

Determinants of Success in High School Economics: Lessons from the Field

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JEL Classification: A20, A22, I20, I21

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Abstract

Recently, the Hawaii Council on Economic Education conducted a survey of high school seniors to gauge their understanding of basic economic concepts. Based on these results, we conduct a series of case studies, consisting of interviews with principals and economics teachers at eight Hawaii public high schools. We summarize the qualitative and quantitative results of these interviews. We then use these and other data to estimate the effects of school, demographic, and other characteristics on average student achievement on the survey. We find that the improvement in student test scores as a result of a one semester economics course is modest, but that the single greatest determinant of achievement is overall school quality. Based on these and other findings, we present recommendations for policy and further research.

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I. Introduction

All of us come by understanding of economic principles and truths in many different ways –jobs, life experiences, post-secondary education, and high school coursework. In the light of economics’ designation as a “core academic subject area” in the No Child Left Behind Act of 2001 (NCLB), high school-level economics education has come even more into the spotlight.¹ To begin to quantify the knowledge imparted in these courses, the Hawaii Council on Economic Education (the Council) sponsored a survey of high school seniors’ economic knowledge, using a 20 question exam based on the Test of Economic Literacy (TEL), developed by the National Council on Economic Education (NCEE) and regularly used to measure such knowledge. We conduct case studies of eight of the schools participating in the survey, and proceed by using patterns from the case studies to examine the determinants of average achievement in each school. We innovate on the current literature by combining a case study approach with a recent survey of student knowledge, which gives us access to qualitative and quantitative results on the same subjects. We find that overall school quality is the single largest determinant of performance on the survey, while teacher background is surprisingly insignificant. We conclude with a discussion of the results and policy recommendations.

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¹ The main effect of identification as a core area is the requirement that teachers who teach the course are required to be “highly qualified.” Outside of the requirement for a bachelor’s degree, each state may modify the definition of “highly qualified.” The State of Hawaii’s requirement system which predated NCLB largely satisfies this requirement.

II. Literature Review

The body of current research on high school economic education is not particularly large.² In his summary paper, Walstad (2001) states that enrollment in Economics courses increased substantially in the country during the 80's and 90's and offers as explanation the increasing number of states which require an Economics course for graduation. These mandates are driven by the widely held belief that economic literacy causes positive externalities or provides practical skills for decision making.³

Unfortunately, the utility of high school Economics courses is not well-established. Belfield and Levin (2004) examine the relationship between mandatory Economics courses and overall academic performance as measured on the Scholastic Aptitude Test (SAT). They find that the average SAT score for students who have taken a mandated Economics course is lower than the average score of equivalent students who do not. Brasfield et al. (1993) report that high school economic education is positively correlated with students' introductory economics grades in college; however, selection bias may have driven their results.⁴ In his research, Peterson (1992) discusses the self-selection problems which are inherent to evaluation of any elective courses; students who have an interest in and talent for economics will be more likely to enroll in a course, making it difficult to separate out the effects of selection from the effects of instruction.

Other research is more focused on overall economic achievement of high school students, as measured by the TEL discussed above. A study done by Walstad and Rebeck (2001) points out a low level of economics achievement even by students who have recently completed a high school Economics course.⁵ He mentions the short length of said course as possibly the most important factor. On the other hand, Tennyson and Nguyen (2001) find that schools which mandate a savings/investment course display higher achievement in students' financial literacy than schools which do not. On a similar note, Beron (1990) advocates an applied curriculum rather than a theoretical one, since only students who are interested in attending college would find a theory course useful. Grimes (1994) looks into the differences between public and private education. Despite the popular perception that private schools provide a higher quality education than public schools, he reports that – controlling for student ability and background – public schools teach economics more effectively than private schools.

On the policy side, some work suggests that state-mandated economic education may be counterproductive. Marlin (1991) posits that the mandate may create the situation where “less-than-qualified teachers who have no aptitude or interest in teaching economics may be commandeered into teaching... [an Economics]...course.” He uses the National Assessment of Economic Education (NAEE), administered in 1987 by the NCEE to support the intuitive positive relationship between teacher attitudes and student achievement; as a result of this and other factors, economics courses taught in states with mandates were less effective as a whole.

² See Becker, Greene and Rosen (1990), Highsmith and Baumol (1991), and Walstad (2001) for summaries of current research

³ Tennyson and Nguyen (2001), Walstad (2001), Grimes (1994)

⁴ Not only is it likely that students who took an economics course would be relatively interested in economics, but the presence or absence of an economics course in a high school curriculum could be correlated with the overall quality of the school.

⁵ High school students with completion of an economics course scored 61 percent correct on a multiple-choice standardized test of economic literacy.

However, one issue in Marlin's research is missing data (e.g. some teachers not filling out the surveys), which may have introduced a selectivity bias. Other researchers have also reported on the impact that instructor background has on students.⁶ In addition, Watts (1992) reports concerns that current high school economic education may be misleading and biased toward favoring a simplistic viewpoint due to the lack of sufficient coverage on some topics.⁷

Kane and Staiger (2002) warn us that test results, even averaged out, are noisy measures; the noise inherent in testing is at least 15 and as much as 80 percent of the difference between different schools' performances, depending on how performance is measured. This noise is decreased by larger samples, as one might expect. Chay et al. (2005) discuss more of the econometric issues and note that there is not yet a consensus within the econometric literature on the severity of or correction for the biases.

