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**Recognising and Building on Freshman Students'
Prior Knowledge of Economics**

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Abstract

The results of three surveys of freshman economics students (2008-2010) at the Waikato Management School, New Zealand, suggest that incoming students have significant levels of prior economics knowledge. Given this head start in knowledge, we have expanded our freshman lecture material with more advanced content than students would normally encounter in a microeconomics principles class. This paper examines the sources of incoming students' prior economics knowledge and discusses some of the changes made to the learning material. The changes relate principally to the links we make between students' basic, prior economics knowledge and the more advanced learning content that demonstrates how formal economics training can add considerable value in thinking more deeply about current affairs, business issues and daily life experiences.

Key Words

freshman economics
economic literacy
prior learning

JEL Codes

A20, A22

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1. Introduction

Economics principles classes in the first year of a college degree typically assume that students arrive with little or no knowledge of economics. In contrast, we have found that students typically arrive at these introductory classes with a significant appreciation of economic concepts, even in the absence of formal economics training. We have leveraged this knowledge to increase the range and complexity of the material that we present in our freshman university teaching program, increasing both the depth and breadth of the lecture content. The material includes relatively advanced content that lies outside the scope of most traditional introductory classes, but which nevertheless builds on students' prior knowledge and experiences. By highlighting how economics helps students to think more deeply about the often complex problems in their daily life and future business careers, we hope to demonstrate more effectively to our students the relevance of what they learn.

This paper has several aims. First, we highlight how pre-testing of students (using the Test of Economics Literacy, 3rd Edition (TEL3)) reveals the extent of prior economics knowledge that students come to their first class with. Second, we explain some of the sources of this prior economics knowledge. Third, we provide some examples of how we have increased the depth and breadth of the student learning content, based on their prior knowledge. Fourth, using the results of a standard post-test (Test of Understanding of College Economics, 4th Edition (TUCE4)), we demonstrate that in diverting teaching time to more advanced applications, our program does not entail the loss of standard or traditional learning outcomes in international comparisons. Thus our paper demonstrates how recognition and understanding of freshman students' incoming economic literacy can lead to a significant re-development of introductory material.

2. Background to the Problem

Our first-year ECON100 course at Waikato Management School is primarily a microeconomics principles course. It is compulsory for all students enrolled in the Bachelor of Management Studies, Bachelor of Business Analysis (Financial) and is also taken by economics majors in the Bachelor of Social Science, and by many other students as an elective paper. In the past, our approach to teaching this course began with the assumption that students came to their first university economics course with no prior knowledge of economics. To a large degree, this assumption was the result of student surveys that indicated that in any given year between 40-55 percent of incoming students had not studied any economics in high school. This heterogeneity of student background presents a particular problem for the teaching of introductory economics (Reimann 2004).

Due to the low starting point tailored to those students with little background in economics, by the end of the semester the course material finished at a level only slightly higher than that taught in final-year high school economics. This end point is relatively

common, as indicated by the content of well-known principles textbooks in common use in both New Zealand and overseas (for example, Stewart and Rankin 2008; Mankiw 2008).

The low starting point and the lack of depth in topics caused by a slow progression through the material were fairly serious problems, since they tended to limit our ability to undertake a thorough treatment of business applications that would extend students beyond what was contained in the textbook. In a business school this constituted a major weakness of the course. The inclusion of lots of introductory material left little room for learning innovations that were becoming more common in university courses, such as complex real-world applications (Smith 2007), or for new material highly relevant to business students, such as path dependence and sustainability (for example, Colander 2005). Focus groups discussions that we conducted suggested the loss of some of our best students to other disciplines, particularly finance, given the perceived lack of challenge and relevance associated with introductory economics.

Pre-testing our students at the start of the course has revealed that students came to the course with significantly more prior knowledge of economics than we previously gave them credit for, and thus allowed us to accelerate the pace and complexity of the course content. The pre-test employed was the Test of Economic Literacy, Third Edition (TEL3) (Walstad and Rebeck 2001a). TEL3 is a test designed to measure economics learning at the high school level, and as such lends itself readily for use as a pre-test of incoming university students. The test contains 40 multiple-choice questions in four content categories: fundamental economic concepts, microeconomic concepts, macroeconomic concepts, and international economics concepts. The questions can be categorized by cognitive character into three levels: knowledge - recognition and recall, remembering information close to the way it was first presented, comprehension - understanding the meaning and intent of information, and application - applying learning to new situations (Yamaoka and Asano 2003). The test contains six knowledge, twelve comprehension and 22 application questions.

