phenomenon.

Is mixing this content into one course good for student learning? The answer is not obvious. On the one hand, economics and personal finance knowledge seem intuitively to support one another. As the introduction to Virginia’s Economics and Personal Finance course describes it, “Students need a strong, interdisciplinary foundation in economics and personal finance to function effectively as consumers, workers, savers, investors, entrepreneurs, and active citizens” (VDOE, 2019). On the other hand, several studies have shown that students learn economics better in a dedicated course (Walstad and Watts, 1985; Martin and Bender, 1985; Buckles and Freeman, 1984). These studies estimate the effects of infusing economics instruction into other course material. However, they do not investigate the interaction of economics and personal finance in a purpose-built mixed course.

We investigated the effect of personal finance instruction and assessment upon economics learning in a “Economics and Personal Finance” (EPF) course that students typically take during their junior or senior year in high school. Specifically, we investigate the effects of a high school EPF course on students’ knowledge of economics by testing them at the beginning of a college level economics course, as well as its effect on the students’ final score in the economics course. We also analysed the differences between a course that combines personal finance with economics, versus one that focuses mostly

on personal finance. We used data from the university on student characteristics, and also surveyed students about their experience in their EPF course in high school, including whether they were assigned a personal finance certification test. Students take this test based on an agreement between their school district and the Wise nonprofit (“Working in Support of Education”), a personal finance advocacy organization. The assignment of the test to students, teachers, and schools is a policy decision made by the local (that is, either county or city) school district (VDOE, 2022). This limits selection bias in our sample, as students do not select the treatment. As Wise-selecting school districts are scattered across the state, the treatment-selection process is good for comparing students who are otherwise similar to one another. We investigate the following research questions about a high school course that includes both economics and personal finance:

1. What is the effect of personal finance instruction on student learning of economics in a high school economics and personal finance course?
2. What is the effect of a standardized personal finance test on the learning of economics?

With the first question, our survey found that almost two thirds of students who took the EPF course reported that it was “mostly about personal finance.” (If the courses had been taught exactly according to the state standards, no students should have selected this answer.) We found that students who reported receiving an entire semester of economics instruction in high school (as opposed to mostly learning personal finance) received higher grades on an economics test which was given on the first day of their college course in economics. There was some evidence that learning high school economics from a teacher that had 40+ hours of professional development in teaching this particular class had a positive effect on one’s final grade in a college economics course.

For the second question, around three quarters of students who answered the survey reported being assigned the Wise standardized certification test in personal finance (an assignment decision made at the school district level). However, taking the Wise test was actually associated with increased economics pretest scores for students with low SATs, and decreased economics pretest scores for students with high SATs (Table 6).

In sum, most students report studying about personal finance at the expense of economics and being assigned a high-stakes personal finance test (but not an economics one). Furthermore, high-SAT students' economics knowledge is hurt by having taken the personal finance test in high school. These findings alone are evidence that personal finance is indeed crowding out economics in this class to some extent. However, being assigned the Wise personal finance test seems to have actually improved the economics learning of students with lower SAT scores. We consider possible reasons for these idiosyncratic results that may inform educational policymaking, course design, and classroom instruction.

2 Literature Review

Researchers have long emphasized the importance of economic education for students (VanFossen, 2011), and studies of high school economics courses have tried to estimate the effect of high school economics instruction on college economics outcomes, an approach that we continue here.¹ Specifically, early studies by Reid (1983), and Palmer, Carliner and Romer (1979) cast doubt on the lasting value of high school economics instruction, while studies by Brasfield et al. (1993), and Lopus (1997) showed effects that last into and through college courses. A review of the literature in economic education led Watts (2005) to conclude that “a formal secondary course in economics is the safest way to improve students' knowledge of economics, but it is far from clear that one course in economics is enough to consider students economically literate.”

Not everyone agrees that an economics high school course should be “standalone.” Morton (2006) argued that economics provide “a home” for personal finance education. Similarly, the Financial Literacy Education Commission's inaugural national strategy document (Literacy and Commission, 2006) specifically recommended embedding personal finance instruction in an economics course if a standalone personal finance course is not possible. According to the Council for Economic Education's biannual Survey of the States (CEE, 2020, 2022), the number of states that require personal finance content stan-

¹Note that both qualitative (Schug and Birkey, 1985; Suiter and Meszaros, 2005) and quantitative (Sosin et al., 1997) studies suggest that even K-12 students can develop economic reasoning and improved money-sense (Chizmar and Halinski, 1983), particularly when taught by teachers trained in such concepts.

dards, or a high school personal finance course, or that at least require schools to offer a personal finance course has been slowly but steadily increasing since the first survey conducted in 1998. Sometimes, these requirements are a part of a course with economics standards. For example, in 2011 Virginia mandated a two-semester EPF course for students entering ninth grade, meaning that the vast majority of students in Virginia public colleges and universities should now have a background in these content areas. North Carolina passed a mandate for a similar course in 2019.

