

What is special about mathematics and statistics for Economics and Finance?

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Research Notes

A quantitative exploration of the statistical and mathematical knowledge of university entrants into a UK Management School

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The topic is timely and important for several reasons:

- There will always be university entrants who are poorly prepared and academically weak.
- the problems created by gaps in mathematical and statistical knowledge of university entrants have also impacted the unit content and delivery of lectures.
- module content had to be re-written and the examination styles had to be changed. Such scenarios most certainly can lead to a lowering of standards at Universities
- Issues arise due to students noticing that the mathematical elements of their degrees are more than what they had anticipated.

Data Collection:

Time of study: 2013/14 new entrants during the Induction programmes

Group of study: BAAF and BABS

- A multiple choice questionnaire with 15 questions
- A written examination with 15 questions

Students had not been warned of the forthcoming test

Each question was weighted with 1 mark and so in both tests the total marks obtainable were 15.

Data

There is a higher demand for the BABS framework.

There are more males than females in each of the frameworks.

There is a statistically significant association between gender and selection of frameworks

- more males significantly prefer both frameworks in relation to females
(Chi-square test for association at a p-value of 0.05)

	Sample Size	% Sample	Males	Females	% Males	% Females
BAAF	138	35	92	46	66.67	33.33
BABS	251	65	136	115	54.18	45.82
Total	389	100	228	161	58.61	41.39

Descriptive for marks scored on MCQ's/(Written Examination)

	Min	Max	Mean	Med.	IQR	SD
<u><i>BAAF</i></u>						
Males	0.00 (6.67)	93.33 (80.00)	59.53 (42.68)	60.00 (40.00)	26.66 (33.33)	20.06 (18.31)
Females	0.00 (6.67)	100.00 (73.33)	57.84 (42.03)	60.00 (46.67)	21.56 (33.33)	18.92 (19.52)
All	0.00 (6.67)	100.00 (80.00)	58.97 (42.46)	60.00 (43.34)	26.66 (33.33)	19.63 (18.65)
<u><i>BABS</i></u>						
Males	0.00 (0.00)	86.67 (86.67)	43.56 (30.34)	46.67 (26.67)	23.62 (26.67)	19.96 (19.76)
Females	0.00 (0.00)	86.67 (73.33)	42.94 (27.19)	42.22 (26.67)	20.00 (26.67)	17.36 (17.93)
All	0.00 (0.00)	86.67 (86.67)	43.28 (28.90)	46.67 (26.67)	22.23 (26.67)	18.78 (18.97)
<u><i>Overall</i></u>						
Males	0.00 (0.00)	93.33 (86.67)	50.01 (35.32)	53.33 (33.33)	26.67 (26.67)	21.44 (20.08)
Females	0.00 (0.00)	100.00 (73.33)	47.20 (31.43)	46.67 (26.67)	26.67 (26.67)	19.00 (19.53)
All	0.00 (0.00)	100.00 (86.67)	48.84 (33.71)	48.89 (33.33)	25.83 (26.67)	20.49 (19.92)

Analysis of MCQ marks

- Most of the students have scored an average mark of around 50%.
- The overall average mark scored by all students reads 48.84% with a standard deviation of $\pm 20.49\%$.
- On average male students have scored higher than female students at the MCQ.
- The highest mark obtained by a male student in the MCQ test is 93.33%
- The student(s) who scored full marks happens to be a female.

performance of the BAAF and BABS students in the MCQ test:

- In the BABS framework no student has succeeded in scoring full marks in the MCQ test with the highest mark attained being 86.67% between both males and females.
- student(s) who scored full marks in this examination are from the BAAF framework.
- The average marks scored by BAAF males and female students are 59.53% and 57.84% respectively.
- The average marks scored by the BABS males and females are considerably lower at 43.56% and 42.94%.
- ✓ The BAAF students have performed better than the BABS students in the MCQ test.

In terms of the overall comparison:

Welch two-sample t-test fails to find any evidence of a statistically significant difference between the average MCQ marks obtained by males and females at the 5% level

There is statistically significant evidence to suggest that there is indeed a difference between the average MCQ marks scored by all BABS and BAAF students based on a two-sample Welch t-test.

- on average BAAF students are more likely to outperform the BABS students in the MCQ test.

There are statistically significant differences between the MCQ marks scored by:

BAAF males and BABS males

BAAF males perform better than BABS males

BAAF females and BABS females

BAAF females perform better than BABS females

BAAF males and BABS females

BAAF males perform better than BABS females

BAAF females and BABS males.

BAAF females perform better than BABS males.

Analysis of Written Examination Marks

- No student scored 0 in the written examination.
- No student scored full marks.
- The highest mark obtained by a male student in the written test is 86.67% whilst the highest mark attained by a female student was 73.33%.
- Based on median marks, it appears that overall, males have performed better than females in the written examination.

statistical tests:

BAAF students have performed significantly better than the BABS students.

No evidence for statistically significant differences between males and females in both BAAF and BABS.