The key advantage of TEL3 is that it tests economic knowledge without recourse to economic jargon. For example, the question: ‘Which do economists consider to be a productive resource (factor of production)?’ places only secondary importance on the jargon, preferring to use a more general and easily understood term, ‘productive resource’. The test’s simple, intuitive language reveals students’ abilities to reason and to adopt the economic way of thinking, including the ability to establish causative chains of events to solve economic problems. Moreover, TEL3 is designed to measure final-year high school economics knowledge, and is therefore appropriate for our students who in most cases are tested in their first week of entering university.

3. Pre-Test (TEL3) Results

At the beginning of the economics course in each year from 2008 to 2010, students sat the TEL3 as a pre-test. Of the 732 students in the sample, 44.8 percent had no prior economics training, and 53.3 percent had not studied economics at high school.¹ The overall standard of the test might be considered ‘easy-to-average’ for students who had already completed a freshman-level economics course, but might be expected to offer more challenges for students with no formal economics study. Still, the overall results for the class were encouraging, as Figure 1 and Table 1 suggest. The frequency distribution in Figure 1 is reassuring, since it suggests the absence of a strong left-hand tail. Such a tail could raise problems in accelerating the pace of the teaching, if it reflected a significant number of weak students (that is, weak relative to others in the class). The distribution of scores in the pre-test is also clearly bi-modal.

The summary statistics in Table 1 indicate that students are performing at a level better than random guessing, but also reinforce the bi-modal distribution of scores – with those students who have done prior formal economics study performing significantly better. The extant evidence on whether prior economics training at high school is associated with higher economic literacy is mixed, with some studies finding that high school economics is associated with higher economic literacy among students in economics principles classes (for example, Lopus 1997) and high school students in general (Walstad and Rebeck 2001b), while other studies find the opposite (for example, Shipley and Shetty 2008).

While Lopus (1997) notes that the nature of content taught in high school economics makes a difference with courses that teach microeconomics and/or macroeconomics having a significant effect while more general courses do not, in New Zealand high school the economics curriculum is reasonably standardised through the National Certificate in Educational Attainment, which covers both microeconomics and macroeconomics. The strong effect of past economics experience observed here may reflect the nature of students enrolled in the economics principles class (predominantly business students), although business students have been shown to not perform better than other majors (for example, Lumsden and Scott 1987). There is also some evidence to suggest that the economic literacy of freshman students with no prior economics study is declining over time in this course, which further increases the observed effect of prior economics study on economic literacy.²

¹ Students who had prior economics training, but not at high school, included students who had previous polytechnic or university study in economics, including some students who were repeating the introductory economics paper.

² A univariate Poisson regression of student scores (out of 40) against year reveals that this decline in scores over time is statistically significant ($p=0.003$) for students with no prior economics, but the observed increase in scores among students with prior economics is not significant ($p=0.467$).

