Math Placement Exam Outcome Impacts on Quantitative Coursework in Agribusiness and Economics

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Background

- AGEC 3213 Quantitative Methods in Agricultural Economics
- Junior-level course
- 2-hour lecture period + Computer lab (Excel/Spreadsheet)
- Heavily involves calculus & statistics - applications related to ag

Background

- Oklahoma State instituted a ‘math placement’ exam in fall 2012
- ALEKS: **A**ssessment and **LE**arning in **K**nowledge **S**paces
- Required to enroll in ANY math course (not required of AGEC 3213, but math courses are “pre-requisites”)

Anecdotally

- When teaching the course, experienced struggles with the advanced math/stats concepts (ag applications helped)
- These were necessary skills for Agbusiness & Ag Econ students

ALEKS Math Placement

Mc Graw Hill ALEKS®

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WHAT IS ALEKS? COURSE PRODUCTS HIGHER EDUCATION K-12 INDEPENDENT USE & HOMESCHOOL

WHAT IS ALEKS?

- OVERVIEW OF ALEKS
- COURSE PRODUCTS
- ALEKS TOURS
- RESEARCH BEHIND ALEKS
- SUCCESS STORIES

Assessment and **LE**arning in **K**nowledge **S**paces is a Web-based, artificially intelligent assessment and learning system. ALEKS uses adaptive questioning to quickly and accurately determine exactly what a student knows and doesn't know in a course. ALEKS then instructs the student on the topics she is most ready to learn. As a student works through a course, ALEKS periodically reassesses the student to ensure that topics learned are also retained. ALEKS courses are very complete in their topic coverage and ALEKS avoids multiple-choice questions. A student who shows a high level of mastery of an ALEKS course will be successful in the actual course she is taking.

ALEKS also provides the advantages of one-on-one instruction, 24/7, from virtually any Web-based computer for a fraction of the cost of a human tutor.

Student Success

- Success in gateway courses, specifically math courses, results in higher retention and graduation rates
- Of successful graduates, 70% were successful in math courses early in their college path, based on both two- and four-year college students ~ Adelman (2005) ~
- Success in a first-year math course as the second-best indicator of retention ~ Herzog (2005) ~
- Withdrawing from a course reduces the likelihood that college students will remain in school and graduate ~ Adelman (2005) ~

Objectives

- Does early success in math coursework — and/or ALEKS exam — provide an indicator of success in AGEC 3213?

Reasoning:

- Are students provided early indication of math deficiencies to either (1) get improved training prior to AGEC 3213 or (2) select a different degree path that better aligns with math skills — earlier rather than later

Methods

- Employ regression techniques on AGEC 3213 student data, controlling for factors not related to math success (instructor/semester, degree path) and math/ALEKS success.

$$AGEC3213_i = \alpha + \beta_1 Semester_i + \beta_2 Major_i + \beta_3 ALEKS_i + error_i$$

AGEC3213 = Grade (%); Semester = categorical variable representing when course was taken; Major = categorical variable representing if student is AGBU/AGEC student; ALEKS = grade on overall placement exam.

→ Given that LHS (dependent) variable is bound between 0 and 1, Probit regression model was used

Data

- Data were collected from OSU for individual ALEKS outcomes
- Matched to AGEC 3213 students via OSU identification number
- Students without reported ALEKS score were removed

