Algbera I Assessment and Student Performance in Principles of Economics
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Motivation
• Incoming freshmen do not have the Algebra I skills to be successful in economics. This slows the pace of the class and compromises rigor.

Fall 2012 Algebra I Assessment
• Administered to 1361 incoming freshmen in Principles of Economics
• Assessment counts towards 10% of course grade
• Students have four optional opportunities to pass the assessment
  o First opportunity during the first week of class
  o Each subsequent opportunity given every 2 weeks
• Format:
  o 20 questions covering Arithmetic, Algebra, Geometry, and Graphing
  o No multiple choice questions
  o Calculators not allowed
  o To show mastery, students must score an 80%

Fall 2012 Assessment Results
• 11.5% of 1361 students failed
• On average, it took a student 1.59 times to pass.
• On average, women took longer to pass (significant at 5%) with no significant difference in failure rates.
• Students from private schools took longer to pass (significant at 1%) with no significant difference in failure rates.
• Upper-classmen had a much higher failure rate (significant at 1%) with no significant difference in failure rates.

Do SAT Math Scores Predict Performance on the Assessment?
• Distribution of SAT Math scores by pass (top) and fail (bottom)

Do SAT Math Scores and the Assessment Predict Performance on the Final Exam?
• OLS regression of Final Exam on Assessment Performance and SAT Math scores
  o Students in Performance Groups 1-3 score between 10 and 15 points higher on the Final Exam than students that fail, significant at 10%.
  o The 1st Algebra I Assessment opportunity and SAT Math have little predictive power in determining students’ performance on the Final Exam.
    • A 1% increase in the SAT is predicted to improve final exam score by .1%, significant at 1%.
    • A 1% point increase in the 1st Algebra I Assessment predicted to improve final exam score by .02%, significant at 10%.
  o Innate test taking ability (using SAT Verbal scores as proxy) has a positive and significant impact on Final Exam scores
  o SAT Math is not adequately testing students on the basic math skills needed for Principles of Economics

• Both the SAT Math and Algebra I Assessment cover the same material, so why the difference in predictive power?
  o Difference in test format.
  o Difference in allowance of calculators.

Comparison to Past Research
• Ballard and Johnson (2004) - effect of ACT Math scores, calculus, remedial math, and a math quiz on course performance.
  o All are significant
  o ACT Math and math quiz scores were similar
  o Quantitative skills are multifaceted
  o Our results are different perhaps due to test format and disallowing use of calculators

Preliminary Results of the Effect of Calculator Use on Assessment Scores
• Comparison of Algebra I Assessment scores from Spring 2012 and Spring 2013
  o Spring 2012- no calculator use allowed (green line-mean, black line-cut off to pass)
  o Spring 2013- calculator use allowed (green line-mean, black line-cut off to pass)

Conclusions
• SAT (or ACT) Math do not seem to pick up on the math skills needed for Principles of Economics
  • A basic test of math ability is important to test for readiness to study economics
  • Calculator use on the SAT Math test may be masking mathematical ability
  • The multiple choice format of the SAT Math test may be masking mathematical ability