Figure 1: Frequency distribution of TEL3 scores for freshman students, 2008-2010

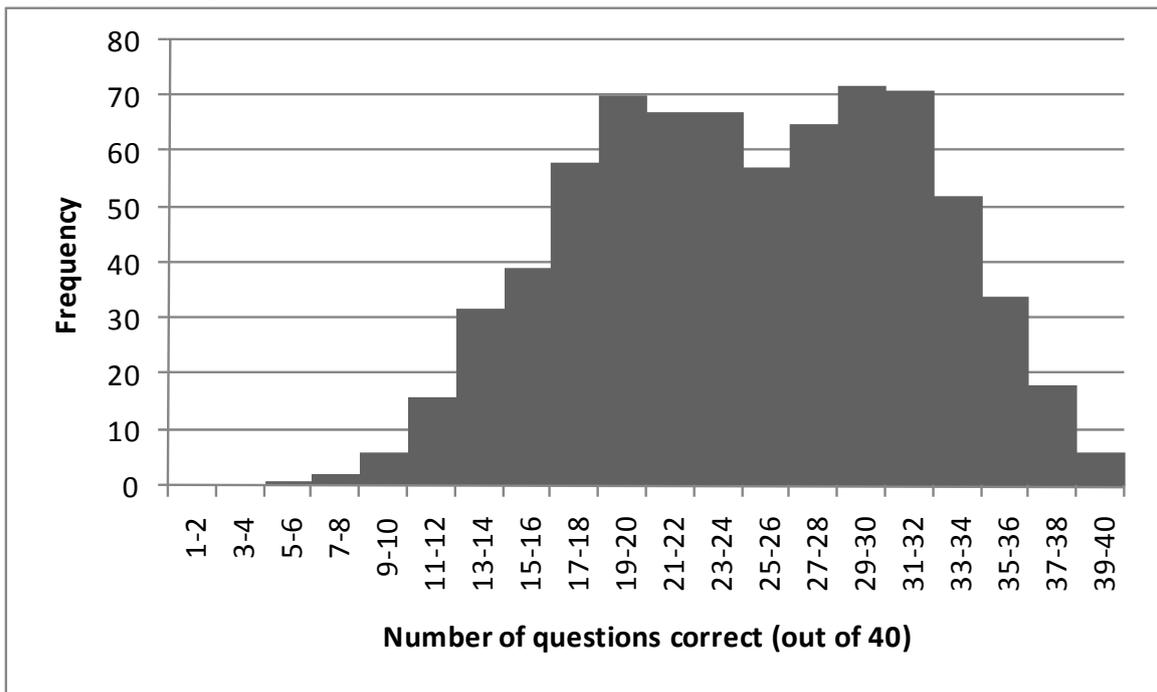


Table 1: Summary statistics of TEL3 scores for freshman students, 2008-2010

	No prior economics				Prior economics				Total			
	n	Mean	Med.	S.D.	n	Mean	Med.	S.D.	n	Mean	Med.	S.D.
2008	56	22.80	23	5.44	121	27.20	28	6.50	177	25.81	26	6.50
2009	119	21.34	21	6.33	133	28.31	29	6.24	252	25.02	25	7.18
2010	153	20.25	19	6.01	150	28.81	28	5.90	303	23.99	24	7.05
Total	328	21.08	21	6.09	404	27.79	29	6.19	732	24.78	25	6.99

Separating the TEL3 scores by question type (knowledge, comprehension, and application), reveals a similar pattern of differences between students with prior economics and those without, as shown in Table 2. These results are also encouraging, as the surprisingly high level of economic literacy among students with no prior economics is repeated across all question types. This decomposition of TEL3 scores also reveals that the decline in economic literacy over time among freshman students with no prior economics is due to worse performance in the comprehension and application questions, but not the knowledge questions.³

³ Univariate Poisson regressions show that, among students with prior economics, the decline in knowledge is weakly significant ($p=0.064$), but the declines in comprehension ($p=0.037$) and application ($p=0.002$) are more statistically significant. None of the changes in question type scores are significant for students with prior economics.

Table 2: Summary statistics of TEL3 scores by question type for freshman students, 2008-2010

Question Type	Year	No prior economics			Prior economics			Total		
		Mean	Med.	S.D.	Mean	Med.	S.D.	Mean	Med.	S.D.
Knowledge (7 questions)	2008	4.21	4	1.84	5.05	6	1.76	4.79	5	1.82
	2009	3.79	4	1.80	5.15	5	1.46	4.51	5	1.77
	2010	3.67	4	1.69	5.25	5	1.37	4.45	4	1.73
	Total	3.81	4	1.76	5.16	5	1.52	4.55	5	1.76
Comprehension (11 questions)	2008	6.29	6	1.79	7.86	8	1.98	7.36	7	2.05
	2009	5.91	6	2.13	7.77	8	2.13	6.89	7	2.32
	2010	5.67	6	2.06	7.87	8	1.95	6.76	7	2.29
	Total	5.86	6	2.05	7.83	8	2.02	6.95	7	2.25
Application (22 questions)	2008	12.30	13	2.82	14.29	15	3.57	13.66	14	3.47
	2009	11.64	11	3.37	15.39	16	3.42	13.62	14	3.88
	2010	10.92	11	3.44	14.69	15	3.45	12.78	13	3.93
	Total	11.41	11	3.35	14.80	15	3.50	13.28	13	3.82

A more detailed approach involves the identification of specific questions that strongly indicate students' intellectual abilities and the capacity to think like economists, and therefore could be considered key indicators in leading us to accelerate the pace of learning. Since ECON100 is a course in microeconomics, two indicative questions that get to the heart of markets and market interventions are: (1) 'Which would most likely decrease the quantity of corn sold in a competitive market?'; and (2) 'In a competitive market, the price of a product is \$5.00. If the government passes a law that sets a minimum price of the product at \$6.00, this change will result in...'. Combined across the three years, the average scores for these questions were 77.4 percent and 65.7 percent respectively (and 66.8 percent and 50.6 percent respectively for those students with no prior economics), indicating a high baseline level of understanding of basic applied economics even among those students with no formal training in economics.