Burnett and La Croix (2003, 2006) report extensively on the current status of economic education in Hawaii. In contrast to the rest of the country, Hawaii's enrollment in economics courses declined substantially through the 1990s. They suggest that Hawaii's slow economic growth starved the Department of Education (DOE), Hawaii Council on Economic Education and University of Hawaii (UH) of resources during this period. As a result, the DOE focused on "core" courses at the expense of other electives; teachers were not in a position to make use of Council support; and fewer economics majors graduated from UH, decreasing the supply of potential economics teachers.

III. Methodology In April 2004, teachers in 19 public high schools located on the 4 islands with the largest populations, administered a 20-question exam⁸ developed by the National Council on Economic Education (NCEE).⁹ With the exception of one school dropped from the statistical results, the surveys were conducted in a non-Economics or Consumer Education class.¹⁰ The exam results did not affect students' grades, and no compensation was paid to any student based on completion or score. We believe the scores on the exam to be reasonable proxies for economic understanding. Data collected on the individual students was tightly restricted by the Hawaii State Department of Education. They allowed data collection on just a few student variables: gender, participation in an Economics or Consumer Education course, participation in a stock market simulation, interest in taking future economics coursework, and plans to attend a two- or four-year college after graduation. Finally, the authors dropped a few observations from the sample due to clear evidence that some students did not value performance on the exam.¹¹ Econometric and data issues forced Burnett and La Croix to disregard school-level variables. As a result, we use a case study approach to expand our information on the schools and inform further analysis.

⁶ Allgood and Walstad (1999) report on the results of training designed to compensate for a light background in economics; Bosshardt and Watts (1990) find that teacher background in Economics in the form of undergraduate coursework is an important determinant of teacher success.

⁷ Watts (1992) relays one critique of current high school economic education: "[It] serves as an apologia for the powerful interests of big business or old money."

⁸ Please see Appendix I for the exam/survey instrument.

⁹ 17 of the 19 schools offered economics courses at the time of the survey.

¹⁰ We discovered that one of the schools we interviewed violated the protocols for our surveys by administering it to a Consumer Education course; accordingly, we dropped it from our statistical analysis.

¹¹ See Burnett and La Croix (2006) for methodological details.

We posit that average scores for each school would be determined by four general categories of variables: student body characteristics, teacher characteristics, school quality, and geographic indicators. Based on this, we designed our case studies as follows. Eight schools were selected to represent a range of demographic, geographic, and survey characteristics, and at each school, the principal and that school's economics teacher were interviewed. Questions covered many areas, including: teacher background; classroom budgeting; preferred textbooks; use of content standards; and variables such as non-native English speakers, time of day for the course, and the number of teachers in the department who could teach the course. Once measures of teacher background and enthusiasm were identified, teachers at the remaining eleven schools were contacted and given brief telephone interviews.

The face-to-face interviews took between one half hour and two hours, depending on the interviewees' schedule and level of interest. Each interview took place on the high school campus during the business day before, after, or between classes. Interviews with the principals were generally in a staff room, while interviews with teachers were generally in their classrooms. Responses were documented through note-taking. All interviews conformed to human subjects guidelines, and confidentiality was strictly maintained. Interviewees received no compensation for their time, and their answers were generally believed to be credible. The interview instrument can be found in Appendix II.

IV. Case Study Results

Our interviews provided a wealth of anecdotal information, which we discuss below and synthesize with available statistics.

Table 1: School and Geographic Characteristics

School	Avg. Score (out of 20)	%students taken Econ (sample/school) ¹²	%8 th graders to private ¹³	Average per-capita income ¹⁴	%School lunches ¹⁵	%Native or Part-Native Hawaiian ¹⁶	Sum of math and reading test scores ¹⁷
1	11.5	74.3/30.4	0.92	\$37,078	10.5	9.1	1417
2	13.4	20.0/4.5	1.13	\$22,359	15.0	11.7	1393
3	9.0	12.5/10.24	0.48	\$24,655	20.7	14.7	1376
4	8.0	0/6.5	5.72	\$23,482	22.7	22	1381
5	11.3	21.4/4.2	0.43	\$24,424	11.4	8.9	1406
6	9.4	65.4/18.8	1.17	\$21,344	50.1	34.6	1371
7	13.5	92.6/42.2	1.48	\$19,475	31.0	24.5	1400
8	9.3	21.7/13.4	0.61	\$17,549	40.9	9.0	1355
Avg.	10.7	38.5/16.04	1.49	\$23,796	25.3	16.8	1387.37

¹² Percentage of seniors who have taken economics in our sample, vs. the proportion in the senior class having taken same. Source: registrars of participating schools.

¹³ Percentage of eighth graders attending public school who are eligible to attend this school but choose a private, charter, or home school instead. Source: Hawaii Department of Education internal data.

¹⁴ Average per capita income of the neighborhoods feeding into this school. Hawaii Department of Education, School Status and Improvement Report, 2002.

¹⁵ *ibid.*

¹⁶ *ibid.*

¹⁷ 10th grade students, *ibid.*

School Characteristics

Table 1 above presents relevant characteristics of the student and schools included in our sample. Average scores on the 20-question exam ranged from 8.0 to 13.5. To give a sense of how well our sample of students represented actual enrollment in economics at one particular high school, we report the percentage of seniors who have taken economics in our sample versus the proportion in the senior class having taken the same.