Regression Results

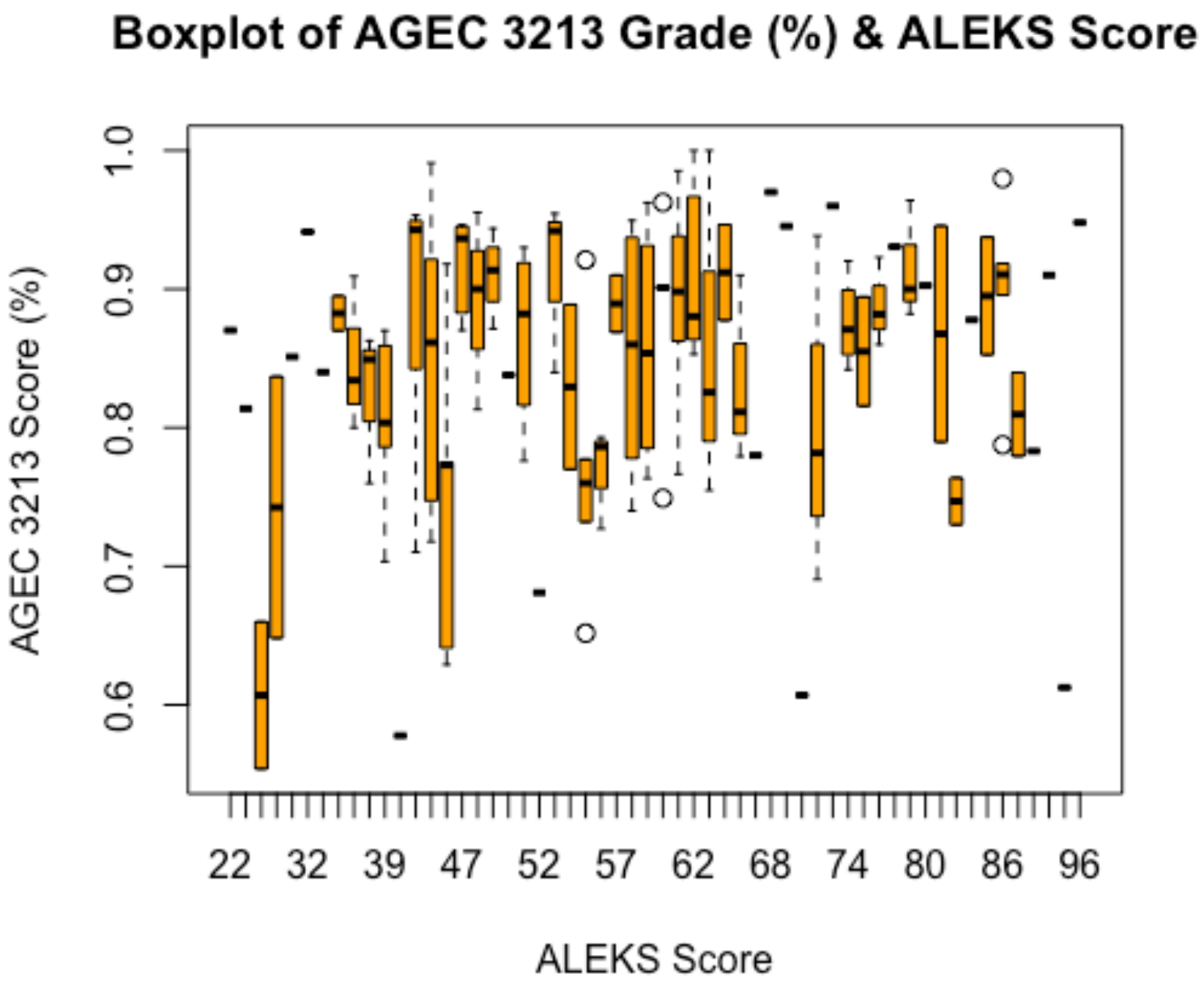
Coefficients:

	Estimate	Std. Err.	t-value	Pr(>|t|)	
(Intercept)	0.605096	0.306060	1.977	0.05009	.
F2012	1.022663	0.583345	1.753	0.08187	.
S2013	0.030922	0.472024	0.066	0.94787	
F2013	-0.074077	0.229678	-0.323	0.74756	
S2014	0.575811	0.241450	2.385	0.01849	**
F2014	0.449036	0.178864	2.510	0.01325	**
F2015	0.689290	0.221725	3.109	0.00230	***
S2016	0.368121	0.177551	2.073	0.04006	**
F2016	0.978571	0.220722	4.433	1.91e-05	***
S2017	0.362024	0.329255	1.100	0.27351	
AGBU	0.148256	0.179141	0.828	0.40937	
AGEC	0.362402	0.236636	1.531	0.12801	
AGCM	0.546458	0.316089	1.729	0.08615	.
ANSI	0.077081	0.225190	0.342	0.73267	
PASS	0.195842	0.781273	0.251	0.80245	
ALEKS	*0.010006*	*0.003618*	*2.765*	*0.00649*	***

Marginal Effects

Marginal Effects:

	dF/dx	Std. Err.	z	P>|z|
F2012	0.0890344	0.1351191	0.6589	0.5099
S2013	0.0038144	0.2377977	0.0160	0.9872
F2013	-0.0094508	0.1237288	-0.0764	0.9391
S2014	0.0603867	0.0862582	0.7001	0.4839
F2014	0.0505818	0.0746065	0.6780	0.4978
F2015	0.0713529	0.0769495	0.9273	0.3538
S2016	0.0420760	0.0763938	0.5508	0.5818
F2016	0.0948113	0.0658084	1.4407	0.1497
S2017	0.0399852	0.1317378	0.3035	0.7615
AGBU	0.0185147	0.0924625	0.2002	0.8413
AGEC	0.0410380	0.0997758	0.4113	0.6809
AGCM	0.0571823	0.1122197	0.5096	0.6104
ANSI	0.0094163	0.1112249	0.0847	0.9325
PASS	0.0227882	0.3491311	0.0653	0.9480
ALEKS	0.0012475	0.0018515	0.6738	0.5004


Boxplot of AGEC 3213 Grade (%) & ALEKS Score
AGEC 3213 Score (%)
0.6
0.7
0.8
0.9
1.0
22
32
39
47
52
57
62
68
74
80
86
96
ALEKS Score

Thank You & Questions

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