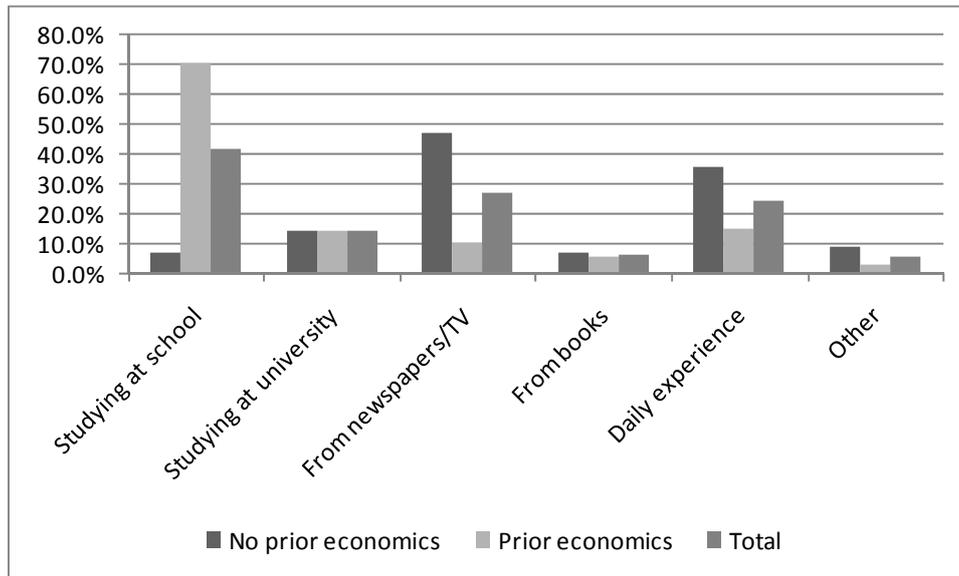
4. Sources of Economics Literacy

Why should students have done so well, even when so many of them had no formal training in economics before? One explanation is that economics is so central to students' daily lives that they practice economic principles almost every day, even without being conscious of it. Concepts such as opportunity cost become internalised in the day-to-day choices that people make. The centrality of economics also translates into news media reports that reinforce economic concepts and the occasional definition.

To gain a deeper understanding of such issues, we administered a student survey to accompany the pre-test, which collected demographic details as well as responses to questions relating to student interest in economics, their sources of economics knowledge, whether they have studied economics before, English language ability, and so on. Students

reported that they learned economics from a variety of sources, as summarised in Figure 2. Newspapers and television were the most common informal source of economics learning (27.2 percent), followed by daily experience (24.7 percent). Informal sources were significantly more likely to be mentioned by students with no prior formal economics training.⁴

Figure 2: Sources of economics knowledge identified by freshman students, 2008-2010



Preliminary univariate analyses (not shown)⁵ suggested that boys have higher economic literacy than girls ($p < 0.001$); students aged 20-24 years have lower economic literacy than either younger or older students ($p < 0.001$); and those for whom English is their first language have higher economic literacy ($p < 0.001$). Furthermore, reading the newspaper every day is associated with higher economic literacy ($p = 0.018$), as is watching television news daily ($p = 0.014$), and having read more than one book related to business and economics in the previous two years ($p < 0.001$). Reading websites that students think relate to business more often has no significant effect on pre-test scores, but students who report they are interested in economics have significantly higher pre-test scores ($p = 0.001$).

One problem with using raw test scores, such as those reported in Tables 1 and 2, as a measure of economic literacy is that such an approach implicitly weights the answers to all questions equally in the overall measure, when in actual fact some questions probably test similar components of economic literacy and their combined contribution should be adjusted

⁴ Univariate logistic regressions of each source of economics knowledge against prior economics learning reveal that studying at school was more likely to be mentioned by students with prior economics ($p < 0.001$), while newspapers and television ($p < 0.001$), daily experience ($p < 0.001$), and ‘other’ ($p = 0.002$) were more likely to be mentioned by students with no prior economics.

⁵ Based on univariate Poisson regressions of student scores (out of 40) against the variable of interest.

to reflect that. An alternative to raw test scores is to combine the scores on each question (that is, correct, incorrect) in a way that explicitly weights each question's contribution to an index of overall economic literacy. To achieve this, we used principal component analysis to estimate coefficients for weighting each question in an index of economic literacy – principal component analysis is a technique that reduces 'the dimensionality of a data set consisting of a large number of interrelated variables, while retaining as much as possible of the variation present in the data set' (Jolliffe 2002, p.1). The assumption in this application is that the coefficients from the first principal component of the data will provide a suitable index of economic literacy. This assumption is plausible provided that: (1) the signs on all of the coefficients in the first principal component are positive (such that a correct answer in any question leads to a higher value in the resulting index of economic literacy); and (2) that the first principal component explains a 'high' proportion of the covariance in the included variables when compared with proportion explained by the second and subsequent components (such that we can conclude that there is a single index of economic literacy as opposed to two or more indices).