A potentially important indicator of school quality is what percentage of the students that are zoned to attend this school opted to instead attend some alternative, such as a private, charter, or home school. Unfortunately, we were not able to get the raw information on the number of eligible students for a given school who choose an alternative. However, we believe the percentage of 8th graders in public school who decided to attend a substitute instead of this public school to be a good proxy and report this in Table 1.¹⁸ Another obvious determinant of performance on the exam might be the overall socioeconomic status of the school's student population. We report two potential indicators of such status, per capita income and the proportion of students receiving free or subsidized school lunches through the corresponding federal programs. Per capita income of the area feeding students into the school is appealing for its holistic quality, but the percentage of students receiving school lunches is more directly tied to the student population. We also investigate the extent to which Native Hawaiian ethnicity determines performance on the exam.

Because Economics had no prerequisites at any schools surveyed, students' backgrounds and talents in math and verbal skills varied tremendously, which increased the difficulty of effective instruction.¹⁹ Since both math and reading skills contribute to economic understanding (and since the two measures are closely correlated), we combine the average scores on Hawaii state achievement tests to get a composite variable. According to teacher accounts, the students who took Economics seemed to fall essentially into two groups – one, college-bound seniors, and two, students who were looking for a Consumer Education course (and who found the abstract nature of the high school Economics course uninteresting). Also, the one school which effectively required an Economics course of its students did not achieve a particularly high average score on the survey, despite its strong overall reputation for academic success.²⁰ In the schools which offered a one-semester Economics class, enrollment in economics courses seemed to be squeezed from both ends. Our interviewees agreed that exceptional students leaned toward AP courses for their Social Studies electives; but on the other hand, economics has a reputation as being relatively rigorous, so less motivated students tended to avoid it.²¹

¹⁸ Of course, the decision to attend a private or charter school also depends on the quality of alternative which is available; however, private and charter schools draw from multiple high school districts, so this would be prohibitively difficult to measure.

¹⁹ One teacher reported that he had come to the school to teach economics, but that their favorite class to teach was now geometry, because it was less frustrating to find the right level at which to instruct. Another teacher reported that their class contained students who were taking AP Calculus and others who were still struggling to pass algebra courses.

²⁰ The Hawaii public school system requires four years of Social Studies as part of its graduation requirements. In practice, this means that seniors take two Social Studies electives. One school had only two electives available, one of which was Economics – so it was effectively required to graduate.

²¹ This dynamic will likely be altered by the creation of the new Business Pathways, which generally require Economics. A Pathway is a three-course sequence designed to prepare students for work in a particular field, such

Departmental and Institutional Support

Nearly all of the principals interviewed had a hands-off approach to departmental management. A few of the schools had formal methods by which feedback could be given to teachers, but most gave near-total autonomy to their instructors. As one might expect from this, institutional support was generally relatively weak; while most principals considered Economics very much an appropriate course to offer, it was kept at elective status.²² There was one exception to this; at the school which effectively required economics, the department head was given the resources to run an AP course, whether or not student enrollment was high in that semester.

Table 2: Teacher Characteristics

School	Avg. Score (out of 20)	Undergrad Economics courses taken ²³	Years teaching Economics ²⁴	Teacher's personal focus ²⁵	Assigned or by choice? (C = Choice)	Proportion of class time (lecture/participation) ²⁶
1	11.5	9	17	Economics	C	0/100
2	13.4	6	20	Economics	C	50/50
3	9.0	2	16	Economics	C	33/67
4	8.0	9	9	World History	C	50/50
5	11.3	2	3	US History	A	50/50
6	9.4	9	3	Economics	C	75/25
7	13.5	0	15	Consumer Ed	A	50/50
8	9.3	2	2	History	C	40/60
Avg.	10.7	4.875	10.625	--	--	43.5/56.5

Teacher Preparation and Attitudes

We expected that teachers who had a stronger formal background in Economics would perceive that they were more successful in imparting content to their students, but this appeared not to be the case in our interviews. Some teachers were economics majors as undergraduates and/or had acquired an MBA. As can be seen in Table 2 above, others had only a pair of introductory Economics courses, while one teacher had no formal economics training whatsoever. One teacher told us that it took them three years to become familiar enough with the subject to teach it well. A number of teachers we spoke to had only just begun teaching Economics, while one had taught the subject for 20 years. Economics was not the personal focus of half of the teachers

as Health Care, Information Technology, or Business. Three of the schools interviewed had Business Pathways (which required Economics) in preparation, while the others were seriously considering the possibility.

²² The schools did not, by and large, seek to “sell” economics as a high-priority elective to juniors signing up for courses, and there were few extra- or co-curricular activities sponsored by the schools.

²³ Source: teacher interviews. Teachers with an MBA are considered to have the same number of courses as a major in Economics, nine at the University of Hawaii.

²⁴ Ibid.

²⁵ Ibid; some teachers reported more than one personal focus; if their foci included Economics, we use that. If they did not, we use the first one reported.

²⁶ Ibid.

we interviewed; History or Consumer Education was the preferred course for many. Half of the teachers interviewed were assigned (or pressured to volunteer) the course, whether or not they felt prepared to do so.²⁷ The teachers who believed that they were more successful seemed to be the teachers who felt more *comfortable* with economics, which was not clearly related to their formal backgrounds.

All of the teachers who we interviewed were professional and committed to their students' well-being. Most of the teachers to whom we spoke felt that economics mixes the "soft" skills associated with social studies (critical reading, addressing "fuzzy" problems, picking out which details are important) with the "hard" skills of business (reducing problems to a model, applying the results of calculation back to the real world). The Social Studies Certification required to teach Economics in Hawaii's high schools is very broad (in theory, a teacher with such a certification is qualified to teach world history, psychology, and civics), and it may not be reasonable to include economics in that already large set.

