

A study of the Unified State Exam's validity in Russia

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Why is it interesting?

- The USE is the most important new addition to the Russian educational system.
- The USE fully replaced the old entrance examination system only in 2009.
- Thus in 2013 the first cohort of “USE” students graduated from bachelor’s programs in Russia.

Unified State Exam (USE)

- Combines high school exit and university entrance examination.
- Primarily measures comprehension of the school curriculum.
- There are USE tests for 14 different school subjects
- Scale is from 1 to 100 points, pass-fail threshold at 20-30.

School:

- Math and Russian language are obligatory for every school graduate.
- Additionally the student chooses other subjects test based on the area in which he plans to get his next degree.

University:

- Each university department demands three or four specific subject tests for enrollment in the program.
- Russian language is obligatory for all programs.
- The applicant's final score is the sum of all USE subject scores.

Research question

Conditions:

- Any entrance examination should help to choose applicants.
- Applicants are ranked on the basis of their USE scores.
- Universities can admit a limited number of students.

Assumption:

Thus, those with higher USE scores are presumably more capable and, therefore, should perform better academically after admission.

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- Applicants are accepted based on the sum of USE scores

All subjects should predict future student's performance equally.

- Both assumptions of the USE system are studied here.
- The main purpose is to analyze the relationship between USE scores and a student's further academic achievement in university. Through that relationship, we will examine the predictive validity of the USE as a tool for university admission.

Other studies

- Russia
 - A few studies on this issue have already been held. All these studies are made in case-study methodology.
 - On average their results showed that USE scores explain up to 25-30% of the variation of student performance.
- The USA
 - Average correlation coefficient between entrance tests scores (SAT and ACT) and academic achievement lies in the range of 0.35 to 0.46 (Kuncel, Hezlett, 2007, 2010). We set this range as a reference value.
 - Many studies have shown that first year of study is crucial for performance in all subsequent years.
 - Taking school GPA into account significantly improves predictive ability.

Sample

- 5 universities from different Russian regions
- Three cohorts: students enrolled in 2009-2011
- Overall the sample data included 65 departments and more than 19,000 students.

Methodology. 1

- OLS regression:

Dependent variable – first year university GPA.

Independent variable:

Model 1 (bivariate regression):

A sum of all USE subject test scores.

Criteria: multiple correlation coefficient (or determination coeff. R^2).

Model 2 (multiple regression):

Scores for each subject test separately.

Criteria: Standardized regression coefficients.

A series of models were estimated for each department for all three years.

Methodology. 2

- In order to identify the main patterns and give an overall evaluation of the USE validity.
- All departments in the sample were divided into 7 groups based on the areas of study.
- Meta-analysis (random effects model) of the criterion in each group were performed.
- *Number of models combined in a meta-analysis:*

Area of study	Number of models
Math and Computer Science	26
Physics and Engineering	56
Science	32
Economics	21
Management and Marketing	33
Philology and Journalism	18
Humanities	18

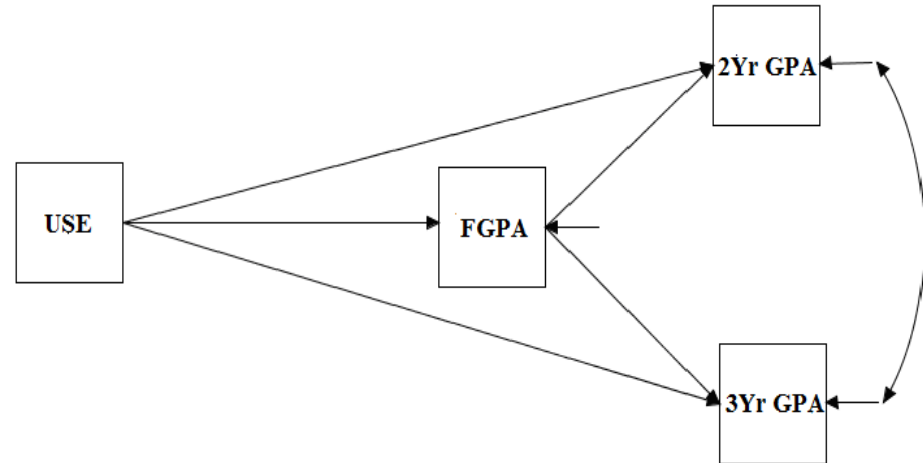
RESULTS



Long-term versus short-term prediction

- Direct and indirect effects of USE scores on GPA in different years of studying.