One of the 40 questions was excluded from the final principal component as the sign on its coefficient was negative, leaving 39 questions all of which have positive coefficients. The first principal component explained 16.4 percent of the covariance in the questions, with the second principal component explaining just 4.1 percent. This suggests that the coefficients from the first principal component provide for a suitable index of economic literacy as other components have little explanatory power in comparison. The index has a mean of zero and a standard deviation of 2.527. Further evidence of its suitability as a measure is provided by the close correlation of 0.987 between the index and the total score from the TEL3 test.

Econometric analysis was performed using ordinary least squares regression, with robust standard errors.⁶ The results of the final, multivariate model are presented in Table 3, with the coefficients presented as both raw coefficients and as the number of standard deviations of the dependent variable (economic literacy index). Holding other variables constant, students who have studied economics before have 0.81 standard deviations higher economic literacy than those who haven't, students with English as their first language have 0.74 standard deviations higher economic literacy than those for whom English is a second language, and male students have 0.25 standard deviations higher economic literacy than female students. Students who have read more than one book that relate to business and economics in the previous two years and students who report a high level of interest in economics also have significantly higher economic literacy, by 0.11 and 0.18 standard deviations respectively. All of these marginal effects are statistically significant.⁷

⁶ All further analysis in this section was also repeated using the total TEL3 score as the measure of economic literacy, and using Poisson regression as opposed to OLS regression. All results obtained were qualitatively the same.

⁷ Reading newspapers more often and watching television news more often were statistically insignificant in these multivariate regressions.

Table 3: OLS regression results

Variable [†]	Coefficient	Coefficient/ SD (index)	Std. Error	<i>t</i>	<i>p</i> -value
Gender (Male=1)	0.643	0.254	0.141	4.56	<0.001 ^{***}
Age 20-24	-0.822	-0.325	0.189	-4.36	<0.001 ^{***}
Age 25 or over	0.279	0.110	0.310	0.90	0.369
Studied economics before	2.051	0.812	0.149	13.78	<0.001 ^{***}
English as a first language	1.865	0.738	0.181	10.28	<0.001 ^{***}
High interest in economics	0.458	0.181	0.145	3.16	0.002 ^{***}
Read two or more books	0.289	0.114	0.170	1.70	0.090 [*]
Constant	-2.698	-	0.201	-13.45	<0.001 ^{***}

N=728; R²=0.4602; ^{***} significant at the 1% level; ^{**} significant at the 5% level; ^{*} significant at the 10% level;

[†]Yes = 1, unless otherwise specified.

When the same regressions are run separately for those students with and without a background in economics, some interesting differences emerge as shown in Table 4. Among those with no economics background, the oldest age group has the highest economic literacy whereas among those students who have done economics before both older age groups have significantly lower economic literacy than the youngest age group. This non-linear association between economic literacy and age is similar to that observed by Parker (2006) in South Africa. Having a high interest in economics is only significant among those who have studied some economics before, as is reading books on economics and business.⁸ These results suggest that, for those with no background in economics, the most important source of their economics knowledge is daily experience as opposed to engagement in other activities we may expect to increase economic literacy, such as reading newspapers and books about business or economics.

Table 4: OLS regression results, by economics background

Variable [†]	No prior economics (n=325, R ² =0.3287)		Prior economics (n=403, R ² =0.3342)	
	Coefficient/ SD (index)	<i>p</i> -value	Coefficient/ SD(index)	<i>p</i> -value
Gender (Male=1)	0.210	0.011 ^{**}	0.336	<0.001 ^{***}
Age 20-24	0.139	0.182	-0.748	<0.001 ^{***}
Age 25 or over	0.554	<0.001 ^{***}	-0.360	0.097 [*]
English as a first language	0.986	<0.001 ^{***}	0.440	<0.001 ^{***}
High interest in economics	-0.027	0.780	0.291	<0.001 ^{***}
Read two or more books	0.116	0.271	0.137	0.088 [*]
Constant	-	<0.001 ^{***}	-	0.871

^{***} significant at the 1% level; ^{**} significant at the 5% level; ^{*} significant at the 10% level; [†]Yes = 1, unless otherwise specified.

⁸ Other variables such as reading newspapers often and watching television news often were also insignificant among those who have done no economics before.