The style of teaching varied from school to school as well, with one teacher apportioning 100 percent of class time to participatory learning, while most allocated half or more to traditional lecture.

Content Standards

Most teachers paid close attention to the Hawaii content standards. The standards were vague enough, however, that there was quite a bit of variation in the material taught in different schools. One teacher consciously tried to synthesize consumer education and economics, while another used Junior Achievement as the basis for their curriculum.²⁸ Still other teachers had a favored economics textbook and kept close to it.

²⁷ Ibid; a common refrain was, "No one else wanted to teach the class, so I went ahead and volunteered." One teacher related that they found their undergraduate Economics courses to be incomprehensible, but then found themselves trying to relate the same concepts to a classroom of high school students.

²⁸ Junior Achievement is an organization devoted to improving student understanding of business and economics. One of their larger programs is a curriculum developed around students starting their own businesses. It works students through the process of developing an idea, finding financing, marketing their product, etc. over the course of a semester.

Table 3: Course Characteristics

School	Avg. Score (out of 20)	Pattern of Enrollment? ²⁹	Reason course was offered ³⁰	Other teachers available
1	11.5	Effectively required	Teacher interest; useful skills for students	3
2	13.4	AP's more attractive, how it is sold to Juniors	Instructor pushed for inclusion	0
3	9.0	Course difficulty leads to low interest	Desire to offer a variety of electives; sense that material is good for students	1
4	8.0	Econ 1 of 2 choices for 2 nd senior elective	Needed for career pathways	1
5	11.3	Popular career pathway requires an Economics course.	Teacher availability, student interest	3-6 ³¹
6	9.4	Only some students have academic background for course	Teacher availability (teacher is considered particularly skilled)	0 ³²
7	13.5	Hardest of the Social Studies electives, culture of entrepreneurialism	Rigorous, business-oriented course; useful skills for students	1
8	9.3	Class has good reputation	Traditionally offered; sense that econ offers essential skills	4
Avg.	10.7	--	--	1.625-2

Course Offerings

Most of the schools offered a single-semester elective economics course with 1-2 sections of 20-30 students, though one school effectively required economics to graduate and one school had ceased offering Economics in the year between the survey and our interviews. While some courses attracted students because of a teacher's good reputation, others' low enrollment was driven by the course's reputation for difficulty. The course was taught at all hours of the school day, mainly determined by the details of scheduling. All of the schools determined their course offerings by listing available courses to third year students and allocating sections based on their responses. Six schools had at least one teacher in addition to their current instructor who was able and willing to teach additional Economics sections; of these, two had more than one backup instructor. At the time of our survey, we believed Consumer Education courses to be relevant to

²⁹ Interviewees' view of why the course is relatively sought-after or unsought-after.

³⁰ Interviewees' view of why the course was offered.

³¹ The principal was more optimistic than the instructor.

³² The course was discontinued between our survey and the interviews when the sole instructor for the course moved on.

student achievement; unfortunately, student self-reporting regarding Consumer Education coursework proved unreliable.³³

Course Texts, Structure, and Budgets

There was tremendous variation among the courses in text and structure. No two instructors used the same textbook (if any); two of the courses centered around problem-based approaches, while the other six were more traditional. Therefore, we were unable to determine any patterns regarding the course structure or textbooks used by teachers.³⁴ Inertia was the single largest reason for the adoption of a particular text; other teachers cited recommendations from the Council or peers. Budgets for the courses were small (in the hundreds of dollars per semester, not counting textbook purchases) and varied little. Although one school maintained a highly centralized budget system, most schools used an informal system for managing their resources, with departments making decisions as to textbook and other large purchases. Extracurriculars were a function of individual teacher interest, rather than school policy. As a result, no school had an economics club, as such, though one school did send teams to the Economics Challenge, a competitive Scholastic Bowl-style event hosted by the Hawaii Council on Economic Education.

V. Statistical Results

Based on our interviews, we identified 11 stratum-level variables which we viewed as likely to affect average school scores on the survey of economic knowledge:

- the percentage of students taking the survey who have taken an economics course;
- the average per-capita income in the area feeding into the high school (a measure of socioeconomic status);
- the sum of the school's average math and reading scores on the Hawaii standardized tests in those areas (a measure of the school's overall academic success);
- the percentage of students in the school taking economics (a measure of the externality effects of the economics course);
- the percentage of students receiving subsidized school lunches (an alternate socioeconomic measure);
- the percentage of students interested in taking economics courses;
- a measure of the proportion of eligible students choosing to attend private, charter, or home schools (a measure of a possible "brain drain");
- a dummy variable for schools on Oahu as versus the neighbor islands;
- the percentage of students who self-identify as Native Hawaiian or part-Native-Hawaiian, a group which has historically endured discrimination and dislocation;
- and the number of undergraduate courses a teacher took in economics (a measure of teacher background) along with an interaction term.

We present summary statistics in Table 4.³⁵

³³ Schools which did not offer Consumer Education often had as many as 20% of students reporting having taken it. In addition, one school only offered Consumer Education to its Special Education students, but several students reported having taken it.

³⁴ Texts included teacher-generated packets, as well as books by Clayton, McConnell and Brue, Miller, O'Sullivan and Sheffrin, Rinehart, Slavin, and Wolken and Glocker.

³⁵ Please see footnote 10 regarding the one school which we dropped for violating the experimental design.