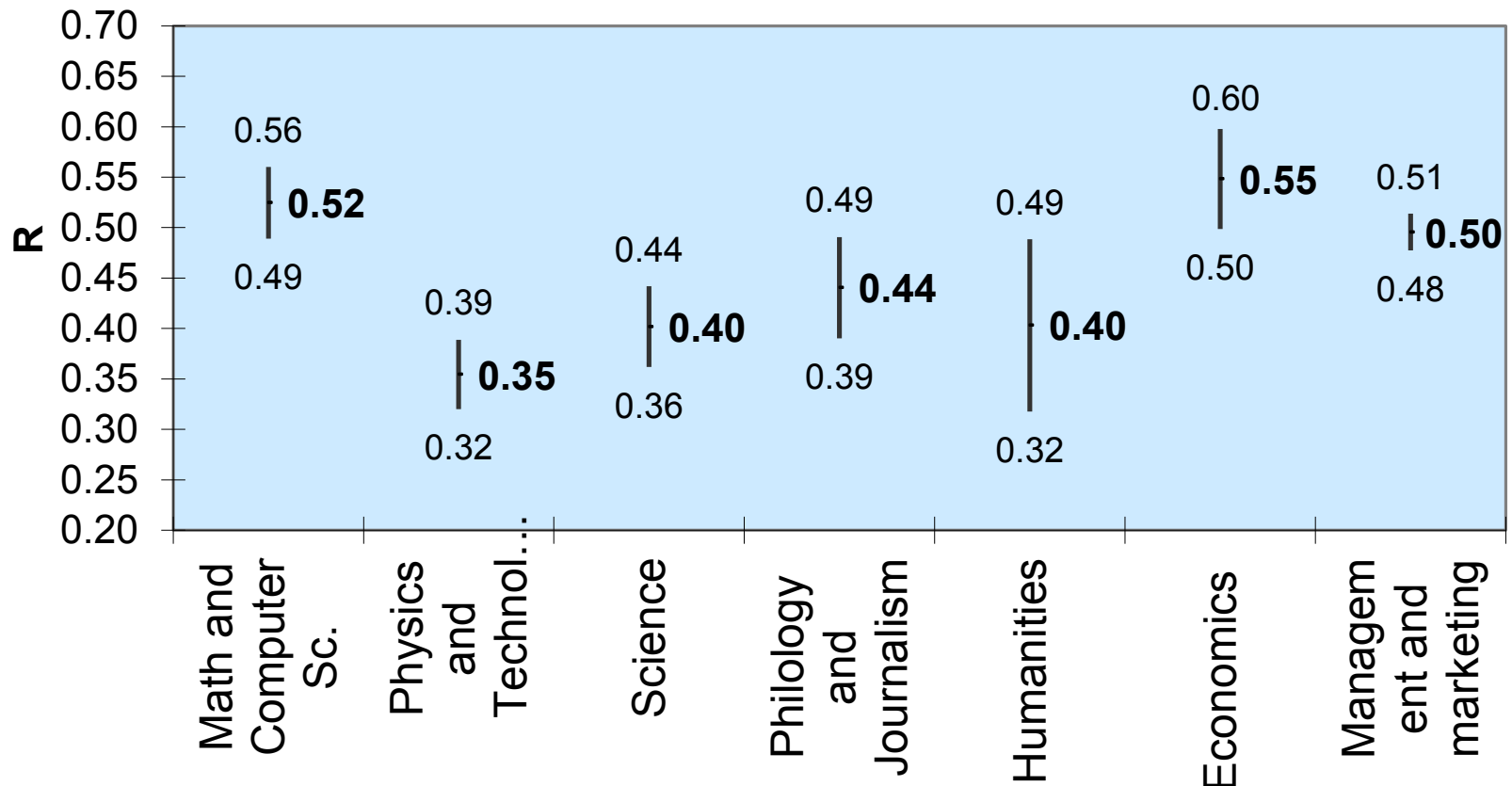
- SEM:



- The association between the USE and academic performance in the second year and higher could be observed only indirectly through the first year performance.
- It is consistent with previous studies.
- Therefore, in further analysis, the relationship between USE and first year GPA will be considered as a sufficient condition for the USE's validity.