Few studies have investigated the interplay of personal finance and economic education per se. Several studies analyzing either economics or personal finance education have mentioned the effects of one on the other in a more incidental fashion, with the two subjects tending to complement each other in a minor way (Walstad et al., 2010; Walstad and Buckles, 2008; Hill and Asarta, 2016). Swinton et al. (2007) found that the students of high school teachers who took a one-day professional development workshop in personal finance education scored slightly higher in economics end-of-course tests. Alternatively, Soper and Walstad (1988) found evidence that students taking a course in "consumer economics" learned less than students taking a dedicated economics course. While these studies may look at the efficacy of teaching economics via personal finance, they have not considered situations where personal finance and economics are supposed to share space in one course, which we emphasize here.

One way to investigate this interplay is by studying the effect of a national, standardized (though not state mandated) personal finance test in a shared economics and personal finance course. Such a test is administered by W!se, a national nonprofit that promotes personal finance education. This organization offers a financial literacy certification to students, which is a "credential awarded to students who pass the test. The credential demonstrates to colleges and employers that students have the knowledge and skills to be financially savvy" (W!se, 2020a). The impact of this test on classroom instruction is not trivial: the W!se website claims that 6 million instructional hours are dedicated each year to prepare for the test (W!se, 2020b). The organization administers its test to approximately 400 schools in Virginia alone (personal communication, July 2020) out of a total of 623. Based on other recent studies showing the potential efficacy of personal finance education, it is reasonable to assume that the score gains that students exhibit on the W!se

test may correspond to real increases in classroom learning about personal finance (Kaiser and Menkhoff, 2017; Kaiser et al., 2020).

In this study, we explore the relationship of economics and personal finance in a two-semester high school course that has an equal number of standards, and, theoretically, equal classroom instructional time (one semester for economics and one for personal finance). By focusing on the effect of a standardized test on curriculum, we followed a rich literature and a mixed history. First, there is evidence that a standardized test can do exactly what it is designed to do: increase student knowledge in the targeted area. For example, there was rapid increase in math scores for both Black and Latino students in the first few years of the No Child Left Behind testing regime (NCLB) (Blank, 2011; Hansen et al., 2018). Dee and Jacob (2011) found that NCLB caused an increase in National Assessment of Educational Progress (NAEP) math scores for fourth- and eighth-grade students, though they did not find an effect for English-Language Arts scores.

However, standardized testing comes with trade-offs. Scholars have argued that with testing also comes “curriculum narrowing.” This is when “teachers exclude from their lesson plans the material that is not tested in an attempt to maximize the learning opportunity for students on the content of the test” (King and Zucker, 2005). That is, they teach to the test. Hess and Brigham (2000) noted that standardized assessments “are not meant to suggest that only what is on the test is important, but many schools have interpreted them this way”. Crocco and Costigan (2007) observed that this was an especially strong tendency in social studies classrooms where standardized testing was prescribed and high-stakes. Data from the nationwide NAEP test showed that there was less attention was devoted to social studies instruction in areas where high-stakes testing was salient (Fitchett and Heafner, 2010; Heafner and Fitchett, 2012; Hansen et al., 2018). VanFossen (2005) demonstrated that a subject area can be marginalized under certain conditions, especially where standardized tests are high-stakes. The presence of a relatively high-stakes personal finance certification test in a classroom is likely to have a similar effect on classroom instruction as do other standardized tests.

Of course, such a test is not a part of all classrooms that include both economics and personal finance. But there is still reason to believe that personal finance might play an outsize role in such a course. This is because of the crucial role of teachers in making

curricular decisions (Thornton, 2005). Teachers may find that economics content is difficult to learn how to teach. Several studies have shown that a teacher must take three or four economics courses before the added knowledge turns up in student test scores (Allgood and Walstad, 1999; Walstad and Watts, 2015). Additionally, teachers may be more compelled by the apparent practical benefits of personal finance content.

3 Data

We gathered administrative data from the university and testing data (in-person) from college students at the Virginia Commonwealth University who took an introductory level course in economics between spring 2019 and spring 2020, a total of 629 students.² These students were from diverse backgrounds and were not necessarily majoring in economics. There were students from the School of Business, the College of Humanities and Sciences, the School of Education, and several other departments across the university. Using one's own students to study the effects of economics instruction is conventional for this type of study, as exemplified by Myatt and Waddell (1990), and Brasfield et al. (1993).