In comparing between frameworks:

BAAF males and BABS males,
BAAF females and BABS females,
BAAF males and BABS females,
BAAF females and BABS males

➤ which confirms that in each case BAAF students have indeed performed significantly better than the BABS students.

Analysis of Educational Qualification and its Influence on Mathematic Skills

Education	BAAF	BABS
A	8	33
AAM	25	9
AE	-	6
AOS	-	75
APM	31	17
D	-	23
GCSE	30	73
IB	2	8
NVQ	3	4
FM	-	1
F	-	1

Marks scored by students and their educational qualifications: The MCQ related results

For the BAAF framework:
we find statistically significant evidence of differences in the statistical and mathematical knowledge of students from:

- AAM and GCSE,
- AAM and NVQ,
- APM and GCSE.

For the BABS framework:
we find similar evidence between

- A and AOS,
- A and D,
- A and GCSE,
- AOS and APM,
- APM and D.

Written exam:

In the BAAF framework:

- AAM and GCSE,
- APM and GCSE,
- A and AAM,
- A and APM.

BABS framework:

- A and AOS,
- A and D,
- A and GCSE,
- AAM and D,
- AOS and APM,
- AOS and IB,
- APM and D,
- APM and GCSE,
- D and IB backgrounds

What to do next....

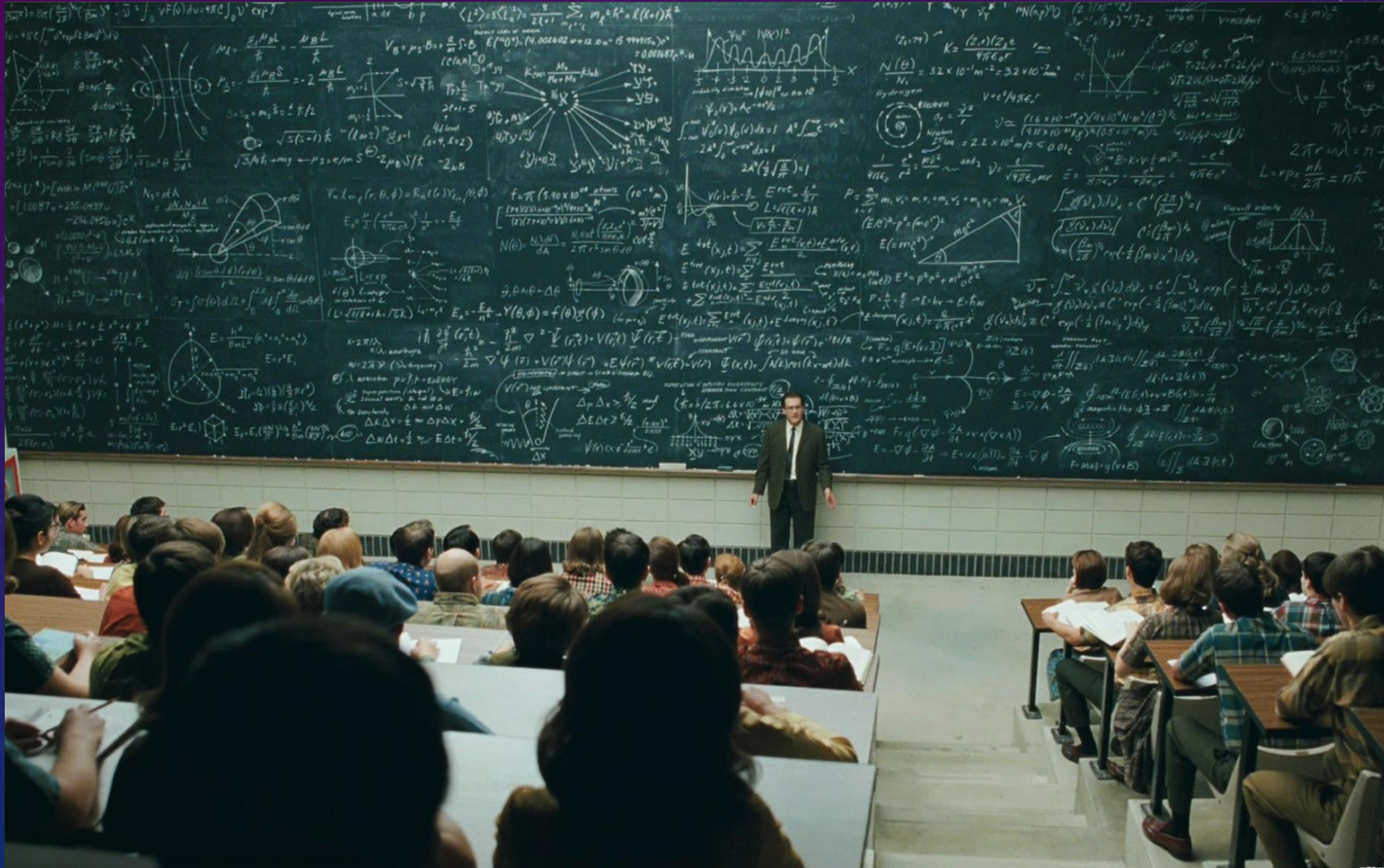
- Universities should consider more strict entry criteria which in turn can ensure students are better equipped and able to tackle mathematics and statistics at university level.
- Additional mathematical and statistical support for students.
- Motivate students to study.