5. Illustration of Changes to Lecture Content

Consistently positive economic literacy results encouraged us to experiment with greater depth and complexity of content in the course. In some topics we increased the content by as much as 50 percent, but with the same number of lecture hours as before. The course now seeks to impart a sharper focus to each topic, introducing relatively advanced and innovative approaches to extend basic concepts. The extra material that we now teach includes:

- The cobweb model of supply and demand;
- The effects of two-part tariffs, advertising, and product differentiation within the consumer choice model;
- Game theory that also emphasises sequential games, entry games, repeated games, mixed strategy equilibrium, and credible commitment; and
- Pricing strategies that cover creating and capturing value through, for example, demand-side lock-in, multi-period pricing, bundling, and block pricing.

Thus, one area that separates our course from standard textbook treatments, or a ‘short-list’ course on economic concepts such as that advocated by Salemi (2005), is the greater emphasis on business applications. We also avoid the problems associated with the content-driven, lecture-centred approach, such as surface learning (Reimann 2004), by using frequent real world examples, case studies, and generally adopting an interactive and student-centred problem-solving approach within lectures. Given that a majority of our freshman-level economics students are business majors, we begin the course with advice for future managers: breaking problems into smaller pieces, questioning the question, distinguishing between association and cause and effect, practicing economics (not just memorising), and so on.

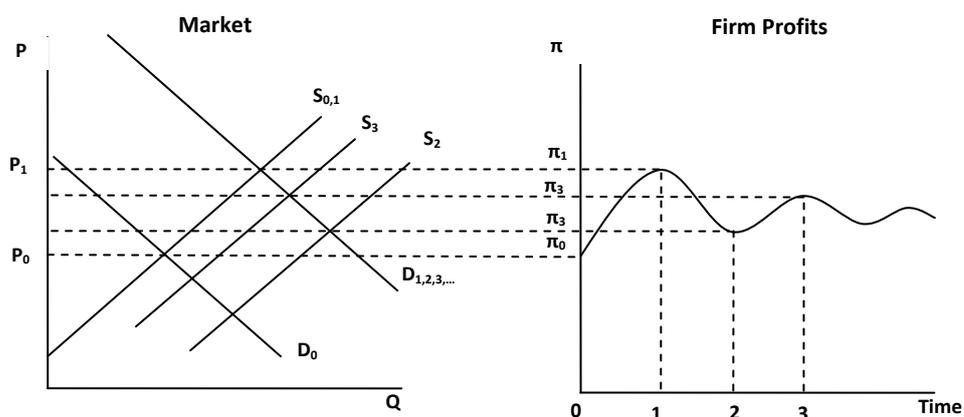
Giving students practice in seeing patterns is emphasised. We stress that the ability to predict outcomes is the key driver of business success. Here the lectures often integrate the standard textbook concepts with non-standard applications. For example, textbook chapters on the three conditions of perfect competition (large numbers of buyers and sellers, identical products, and freedom of entry and exit – see Gans, King and Mankiw (2009, p.294)) highlight that firms earn zero economic profits in the long run. In class we show even in competitive markets investors can make long run above normal profits by adopting a hit-and-run strategy. Essentially, we show students how they may use economic theory to take bets in markets:

Consider a perfectly competitive market, as shown in Figure 3. Initially (at time 0) the market is in equilibrium with price P_0 , and each firm makes profits of π_0 . Let there be an increase in demand at time 1. Prices increase to P_1 , and firm profits also increase (to π_1). With no barriers to entry, the higher profits encourage new firms to enter this market. Supply increases to S_2 at time 2. Price falls to P_2 , and firm profits also fall (to π_2). Now profits are

lower and some firms will exit the market. Supply decreases to S_3 at time 3. Price increases to P_3 and firm profits increase to π_3 . A cycle of high-low-high-low profits emerges over time.

Investors with knowledge of the cycle can take advantage of this using a hit-and-run strategy, i.e. buying into this market when prices and profits (and the costs of entry) are low, and selling out when prices and profits are high (and receiving a large capital gain). Essentially, the investor cherry-picks, profiting from the upsides of the cycle and exiting before the downturns, so that above-normal profits are realised over the duration of the cycle.