We delivered a twenty-question in-person pretest on the first day of each course. These questions were taken from the Test of Economic Literacy (TEL) by the Council for Economic Education (Walstad et al., 2001). The TEL was created to assess high school-level economic understanding, and it is commonly used in the literature for the same purpose as in this paper (Gleason and Van Scyoc, 1995; Koshal et al., 2008; Grimes et al., 2010). We chose 20 questions split between micro and macroeconomics that had short descriptions and addressed different topics (the full test covers 20 different concepts and has 2 versions).

Other studies on the learning of economics and personal finance have also used questions drawn from standardized tests rather than using the entire test (Harter and Harter, 2009; Walstad et al., 2010). This is a technique to increase participants' motivation to respond in the school context, where teachers and students are often tired of too many tests. We did not offer the students a post-test for a similar reason; we did not want to over-test

²Either Introduction to Economics or Principles of Microeconomics.

them. We use the word "pretest" to emphasize that the test was taken before they got any college economics instruction, and to differentiate it from the Wise test.

We also estimated the effect of our independent variables on students' final college course grade, an approach that follows previous studies on the effect of high school economics (Myatt and Waddell, 1990; Lopus and Maxwell, 1994). Though this does not qualify as panel data or allow measurement of achievement over time, it did allow a look at the data using two different dependent variables, and to see if experiences from high school had an effect further into the future.

Every student present during the first class in each course took the test, since completing it earned them participation points and was done in-person. We also obtained IRB authorization for this study, including access to administrative data on each student. The variables we collected from the university were: gender, ethnicity, first generation college student, SAT score, and high school GPA.

In addition to the test, we delivered a voluntary survey (B) regarding their high school economics experience. The questions were formulated to be extremely straightforward: whether they were assigned the Wise test, whether their course was mostly about personal finance or if it split equal time with economics, whether they took the course online or in-person, and what their high school teacher's name was. This last item was cross-referenced against VCEE's database of certified educators³ attendees to determine which students had VCEE-trained teachers. The survey had a high take-up rate, with 83.8% student completion, and the group of students who completed the survey was statistically similar to our entire sample, an indication that response bias did not unduly distort our results (see supplemental Table 9).

The survey question asking if students took an entire semester of economics, or if the course was mostly about personal finance was important. Students who took an Advanced Placement (AP) economics class could have selected this answer, so some of the full-semester economics classes were from EPF students, while some would have been AP students. For the purposes of the analysis, the item of interest was whether they were supposed to have received a full semester of high school economics instruction, and what the effect of that is on their scores. For simplicity, we refer to any high school courses that

³Teachers earn this certificate after attending a 45-hour institute and passing an exam in the end.

were to include economics and perhaps personal finance as an “EPF” course. As the data below shows, most students took a class focused on the Wise test, not the AP test.

Since not all high school students will go to college and take an economics course, the benefits of the economics instruction (which we found to be significant prior to the course as measured by the pretest scores) may be manifested among the students who stopped their economics education at high school. However, this data set only contained students who went to college and took an economics course.

3.1 Summary Statistics

Table 1 shows the demographic characteristics for the 629 students in our full sample. For reference, the student population at VCU (2019-2020) was comprised of 61% female, 17% black, 45% white, 9% Latino, and 4% international (VCU, 2020).

Table 1: Descriptive Statistics

Characteristics	Share
Female	0.57
Black	0.21
White	0.41
Latino	0.14
Asian	0.13
Multi-race	0.09
Internal	0.02
First Generation	0.31
Sample of 629 students	

Female students were the majority, comprising 57% of our sample, while black, white, Latino and Asian students represented 21%, 41%, 14%, and 13% of the sample, respectively. Almost a third were first-generation in college, and international students comprise a small share, only 2%. One can see that our sample is similar to the university’s population.

Regarding the students’ test scores, the pretest average was 56% (11.21 out of 20), the average final course grade was 78%, the average SAT was 1141 in 1600-point scale, and

the average high school GPA was 3.52 (Table 2).

Table 2: Grade Statistics

Variable	N	Mean	Std Dev
Pretest score	629	11.21	3.17
Final course grade	562	78.31	11.71
SAT (1600 pt scale)	422	1141.04	115.61
HS GPA	560	3.52	0.44

Among the 527 students who completed the survey, 73% reported taking the Wise test in high school, and 89% reported taking an EPF course (Table 3). Considering the students who took an EPF course, 20% report it being online with little teacher involvement. It is safe to say that the majority of Virginia students who take an economics course take a mandated personal finance test. Among the 431 students who reported their school division, 419, or 97%, reported going to a high school in Virginia.