Sum of the USE scores. 1

The predictive validity of the total USE score in different areas of study

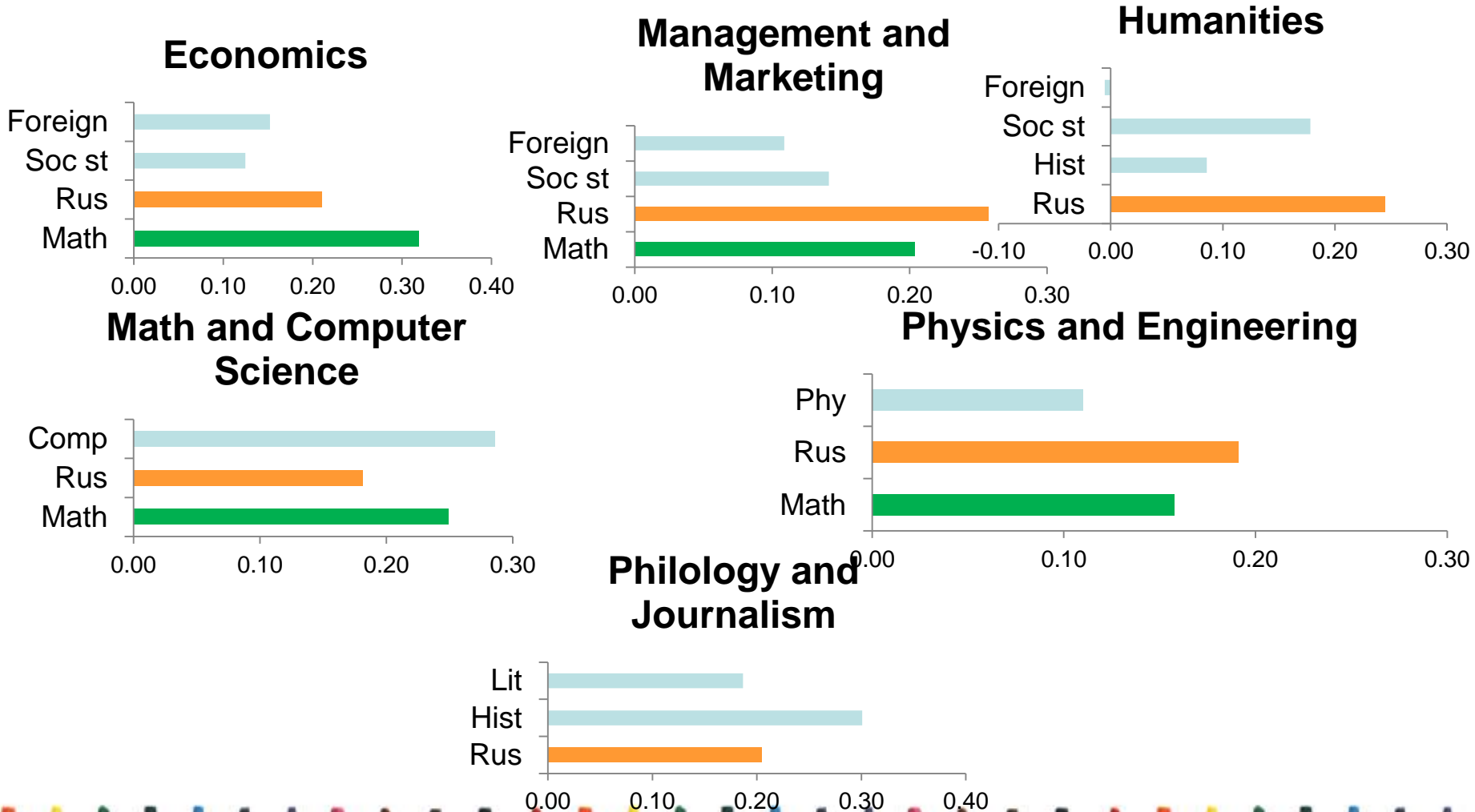


Sum of the USE scores. 2

- The multiple correlation coefficients' values are in the range of 0.35-0.60. Thus total USE score explains from 10% to 35% of the variation in first year academic performance. The results are close to the reference value which are 0.35-0.46 for correlation and 12-25% for variance explained.
- USE predicts academic performance rather equally in all areas of study.
- However, in the Economics, Mathematics and Computer Science, Management and Marketing departments USE predicts academic performance slightly better.
- For Physics and Engineering departments total exam score is not such a strong predictor of future performance.

USE different subjects scores. 1

Standardized regression coefficients



USE different subjects scores. 2

- In Mathematics and Computer Science departments the most important subjects for predicting future performance are the USE in Math and the USE in Computer Science. They are corresponding subjects for the departments.
- For Physics and Engineering, the USE in the Russian language and Mathematics were slightly better predictors than the USE in corresponding subjects, e.g. physics.
- For the Economics and the Marketing and Management departments the best predictor is the USE in Mathematics, next is the Russian language.
- Foreign language and social studies have almost equal coefficients, which are significantly lower than that for the Russian language and Mathematics.

Discussion. Math and Russian USE

- These are obligatory exams.
- They are intended to evaluate both students who are aiming only to get a high school diploma and those who plan to go to university. Therefore these tests can differentiate the students better.
- In schools most effort is directed at preparation for the obligatory subjects. This gives all children an opportunity to prepare for the exams.
- In Russian universities first year students take a large number of general courses that do not reflect the specifics of their program.

Conclusion

- The total USE score predicts further performance accurately enough to consider this exam as a valid tool for selecting applicants.
- The regression models resulted in a percentage of variance explained ranging from 15 to 35% in different departments.
- The predictive ability of specific subject scores is approximately the same, but the examinations in Mathematics and Russian language are most likely to be the best predictors of academic performance.
- The association between the USE results and academic performance during the second year and higher could be observed only indirectly through the first year performance.



Thank you for your attention!

Any questions or comments are highly
appreciated

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