Table 4: Summary Statistics (n = 18)

Variable	Mean	St. Dev.	Min	Max
<i>Average Score</i> (dependent variable)	10.44	1.3	8.00	13.52
<i>dpecon</i> Percentage of students in sample taking econ (demeaned) ³⁶	0	31.52	-34.01	61.82
<i>dpc</i> Per-capita income, in thousands (demeaned)	0	5.07	-6.562	15.88
<i>dmplusr</i> Average math + average reading scores, 2002 (demeaned)	0	19.50	-34.26	34.74
<i>schdpecon</i> Percentage of students in school taking econ (demeaned)	0	15.91	-18.35	27.65
<i>lunch</i> Percentage of students in Federal school lunch program	31.19	16.53	10.5	65.0
<i>Interest</i> Percentage of students in sample indicating interest in econ	20.36	9.95	0.00	37.5
<i>private</i> percentage of eligible public-school 8 th graders choosing a private, charter, or home school instead. ³⁷	1.28	1.46	0.166	5.72
<i>island</i> dummy = 1 if school is on Oahu	0.56	0.51	0.00	1.00
<i>hawaiian</i> percentage of students in school who identify as Native Hawaiian or part-Native Hawaiian	20.35	13.16	8.30	59.5
<i>teacherecon</i> Number of undergraduate courses a teacher took in econ. ³⁸	4.11	3.46	0.00	9.00
<i>tdpecon</i> Interaction term between <i>teacherecon</i> and <i>dpecon</i> .	0.056	1.64	-3.061	3.625

Each student's score on the survey was the result both of individual and schoolwide characteristics. Burnett and La Croix (2006) focus on individual characteristics and use a simple procedure to control for schoolwide characteristics without examining them.³⁹ We examine the schoolwide characteristics by using as our dependent variable the average score at a given school, rather than any student's individual score.⁴⁰ In order to justify this process, we assume that the school-level variables are not geographically correlated – that a given high school is not more likely to, for example, have a teacher with a high degree of economics experience because it is near another school with such a teacher.

³⁶ Demeaning these variables ensures that the constant term gives us useful information and allows us to concentrate on the differences between schools.

³⁷ See footnote 13.

³⁸ See footnote 20.

³⁹ Wooldridge (2002) explains: "If we are interested in the coefficients on the individual-specific variables . . . there is a simple solution: include stratum dummies along with [the individual variables]." (p. 133)

⁴⁰ Again, Wooldridge (2002): "If the strata are, say, states in the United States, and we are interested in the effect of state-level policy variables on economic behavior, one way to proceed is to use state-level data on all variables." (p.133)

Our average score and teacher background variables are consistent with Walstad (1992) and Marlin (1991). The data for most of our variables is gathered either from census data or registrars' records at the various schools and should be highly accurate. There are a few concerns, however. First, students' self-reporting on whether or not they had taken a Consumer Education course was inconsistent enough with registrars' records that we were forced to drop that line of inquiry. On the other hand, Economics courses are more of a well-defined concept. The close correlation between *dpecon* and *schdpecon* (a correlation coefficient of 0.79) gives the impression that although our sample is slanted toward students who have taken Economics, it is consistently slanted that way and that the answers to the question are likely reasonably accurate. Our measure of school quality, *dmplusr*, is very much an index variable; it combines information on the student body's overall level of talent, commitment, and resources, the value of the curriculum, the teaching staff's effectiveness, the school's resources, and the quality of the administrative staff. Some of these aspects are partially coded for in other variables (such as *dpc*), while others are not, which raises multicollinearity concerns. This suggests that our coefficient for *dpc* (demeaned average per capita income) may be unpredictably biased, which means that we cannot straightforwardly interpret its coefficient. Econometric testing reveals that *dpc* is correlated with the error term for specifications which do not include it but do include *dmplusr*, while *lunch* (percentage of students receiving free or subsidized lunches through the appropriate agencies) is not. There was no theoretical reason to choose between *dpc* and *lunch* for our baseline socioeconomic variable, so we use *dpc* in order to avoid omitted variable bias.

Our average score variable is, of course, only a proxy for average student understanding of economic principles and applications. We also expect our average score and *dmplusr* variables to be noisy, due to their reliance on the average of student tests.⁴¹ The dual measurement error in the score variable (once from its proxy status and once from expected noise) will cause the relatively innocuous result of an underestimate of the regression errors. We thus consider our R-squared statistics to be upper bounds. If the measurement error in *dmplusr* is uncorrelated to any missing variable, it will bias its corresponding estimated coefficient towards zero. Since the error in testing is likely due to idiosyncratic events (the classic example being a dog barking in the parking lot during testing), we assume that the error is uncorrelated with other variables, and therefore consider the *dmplusr* coefficient a lower bound. One could make a similar argument for our per-capita income variable, as it measures that information for the neighborhood, rather than the precise households which support the student body.

For simplicity, we use a linear specification in our econometric analysis of these relationships. Other functional forms were tried, including a log-linear form, but they added no additional useful information. With our small number of observations (still approximately half of our sample universe of Hawaii high schools), we were forced to be parsimonious in the construction of our regression equations. We identified three variables which we felt had core explanatory value – the sample percentage of students taking economics, local socioeconomic status measured by per capita income for the reasons stated above, and overall school quality – and used them for our base regression, adding additional variables to examine each separately. We report the baseline model (1) and our other specifications below in Table 5.