“Why do I need to know this?”

“When will I ever use this?”



Professional Studies and Quantitative Techniques

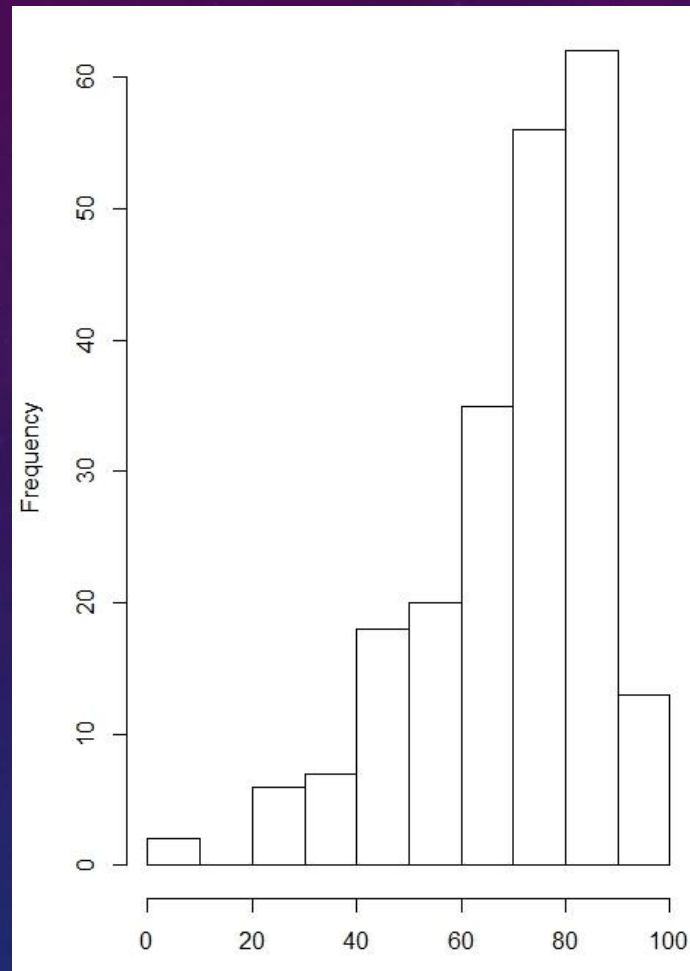




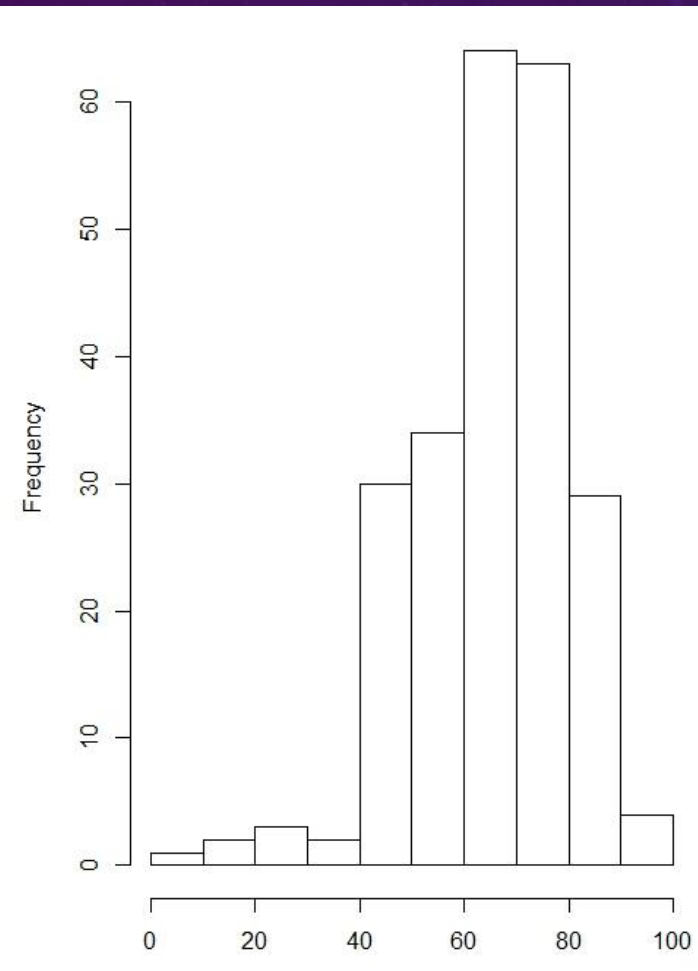
How computational algorithms shape our world!



Professional Studies and Quantitative Techniques Final exam grades



2017-18



2016-17

Thank You.