Table 3: Survey Statistics

Variable	N	Participation
Survey	629	84%
EPF course	527	89%
Wise test	523	73%
EPF course online	461	20%
Virginia high school	431	97%
Teacher trained by VCEE	290	26%

Table 9 shows that there is no relevant difference between students who decided to complete the survey and those who did not, except for their SAT score (Table 12).

Only 290 students answered the question about their teacher's name, which we used to match with VCEE training data base. For the observed names, only 26% received training. Among those, 84% reported taking the Wise, 74% reported their EPF course was mostly personal finance, and 24% reported they were taught an even blend of economics and personal finance. Among those not trained by VCEE, 84% reported taking the Wise, 63% reported their EPF course was mostly personal finance, and 35% reported they were taught an even blend of economics and personal finance.

As evidence of personal finance crowding out economics teaching, we found that 68% of students who took an EPF course in high school reported that their course was “mostly personal finance,” and just 29% said they were taught an even blend of economics and personal finance, as delineated in the state standards (Table 4). Of the 68% of students who reported that their EPF course was mostly personal finance, about 83% said they took the W!se test. And among the 29% of students who reported they were taught an even blend of economics and personal finance, about 79% said they took the W!se test.

Table 4: Average Test Scores and W!se Participation by Type of EPF Course

Course type	N	Pretest	SAT	W!se
Mostly Personal Finance	319	54.9%	1152.5	83%
Semester of Economics	135	58.7%	1130.4	79%
Other	13	56.9%	1160.0	54%
Total sample	467	56.1%	1146.6	81 %

Pretest performance varied depending on the type of EPF course taken, with students scoring higher if they had a whole semester of economics instruction. This difference can indicate that more economics instruction leads to better learning of economics, especially since they actually scored lower on average on the SAT. In the following sections, we control for other variables to see if this result still holds.⁴

We also observed that a lower share of white students (68%) took the W!se test than non-white (76%), as shown in Table 5. There are also relatively more first-generation college students taking the test than non-first-generation students. More males than females reported learning economics for a full semester. This likely is related to a higher share of male students taking AP Economics classes (Goldin, 2015). However, this was not statistically significant. A separate logistic regression (Table 13) indicated there were no demographic variables that were associated with a student reporting an entire semester of economics instruction.

⁴This difference is significant in a 95% confidence interval (see supplemental Table 11 and 12).

Table 5: Participation in Test/Course by Group

Group	W!se Test	Sem. of Econ	Mostly PF
Female	0.74	0.23	0.65
Male	0.72	0.30	0.55
Asian	0.78	0.28	0.67
Black	0.76	0.23	0.69
Latino	0.76	0.22	0.64
International	0.25	0.08	0.25
Two or More Races	0.87	0.25	0.67
White	0.68	0.29	0.54
Sample size	523	527	527

4 Methodology

To answer our research question on the effect of personal finance instruction on student learning in economics, we regressed the pretest score on the EPF course experience (economics for an entire semester versus mostly personal finance) and W!se test-taking while controlling for demographic differences and ability. We hypothesize that the presence of a mandated personal finance industry certification test will decrease time spent on teaching and learning economics, which we expect to observe by a downward pressure on student economics achievement. This effect could be a result of either teacher or student choices, or both.

In our survey, in addition to asking whether a student took a personal finance certification test, we asked about the focus on personal finance and economics in the high school course. As Soper and Walstad (1988) argue, a course with a focus on personal finance may have a negative impact on the learning of economics and therefore a lower test grade.

The regression model we used is as follows:

$$X_i = \beta_0 + \beta_1 D_i + \beta_2 H_i + \beta_3 EPF_i + \beta_4 W!se_i + \beta_5 A_i + \epsilon_i \quad (1)$$

where X is the pretest score. D are control variables for relevant demographic characteristics like gender, race/ethnicity, and first-generation college status. H is the ability variable represented by the SAT score. EPF is the dummy variable for taking an EPF course with a full semester of economics, and $W!se$ is the dummy for taking the personal finance certification test. Both variables are reported by students in the survey. A represents additional controls, namely teacher's training (names were cross-referenced to state database on teacher professional development), and course delivery method (online vs. in-person), also reported on the survey. We used robust standard errors to correct for heteroskedasticity.