⁴¹ Kaine and Staiger (2002), Chay et al. (2005)

Table 5: Regression results (dependent variable = Score)

Variable	Baseline	(1)	(2)	(3)	(4)	(5)	(6)	(7)
dpecon	0.0240*** (0.0066)	0.0222* (0.011)	0.0250*** (0.0067)	0.0208*** (0.0065)	0.0239*** (0.0070)	0.0250*** (0.0066)	0.0229*** (0.0063)	0.0297** (0.0112)
dpc	-0.141** (0.059)	-0.141** (0.062)	-0.175** (0.067)	-0.124** (0.056)	-0.141** (0.062)	-0.155** (0.060)	-0.127** (0.057)	-0.117 (0.084)
dmplusr	0.0621*** (0.015)	0.0627*** (0.016)	0.0565*** (0.016)	0.0637*** (0.014)	0.0623*** (0.016)	0.0597*** (0.015)	0.0553*** (0.015)	0.0584*** (0.19)
schdpecon		0.0047 (0.0207)						
lunch			-0.0205 (0.0193)					
private				-0.250* (0.143)				
island					-0.394 (0.445)			
hawaiian						-0.0192 (0.017)		
interest							-0.0323 (0.0205)	
teacherecon								-0.00627 (0.0757)
tdpecon								-0.154 (0.241)
constant	10.478*** (0.199)	10.478*** (0.207)	11.113*** (0.631)	10.798*** (0.261)	10.500*** (0.324)	10.868*** (0.401)	11.132*** (0.457)	10.510*** (0.375)
R ²	0.6518	0.6529	0.6795	0.7179	0.6520	0.6823	0.7076	0.6636
Adj. R ²	0.5772	0.5462	0.5808	0.6311	0.5449	0.5845	0.6176	0.5234

N = 18. Standard deviations in parentheses *,**,*** = significant at 10%, 5%, 1% level

Our results are largely consistent with Burnett and La Croix (2006), with a few wrinkles detailed below.

Students taking an Economics course

Our analysis indicates that, on the margin, a school with a one percent increase in the number of students taking Economics sees a 0.024 point improvement in its average test score. To put it another way, a school which moves from having none of its students taking Economics to having all of them take the course can expect a 2-3 question improvement on the average student performance on the survey. One possible additional benefit of an Economics course would be that students who did not take the course might enjoy an externality effect from exposure to their peers who have. To address this possibility, we include a variable for the percentage of seniors schoolwide who had taken economics; presumably the externality effect would be magnified by increased exposure. We find that this variable is statistically insignificant and believe this to mean that the value of an economics course falls mainly to its direct participants.

Socioeconomic Variables

A priori, we would expect that households with greater resources would invest more resources into their children's educations, so that a school with wealthier students attending would have a greater level of achievement. Because we have already corrected for the nexus of school and student quality in our *dmplusr* variable, we would not necessarily expect to see a significant coefficient on the per capita income variable, *dpc*. Similar reasoning prevails for the variable discussing the percentage of students receiving federally subsidized school lunches, *lunch*,

another proxy for household resources. We theorize that a possible “brain drain” occurs in neighborhoods where wealthier students are more able to leave the public school system and attend private or home schools. Thus, we gathered information on students who were eligible to attend the public schools but took other options in specification (3), using our *private* variable. The double bind mentioned above (where the most talented students seek out AP courses instead of economics, while the less talented students self-select away from the relative rigor of the course) creates the possibility of unpredictable interactions.

The coefficient on our *lunch* variable is statistically insignificant (see specification 2), as expected, but our per capita income coefficient is significant in all specifications and nontrivially negative.⁴² Our one significant coefficient outside of our core explanatory variables was *private*; it was marginally significant, had the expected sign, and even induced a smaller coefficient for per capita income. This was obviously a part of the story. However, since per-capita income is almost certainly a causal variable for school quality, the coefficient on *dpc* is far more difficult to interpret. We could be manifesting nonlinearities in the relationship between per-capita income and school quality. Alternately, we could be picking up systematic social differences between students from households with higher per-capita incomes, such as perhaps a greater distance from economic necessity, or a more strategic attitude toward test-taking. Unfortunately, we lack the data to effectively test these hypotheses, and so we leave the interpretation of the per-capita income coefficient to later work.

We posited that schools which are not on Oahu might face various additional challenges due to their remoteness. In addition, students who self-identify as Native Hawaiian belong to a population which is traditionally underserved. However, our island dummy and ethnicity variables (specifications 4 and 5, respectively) were statistically insignificant.

School and Teacher Characteristics

In order to estimate the explanatory power of each variable, we calculate the standardized coefficients for each specification (not shown here). The nexus of school and student quality measured by student achievement on standardized tests has tremendous predictive power – the most explanatory power of any single variable in every specification.⁴³ Our measure of student interest had the wrong sign and was insignificant (see specification 6). Finally, our measures of teacher background (and the interaction with the percentage of students who had taken the course, reported as specification 7)⁴⁴ were insignificant, which stands in contrast to Marlin (1991), but is consistent with the results of our interviews. This is actually something of a hopeful sign; it implies that it may be possible to effectively train teachers in economics without a prohibitively large investment.

VI. Conclusions

⁴² Please see our discussion of the per-capita income variable earlier in this section for our reasons for including this variable, despite the difficulty of its interpretation.

⁴³ The standardized coefficients are the coefficients which result when the regression is run after each variable is standardized to have a mean of 0 and a variance of 1. This allows us to compare across variables with different scales, units, etc. Most software statistical packages report this routinely.

⁴⁴ As mentioned above, it is reasonable to conclude that the vast majority of the benefit of an economics class accrues to the students of the course, so a knowledgeable teacher’s effectiveness would be multiplied by the number of students in his or her course.