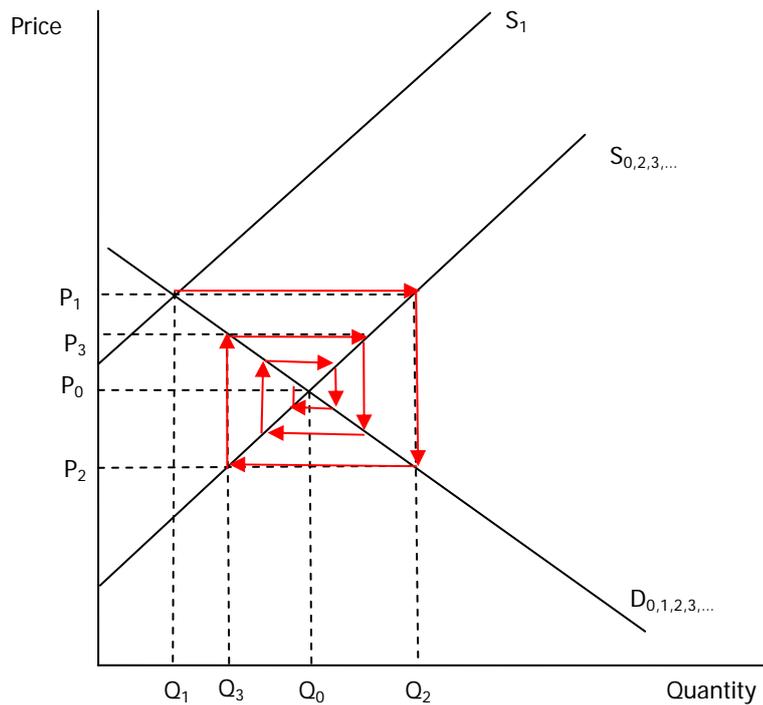
Figure 3: A hit-and-run strategy in a competitive market



Students also learn the cobweb model of competitive markets, which highlights a contrarian production strategy (‘going against the flow’), as shown in Figure 4. Here students consider a competitive market with a production lag (for example, in agricultural markets). Initially this market is in equilibrium with price P_0 and quantity Q_0 . Then in year 1 bad weather hits which reduces supply to S_1 and raises the price to P_1 . However, the bad weather is temporary – in subsequent years supply returns to ‘normal’, that is, S_2 , S_3 , and so on. Farmers are making their decision about how much to plant for year 2, and they observe the high price P_1 at that time. So they increase their planting plans to Q_2 (this is the quantity they are willing to supply at price P_1). After harvesting at the end of the season, though, the farmers have collectively oversupplied – the oversupply will only be sold if price plummets to P_2 . Given this unexpected downturn, farmers reduce their planting plans in the next year to Q_3 , given the previous price P_2). At harvest time the market is undersupplied and price rises to P_3 . And so the cycle continues.

A strategy of going against the flow could be useful in this situation. A farmer that could plant carrots or potatoes observes the neighbours planting lots of carrots; he or she should plant potatoes instead, since the price of carrots will fall at the end of the season due to oversupply and the farmer is the only one supplying potatoes.

Figure 4: The cobweb model of supply and demand



6. Post-Test (TUCE4) Results

The illustrations in the previous section are just two of many that are included in our one-semester course. Given the fixed time allocated to lectures, does this imply a crowding out of traditional textbook material? The answer is probably no. The significant economic literacy that our students begin with allows us to increase the amount of lecture material in each class, including mainstream content. Nevertheless, to confirm that students are not short-changed by our approach, we conduct annual post-tests using the 30 microeconomics questions from the Test of Understanding of College Economics, Fourth Edition (TUCE4) (Walstad *et al.* 2006). In contrast with TEL3, TUCE4 contains much more jargon and also specific diagrams, such as marginal cost and revenue curves, which reflect much of the learning material in a mainstream introductory economics course. TUCE4 is widely used as a test of economic literacy at the end of principles of economics courses at colleges and universities in the United States and elsewhere.

The combined results across the three years are summarised in Figure 5 and Table 5. At first glance, the results (which are expressed as totals out of 30) may seem poor, with a mean mark of just 14.25 out of 30. However, this compares well with recently reported post-test means of 12.77 in the U.S.A. (Walstad *et al.* 2010) and 12.51 for Japan (Jang *et al.* 2010) while significantly lower than a recent mean result of 17.46 reported for students in Korea (Jang *et al.* 2010). The bi-modal distribution is consistent with that observed in the pre-test using TEL3 noted earlier, and is supported by the difference in means between students with prior economics and those without. These results are also similar to those of Lopus (1997),

who found that students with high school studies in microeconomics performed better in post-test TUCE microeconomics. Interestingly, even students with no prior economics do slightly better on average in the TUCE4 post-test than students on average in the United States or Japan.