Furthermore, we investigated whether there is an interrelation between our main control variable—SAT score—and our main variable on student experience—W!se testing. We therefore added an interaction term between W!se test and SAT. This is represented in equation (2). We also looked into the interaction between SAT and taking a full semester of economics but did not find a significant effect.

$$X_i = \alpha_0 + \alpha_1 D_i + \alpha_2 H_i + \alpha_3 EPF_i + \alpha_4 W!se_i + \alpha_5 A_i + \alpha_6 W!se_i \times H_i + \xi_i \quad (2)$$

In addition, we looked into the impact of these variables on the final course grade, Y , using the same model (3), as well as the impact of the pretest score (4). Demographic variables and SAT scores are expected to affect final course grade, and we wanted to know if the EPF course and the personal finance certification test have any observable effect beyond these. We also controlled for high school GPA as well as the students' professor, both of which can affect course grades.

$$Y_i = \gamma_0 + \gamma_1 D_i + \gamma_2 H_i + \gamma_3 EPF_i + \gamma_4 W!se_i + \gamma_5 A_i + \gamma_6 GPA + \eta_i \quad (3)$$

$$Y_i = \delta_0 + \delta_1 D_i + \delta_2 H_i + \delta_3 X_i + \zeta_i \quad (4)$$

5 Results

In this section, we present the results of the model specifications discussed above. Table 6 shows the coefficients for the model described in equation (1). In this table, the effect sizes show points earned out of 20, which is the number of questions on the test. For example, an effect size of 1.0 means one additional correct answer. We found that taking an EPF course with a full semester of economics, versus with a focus on personal finance, significantly increases student's pretest scores. These students scored 1 point higher out of 20—5 percentage points higher—in their tests. Female students scored about 1 point (5 percentage points) lower, which is consistent with previous standardized economics test findings (Walstad et al., 2007; Holtsch et al., 2019). White students scored just over 1 point better than other students. Taking the EPF course with a teacher who was trained by VCEE did not impact the pretest result, nor did taking the course online.⁵

Taking the W!se certification test did not have a significant effect on the test scores, counter to our hypothesis. However, as we can see in the third column of Table 6, students with high SAT scores are negatively impacted by taking the test, while students with low SAT scores benefited from it. Those two forces cancel out in the wider sample, so we only find an effect once we include the interaction between W!se and SAT. The predictive marginal effect of taking the W!se test for different SAT scores is in Figure 1.

For a student with a quite low 850 SAT score (see Figure 1), taking the W!se test would increase their pretest score on average by 2.6 points out of 20 (13 percentage points). For a student with a high SAT score of 1450, taking the W!se reduces their pretest score on average by about 1.6 points (8 percentage points), though the effect for higher-SAT students is only marginally significant.⁶ The average student in our sample had an SAT score of 1141, and would increase their score about 2.5 percentage points by taking the W!se. For comparison, we found that taking the EPF course with a full semester of economics instruction increased one's pretest score by about 1 point, or 5 percentage points. These differing effects of the certification test are not trivial, and they accrue mainly to students with low SAT scores. We explore this result more in the next section.

⁵This is all before the coronavirus pandemic.

⁶The 850 and 1450 are close to minimum and maximum SAT scores in our sample, which are 820 and 1500, respectively.

Table 6: Regressions on Pre-Test Score (20 points)

	(1)	(2)	(3)
Female	-0.933** (0.291)	-0.942** (0.355)	-0.923** (0.288)
White	1.022** (0.334)	1.167** (0.402)	0.953** (0.333)
Black	-0.382 (0.379)	-0.631 (0.475)	-0.373 (0.379)
First-generation College	0.264 (0.315)	0.517 (0.381)	0.265 (0.313)
SAT	0.013*** (0.001)	0.011*** (0.001)	0.018*** (0.002)
EPF (semester of econ)	0.920** (0.315)	0.991** (0.376)	0.926** (0.313)
Wlse	0.431 (0.392)	0.276 (0.577)	8.647** (2.879)
Trained by VCEE		-0.123 (0.361)	
Online		-0.212 (0.496)	
Wlse × SAT			-0.007** (0.002)
Observations	342	217	342
R^2	0.322	0.318	0.334

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Constant term omitted from table.