Our case studies gave us tremendous insight into the challenges and nature of high school economics education in the State of Hawaii. Based on our interviews and follow up statistics, we conclude that overall school quality is the driving force behind success in our survey of economic knowledge. We note that other intuitively appealing explanations, such as socioeconomic variables and teacher background, have far less explanatory power.

A rough estimate of the amount of money spent on high school economics education in the State of Hawaii comes to several million dollars per year.^{45,46} The returns to this investment are modest; a school which sends all of its students to an Economics course gains, on average, 2-3 questions on a 20-question test administered a few months after the end of the course, compared to an otherwise identical school which does not offer Economics. To put this in perspective, a school which improves its average math and reading scores 20 points each (on a 800-point scale) will have approximately the same effect on student understanding of economics.

On the administrative side, our interviews suggest that principals looking to fill sections of Economics classes should seek out teachers who are comfortable with the type of analysis that is inherent to economics – and that said teachers can come either from social studies or business, but that administrators should not assume that the social studies (or business) certification necessarily connotes the level of mastery of economic concepts necessary to teach a course effectively. We also suggest, based on our interviews and results regarding formal economics background, that teacher training in economics should emphasize an approach designed to give teachers a sense of familiarity with economic ways of thinking, rather than particular economic theories or approaches – especially given the tremendous variation in student backgrounds. Finally, we urge further research into economics instruction best practices and effective techniques; the overwhelming diversity of texts and approaches which we document constitutes a sort of Wild West of anarchic instruction.

We should also be careful to examine the student population taking these courses. Our interviewees indicated that Economics courses were mainly taken by college-bound seniors. If that is the case, then we are largely educating people who will have access to more rigorous treatments of the subject in later coursework. If our policy goal is to empower as many people as possible with economic modes of analysis, then our target audience may be the students who are entering the workforce directly, and we should tailor our curricula accordingly.

Moving forward, one obvious extension of this work is to conduct regular, larger-scale surveys in order to create a pool of data which will ameliorate the noise concerns from a particular school. In addition, it would be helpful to study enough schools in depth such that more than one used the same text, so that we could begin to analyze patterns in curricula. Finally, some schools offered business courses (marketing, accounting, etc.), but we do not have systematic data on them; examining how those courses affect economic understanding could prove fruitful.

As citizens and as heads of households, our high school graduates continue to enter a world of ever-increasing economic complexity. We do them no service by failing to give them a basic understanding of these principles. Offering a course which exposes them to economic concepts and analysis is only the first step. We must make certain that the course gives insight that is

⁴⁵ Author's calculations, based on telephone survey done by the Hawaii Council.

⁴⁶ Plus, of course, the opportunity cost of the students' time, an often-overlooked quantity.

useful to those seeking to actively participate in society and make well-informed decisions based on fundamental economic reasoning.

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Appendix I: Survey of High School Seniors' Economic Knowledge

*** Correct Answer; each question also had the option to respond “don't know” or “refuse”

Q1. For most people, the largest portion of their personal income comes from:

- a. Wages and salaries from their jobs***
- b. Interest from stocks and bonds they own
- c. Rent paid to them from property they own

Q2. When a person rents an apartment, who benefits from the transaction?

- a. Only the person renting the apartment
- b. Only the landlord
- c. Both the person renting the apartment and the landlord***

Q3. When deciding which of two items to purchase, one should always:

- a. Choose the item that costs less
- b. Choose the item with the greatest benefit
- c. Choose an item after comparing the costs and benefits of both items***

Q4. In the United States, who determines what goods and services should be produced?

- a. Producers and government
- b. Consumers and government
- c. Producers, consumers and government***

Q5. If the price of beef doubled and the price of poultry stayed the same, people would most likely buy:

- a. More poultry and less beef***
- b. Less poultry and more beef
- c. The same amount of poultry and beef

Q6. The resources used in the production of goods and services are limited, so society must:

- a. Make choices about how to use resources***
- b. Try to obtain additional resources
- c. Reduce their use of resources

Q7. An increase from 5% to 8% in the interest rate charged by banks would most likely encourage:

- a. Business to invest
- b. People to purchase housing
- c. People to save money***

Q8. Mexico grows fruits and vegetables and Argentina produces beef. If Mexico voluntarily trades fruits and vegetables in exchange for Argentinean beef:

- a. Both Mexico and Argentina benefit from the trade***
- b. Both Mexico and Argentina lose from the trade
- c. Mexico benefits and Argentina losses from the trade

Q9. The stock market is an example of an institution within our economy that exists to help people achieve their economic goals. The existence of this institution:

- a. Results in an increase in the price of stocks
- b. Brings people who want to buy stocks together with those who want to sell stocks***
- c. Help predict stock earnings

Q10. A large increase in the number of fast-food restaurants in a community is most likely to result in:

- a. Lower prices and higher quality***
- b. Lower prices and lower quality
- c. Higher prices and higher quality

Q11. Which one of the following statements about the function of money is wrong?

- a. Money makes it easier to save
- b. Money makes trading goods and services easier
- c. Money holds its value well in times of inflation***

Q12. A person who starts a business to produce a new product in the marketplace is known as:

- a. A manager
- b. A bureaucrat
- c. An entrepreneur***

Q13. The manufacturers of “XYZ” winter sportswear have their manufacturing plants running night and day, but they are unable to produce enough sportswear to satisfy demand. If “XYZ” manufacturers cannot increase production and demand continues to increase, the price of XYZ winter sportswear will:

- a. Increase***
- b. Decrease
- c. Stay the same

Q14. Which of the following are most likely to be helped by inflation?