Figure 5: Frequency distribution of TUCE4 scores for freshman students, 2008-2010

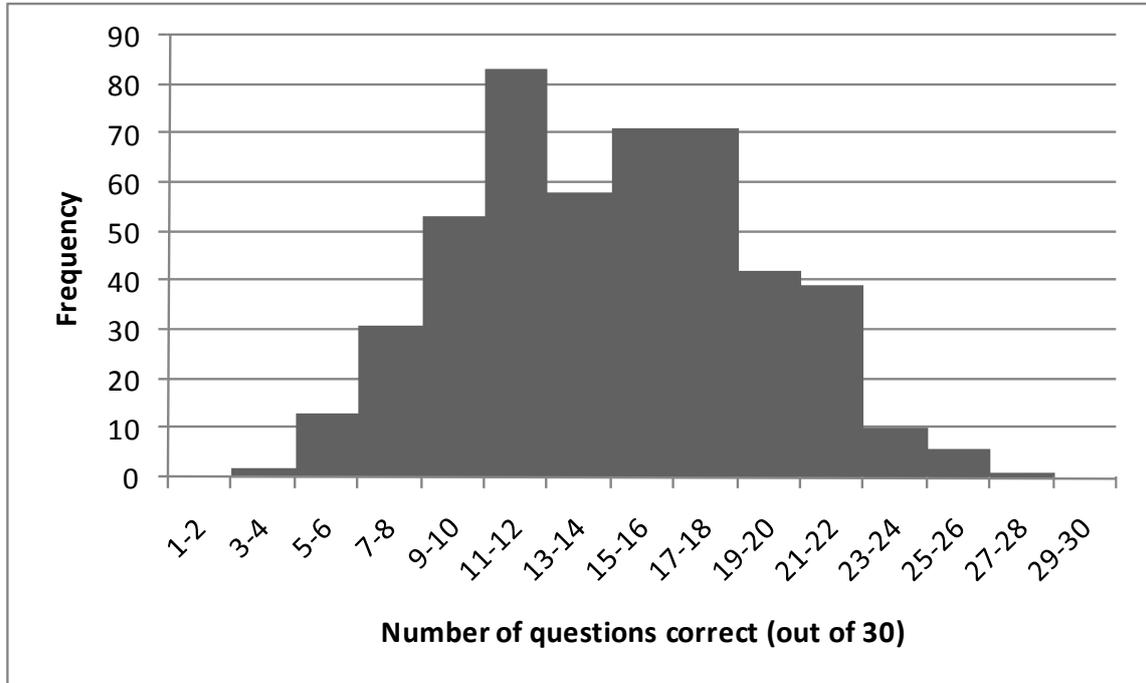


Table 5: Summary statistics of TUCE4 post-test scores for freshman students, 2008-2010

	No prior economics				Prior economics				Total			
	n	Mean	Med.	S.D.	n	Mean	Med.	S.D.	n	Mean	Med.	S.D.
2008	42	13.12	13.5	3.43	63	15.16	16	4.66	105	14.34	15	4.31
2009	91	13.53	13	4.25	92	15.18	15	4.61	183	14.36	14	4.50
2010	82	12.84	12	4.12	69	15.46	15	4.73	151	14.04	13	4.58
Total	215	13.19	13	4.05	224	15.26	16	4.64	439	14.25	14	4.48

These results confirm that the addition of extension material to this introductory economics course does not compromise students' understanding of core economics concepts by the end of the paper. Furthermore, the gap in economics literacy between students with and without prior economics has narrowed from about one standard deviation to around half a standard deviation between the pre-test and the post-test results. This suggests that the extension material does not have the effect of disadvantaging students with no prior economics background relative to their peers.

7. Conclusions

Students come to their first economics course from a wide variety of backgrounds. Some may have had at least three years of high school economics study, yet others may have had no prior training at all. In the past we assumed that all first year students came in with zero economics education. Accordingly, our classes tended to start from first principles, imposing severe constraints on how far our students could progress by the end of the semester.

This paper has shown that students come to their first economics course with significant prior knowledge of economics, as demonstrated by relatively high scores in a pre-test of economic literacy given to students at the start of the course. Higher economic literacy is related to past engagement with economics, whether through prior study or through reading newspapers or books related to business and/or economics.

Recognising the importance of these encouraging results, the course has been adapted to increase both the depth and breadth of content covered, including material that would not typically be covered until intermediate microeconomics or managerial economics classes. Such material is well-received by students at all levels of ability as it highlights the real-world applications of economics. Furthermore it provides the lecturer with additional opportunities for extending the most able students and encouraging them to continue with their studies in economics.

We believe that the approach that we have outlined can be generalised to other universities teaching a similar class, and possibly to classes other than economics where students have prior engagement with real-world applications of the discipline. As emphasized above, the key to introducing more advanced material is to teach it methodically, support it with ample real-life illustrations, and seek constant feedback from students regarding their comfort with the pace of the learning.

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