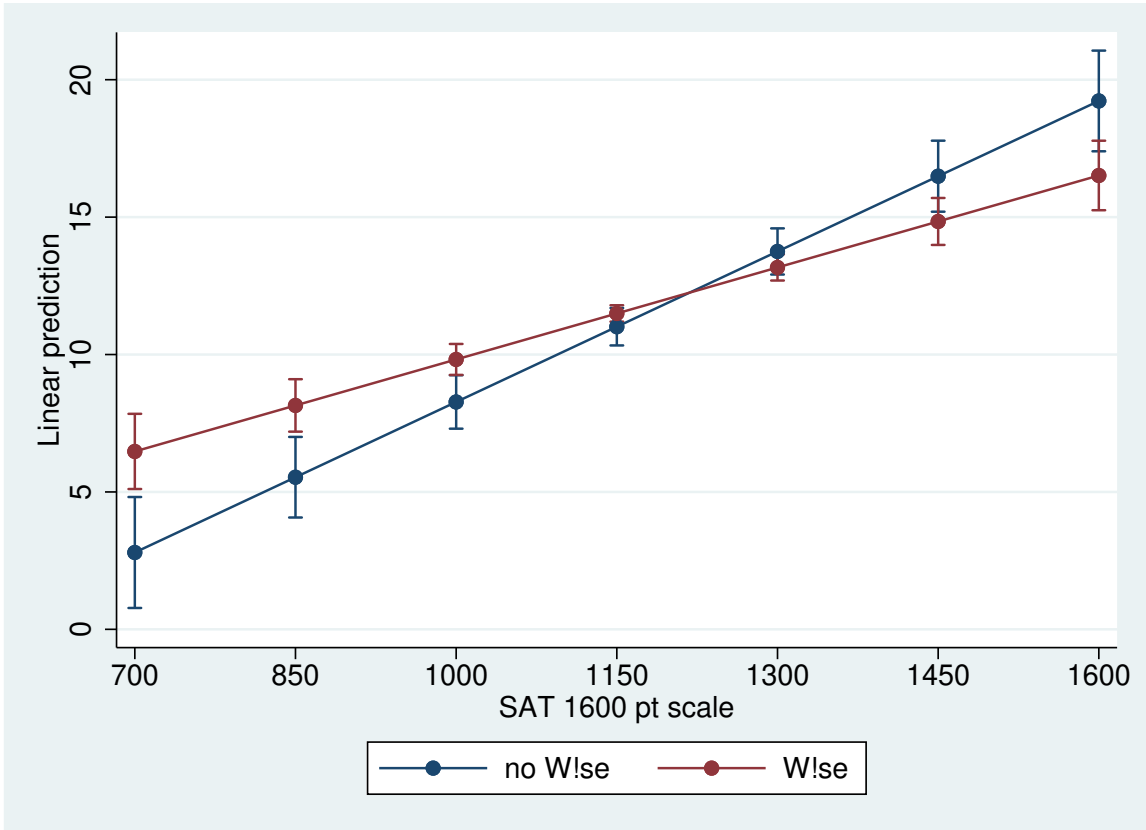


Figure 1: Predictive margins of W!se with 95% CI

The last part of our analysis examined the effects of these variables on students' final grades in their college economics course, following the model in equations (3) and (4). The results can be found in Table 7. These results are subject to perhaps competing effects. On one hand, entering the course with some knowledge of economics learned in high school may allow students to learn more and perform better at their college course. On the other hand, good college instructors can teach the same material and fill any gap in students' knowledge from differences in their high school education.

Table 7: Regressions on Final Course Grade (100 points)

	(1)	(2)	(3)	(4)
Female	2.05 (1.14)	1.48 (1.28)	2.96 (1.57)	0.59 (1.53)
White	-1.57 (1.27)	-2.20 (1.44)	-2.12 (1.80)	-1.92 (1.69)
Black	-1.79 (1.46)	-2.02 (1.61)	-3.26 (1.96)	-3.53 (1.93)
First-generation	1.68 (1.17)	2.48 (1.32)	2.20 (1.55)	1.86 (1.50)
SAT	0.04*** (0.01)	0.04*** (0.01)	0.03*** (0.01)	0.03*** (0.01)
EPF (sem. of econ)		-0.42 (1.54)	1.16 (1.74)	0.30 (1.61)
Trained by VCEE			3.70* (1.66)	2.48 (1.61)
Wlse				-1.35 (2.72)
Online				1.65 (2.30)
HS GPA				7.30*** (1.92)
Observations	388	315	200	198
R^2	0.147	0.150	0.172	0.243

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Constant term and professor fixed effect omitted from table.

We find that students' final grades are determined mostly by SAT and high school GPA. A 100-point increase in SAT score was associated with a 2.73 percentage point increase in final grade. High school GPA had a significant effect, with a half-point increase in high school GPA (e.g., from 3 to 3.5) being associated with an increase in final grade of

3.58. Unlike the pretest analysis, taking the high school EPF course with a full semester of economics had a positive but not significant coefficient, showing that the EPF effect did not persist after the college experience. White and male students did not hold an advantage in final grades as they did in the pretest. Students whose high school teachers were trained by VCEE scored overall 3.7 percentage point higher than their peers, which was significant with a p-value of 0.03 before controlling for high school GPA. However, when high school GPA was included in the model, the effect of VCEE training was rendered no longer significant, with a p-value of 0.07.