- a. People living on fixed incomes
- b. People who borrowed money at a fixed rate of interest***
- c. Banks that loaned money at a fixed rate of interest

Q15. If your city government sets a maximum amount landlords can charge in rent, what is the most likely result?

- a. There will be more apartments available than people want to rent
- b. There will be fewer apartments available than people want to rent***
- c. The number of apartments available will be equal to the number of people than want to rent

Q16. Which of the following would be most likely to accelerate innovation in the computer industry?

- a. Placing a tax on all new inventions in the computer industry
- b. Increasing government regulation of the computer industry
- c. Investing in more research and development in the computer industry***

Q17. When governments supply products and services, these products and services usually benefit:

- a. More than one person at a time whether they have paid for them or not***
- b. Only the people who pay for these products and services
- c. Business at the expense of consumers

Q18. If the United States stopped importing automobiles from Country X, who would be most likely to benefit?

- a. Automobile manufacturers in Country X
- b. Consumers in the United States
- c. Automobile manufacturers in the United States***

Q19. If the gross domestic product of the United States has increased, but the production of goods has remained the same, then the production of services has:

- a. Increased***
- b. Decreased
- c. Remained the same

Q20. When the federal government's expenditures for a year are greater than its revenue for that year, the difference is known as:

- a. The national debt
- b. A budget deficit***
- c. A budget surplus

Appendix II: The Interview Instrument

Questions About the Class:

NB: This instrument contains notes about questions we would like answered. The precise wording of the questions and order in which they will be asked will depend on the ebb and flow of the interview. Every effort will be made to ensure comparability across responses.

Each question will be asked both of a member of the administration (Principal or Vice-Principal) and a teacher (an Economics teacher or the head of the Social Studies Department). They are divided into two categories solely for purposes of organization.

- 1) Which classes, precisely, are offered?
 - Econ or Consumer Ed?
 - Are some or all of the Econ courses AP courses?
 - How many students take the AP?
 - If so, how many students pass the AP (get a 3 or higher)?
- 2) How many students are in one section?
 - How many sections are there?
 - How have sections and numbers changed over the past 3 years?
 - Why do you think you see this pattern of enrollment?
- 3) Which classes do you expect to offer over the next two years?
 - How is that decision made?
- 4) Are there other teachers available to teach the course? E.g. what happens if you are unable?
- 5) What textbook(s)/study guides do you use, if any?
 - Why do you prefer this particular book?
- 6) What other media do you use?
 - Films
 - Multimedia
 - Computer Usage
- 7) What kind of instruction do you practice?
 - Teacher-directed instruction
 - Interactive Learning
 - Simulations
 - What kind?
 - Stock Market Sim
 - Small Business Sim
 - Demonstrations
 - Junior Achievement
- 8) How many years has the course been offered in its present form?
 - (If less than 3) what other forms was it offered in?

Questions About the Class (cont'd)

9) What kinds of homework are assigned?

- Project-based
- Problem sets
- Graphs
- Term Paper
- Current Events

10) Teacher background:

Social Studies Praxis or other form of accreditation?

Teacher's major/minor in college

How many econ courses?

Which courses?

How many years teaching econ?

What challenges do you face with regard to Continuing Education?

Ideal time slots

Orgs

HCEE

FTE

SF Fed

Others

What other subjects do you teach?

Which subject is your personal focus?

Was teaching this course your choice or was it assigned?

Institutional Support:

NB: This instrument contains notes about questions we would like answered. The precise wording of the questions and order in which they will be asked will depend on the ebb and flow of the interview. Every effort will be made to ensure comparability across responses.

Each question will be asked both of a member of the administration (Principal or Vice-Principal) and a teacher (an economics teacher or the head of the Social Studies Department). They are divided into two categories solely for purposes of organization.

- 1) Is the course a school requirement?
Is it part of a list of electives to satisfy a given requirement?
- 2) How often is the course offered? (2 times/semester, 1/yr, etc.)
Historically, over the past 3 years, how often has the course been offered?
- 3) What support, if any, do you receive from the DOE w/r/t economics education?
Training
Seminars
Evaluations
- 4) How is the budget for the economics class set, and by whom? How does it compare to other classes?
- 5) If an AP class, how are the students who take the AP selected?
If an AP class, how are the students who take the AP assisted?
Help with scheduling
“Day of” assistance with taking exams
Study groups
- 6) How is academic success awarded and recognized?
Econ
Math
General
- 7) What is the math sequence leading up to the class? (Algebra, geometry, advanced algebra, pre-calc, calc, etc.)
Prerequisites
Effective average math knowledge of students
Variance

Institutional Support (cont'd)

- 8) What is the English background of the students?
 - Prerequisites
 - Native speakers vs. non-native speakers
 - Effective average knowledge of students
 - Variance
- 9) What time of the day is the course?
- 10) Do you expect to make use of any online AP resources?
- 11) What is the overall level of student interest in the course? (sought-after, usual interest, little interest)
- 12) Is there a gender difference between the economics class population and the student population as a whole?
- 13) For students who are interested, are there economics or Social Studies:
 - Extracurriculars?
 - Co-curriculars?
- 14) How do the continuing education requirements for your economics teachers work out in practice?
- 15) How are content standards used in your Social Studies classes?
- 16) Is Economics taught, using the “infusion” paradigm, in other Social Studies courses?
 - Do you believe that the infusion is useful?
- 17) What was the reasoning behind the decision to offer an Economics course? How and by whom was that decision made?