A further analysis, developed in Table 8, shows the results of a logistic regression on non-drop outs. In column (1), we can see that students with a higher pretest score are less likely to drop-out from the course. However, this effect disappears once we control for SAT and high school GPA, with the latter being the most significant predictor. These results are in line with Ahlstrom and Asarta (2019), who report that “students’ grades in their economics courses are a significant predictor of course persistence for both men and women” and that test scores and high school grades are associated with college performance. In the appendix (Table 10) we describe how the course demographic and scores vary for this group.

Table 8: Logistic regression on non-drop outs

	(1)	(2)	(3)
pretest	1.20*** (0.02)	1.06 (0.08)	1.06 (0.07)
SAT		1.00* (0.00)	1.00* (0.00)
HS GPA			4.42*** (1.66)
<i>N</i>	629	422	422

Odds ratio; Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

As for the results of the students’ final grades, previous studies are ambivalent about the persistence of high school economics study on college achievement. Lopus and Maxwell (1994) and Lopus (1997) found that economics learning can persist, but only in regard to certain economics content. Brasfield et al. (1993) reported that results on this question are

often “inconclusive and often contradictory”, though they did find positive results for high school learning, while emphasizing that effects may vary depending on statistical methods and local context.

6 Discussion

In this study, we measured economics achievement by a course pretest as well as final grade in an introductory college economics course. A large majority of students taking a mandated course in economics and personal finance in Virginia take a required personal finance standardized test. Neither the students, teachers, school-level administrators, or the state’s department of education make this choice; it is done at the school district level. This provided variation in the assignment of the test to students, teachers, and schools which are otherwise similar.

Several aspects of a high school course in economics and personal finance become apparent. More than 68% of all the students who took an EPF course reported that it was mostly about personal finance. This is strikingly close to the 73% of students who reported taking the W!se test, and this is further corroborated by the proportion of schools that W!se works with in Virginia: 400 out of 623, or 64% (One expects that larger public schools are more likely to use the test than private or smaller schools, meaning that the proportion of schools that use the test should be somewhat lower than the proportion of students who take the test.). This, with the drop in economics pretest scores for high-SAT students, provides evidence that personal finance instruction did crowd out economics instruction and/or economics learning. This could happen either because it affected teacher instructional choices, for example, if it leads teachers to “teach to the test”. It could also affect student motivation or studying choices, for example, if a student chooses to spend his time studying for this high-stakes test rather than practice a musical instrument, or spends time studying personal finance rather than economics. Crucially, the personal finance test was not associated with lower economics test scores for all students. Low-SAT students actually performed much better in our economics pretest if they had taken the W!se test, while high-SAT students performed slightly worse. Average-SAT students also had a small increase in economics scores associated with W!se. The interaction between the W!se test

and SAT score tended to have a larger effect than either race or gender.

There could be several explanations for this. One possible explanation is that economics and personal finance complement each other. For example, learning about interest rates in personal finance would also help one prepare for an economics test. Evidence for this explanation was found by Walstad et al. (2010) in a study of student learning gains from a high school personal finance curriculum where students who were in an economics courses scored higher in personal finance than those who were not. In another study by Grimes et al. (2010), a large nationwide telephone survey found that adults who reported taking high school courses in economics were less likely to be unbanked, and people with more knowledge of basic economic concepts were similarly unlikely to be unbanked. The authors' findings demonstrated that "an individual's understanding of the economic system was as important as formal coursework in explaining access to basic financial services".

As for the high-SAT students whose economics scores were hurt by the test, it is possible that they were in classes that focused on getting lower-achieving students to pass the test, and did not focus on digging deeper into economics. It is also possible that in order to get the personal finance certification, they took a more personal finance-focused class rather than a full economics one. One surprising incident provided some anecdotal corroboration of this story: one of the study authors was at a coffee shop discussing these findings with a colleague when a young woman at a nearby table interjected, saying "that's exactly what happened to me. I wanted to take AP Economics, but had to take the W!se test, so I skipped AP and took the personal finance class instead". So in at least one case, we have testimony of the personal finance test causing someone to skip a robust economics experience!

The need to substitute time learning personal finance in place of other courses (perhaps in some cases AP economics) may explain the decrease in economics scores for high-SAT students. This supposed substitution effect is apparently strong enough to overturn the complementary effect of economics and personal finance in these students. Put another way, the required personal finance test tended to close the economics achievement gap between students with lower and higher SAT scores. Whatever the explanation, this finding should be particularly important for policymakers, school district administrators, and classroom teachers. More research is needed for us to have a better understanding of the

certification requirement outside of the classroom.

The effect of being taught economics for a full semester in high school, while significant to the pretest, was not significant for final grades. This is not entirely surprising, as studies have found that previous advantages in economics learning can fade away as current students catch up (Myatt and Waddell, 1990). It is encouraging to note that whatever disadvantages female and non-white students exhibited in the pretest were not present in their final grades. Students who had a high school teacher who did at least 40 hours of teacher professional development from VCEE earned 3.7% more on their final grades than their peers. This is admittedly a model-dependent result with marginal significance. Earlier studies show that teachers need between three and four economics classes before their learning translates into student learning (Allgood and Walstad, 1999; Swinton et al., 2010), and that student gains may be associated with learning certain economic concepts rather than others (i.e., micro rather than macro) (Lopus, 1997).

This study has some limitations. The subjects were drawn from courses during three semesters at a single state university, so it is possible that these data do not reflect the achievement or experience of the wider population. The lack of a true post-test (in contrast to our analysis of final grades) does not allow us to track student growth over time—we have to be content with these “snapshots” of achievement. Much of the study relies on survey responses to at least some degree. We sought to mitigate the problems associated with incorrect survey responses or forgetfulness by asking very broad questions (e.g., Did you take the financial literacy certification test?) and by asking several different questions to try to parse out the relevant phenomena. The variable for teacher’s training was sparse given that several students forgot the name of their teacher. Also, the last semester in our data had a shift in instruction mode once all courses had to be online due to the coronavirus pandemic, so final grades for that semester may be different than for a regular semester.

Our results provide valuable insight into the relationship between economics and personal finance subjects in high school, which are likely to be crammed together in one course. If more states move toward mandates for EPF courses, they will want to be apprised of the tendency of personal finance content to dominate economics content. This paper has demonstrated that this tendency does not necessarily affect negatively economics scores—at least for some students—especially if economics is emphasized or at least given

parity in the classroom. These results have the potential to inform state and school district policies about the design of economics and personal finance courses in high school.

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A Robustness Checks

Table 9: Summary Statistics by Survey Take-up: **Mean**

Survey	Pretest	SAT	HS GPA	Female	White	First Gen.
No	56.00	1113.50	3.44	0.54	0.34	0.32
Yes	56.05	1147.49	3.54	0.57	0.42	0.31
Total	56.05	1141.04	3.52	0.57	0.41	0.31

Table 10: Summary Statistics by Course Completion: **Mean**

Course Drop-out	Pretest	SAT	HS GPA	Female	White	First Gen.
Yes	58.20	1189.41	3.45	0.52	0.46	0.31
No	55.75	1136.80	3.53	0.57	0.40	0.31
Total	56.05	1141.04	3.52	0.57	0.41	0.31

Table 11: T-Test: Difference in pre-test score between groups

	(1) No Survey vs. Survey	(2) No Final vs. Final Grade	(3) Other EPF vs. Sem. of Econ
pretest	-0.01 (0.971)	0.49 (0.235)	-0.72* (0.022)
<i>N</i>	629	629	527

p-values in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 12: T-Test: Difference in SAT score between groups

	(1) No Survey vs. Survey	(2) No Final vs. Final Grade	(3) Other EPF vs. Sem. of Econ
SAT	-33.99* (0.018)	52.61* (0.011)	23.03 (0.107)
<i>N</i>	422	422	342

p-values in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 13: Logistic Regression Coefficients on Wise and EPF Course

	(1) EPF (sem. of econ)	(2) Wise
Female	-0.34 (0.20)	0.18 (0.20)
White	0.40 (0.35)	-0.26 (0.33)
Black	0.14 (0.40)	0.10 (0.37)
Latino	0.14 (0.42)	0.10 (0.40)
Asian	0.39 (0.42)	0.23 (0.41)
First Generation College	-0.29 (0.24)	0.19 (0.23)
Constant	-1.07** (0.33)	0.88** (0.32)
Observations	527	523

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

B Survey: The Effect of High School Economics courses in Virginia

Name _____

1. When did you last take an economics class (high school or college?)
 - (a) Never
 - (b) Last semester
 - (c) Last year
 - (d) Before last year

2. Have you taken a high school economics and/or personal finance (EPF) course?
 - (a) No.
 - (b) Yes. The course was mostly about personal finance
 - (c) Yes. I learned about economics for an entire semester
 - (d) Yes: another course (what was the course?)

3. What grade did you get in that EPF class?
 - (a) A
 - (b) B
 - (c) C
 - (d) D-F
 - (e) Not applicable

4. In which school division (county) did you take your class? [Private or charter schools write "other"]

5. Did you take the W!SE personal finance certification test as part of your high school EPF class?

(a) No or not applicable

(b) Yes

6. How was the EPF course delivered?

(a) With a classroom teacher

(b) Online, with lots of involvement from a classroom teacher

(c) Online, with little teacher involvement

(d) Not applicable

7. What was your most recent high school economics teacher's name (full name)?
