ANNEX B:

MODELLING METHODOLOGY

This is the Annex B for the insight report Unconditional offers – the applicant experience[1].

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Purpose of the model

This analysis aims to identify the effect of holding an unconditional firm offer on applicant attainment. Statistical modelling techniques were used to control for the effect of other factors and thus determine whether an unconditional firm offer is included in the 'important/significant' factors affecting applicant attainment.

Methodology

Modelling population

The model was built using 2019 cycle applicants. In order to minimise issues associated with small category volumes and to ensure a homogenous set of applicant qualifications, inclusion criteria were specified to define the modelling population. The key criteria are listed below:

Applicant characteristics

> 18 year olds domiciled in England.

Applicant offer characteristics

> Held a firm offer.

> Firm offer held at a provider with at least 100 firm offers.

Applicant attainment

> Average GCSE points of at least 4 (or equivalent) in the 'best eight' GCSEs.

> At least seven GCSEs.

> Predicted to achieve at least three A levels equivalent to a grade profile of DDD or higher (specifically, predicted points[2] of 6 or higher in the best three A levels), not including general studies or critical thinking.

> Prior GCSE attainment that was not unusual given predicted grades. Specifically:

> > 2 * Average GCSE points is within 6 of average A level points.

> > Additionally, where average GCSE points is 9 (the highest possible value), predicted A level points equivalent to AAA or higher.

The modelling population comprised 107,045 applicants from the 2019 cycle.

Dependent variable

The dependent variable was a binary variable showing whether predicted grades were missed by three or more grades.

This is a change from last year's model, which evaluated the likelihood of applicants missing their predicted attainment by two or more grades. The change was made due to the increased likelihood of applicants missing predicted grades in the 2019 cycle. In the modelling population, 42.6% of applicants missed their predicted grades by three or more grades.

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[1] https://www.ucas.com/data-and-analysis/undergraduate-statistics-and-reports/ucas-undergraduate-end-cycle-reports/2019-end-cycle-report

[2] 'Grades' and 'points' are generally used interchangeably when referring to A level attainment.

Factors used in the model

The following set of applicant-related variables were used in modelling.

Applicant attainment

> Predicted grades for the best three A levels.

> Subjects studied at A level.

> Average points from the best eight GCSEs.

Applicant characteristics (values)

> Gender (Female; Male).

> POLAR4 quintile (quintile 1 to quintile 5).

> Ethnic group (Asian, Black, Mixed, Other, Unknown or Prefer not to say, White).

> Type of school or college attended (Academy, Applied Directly, Further education, Grammar, Independent, Other, Sixth form college, State).

> Region (East Midlands, East of England, London, North East, North West, South East, South West, West Midlands, Yorkshire, and The Humber).

Applicant offer characteristics

> HE provider at which the firm offer was held. (This variable was included to allow the model to adjust for any differences in the challenge of securing a place between providers). Model coefficients are not provided in this report since these would identify individual providers.

> Flag indicating whether an unconditional firm offer was held.

> Subject in which the offer was held (based on JACS 3.0 subject area).

Interaction term

> Interaction between gender and flag indicating whether an unconditional firm offer was held (This means that within the model, gender is also considered relative to the type of firm offer held).

Modelling approach

Logistic regression was used to build the model.

Initial development on a subset of data was used for variable selection. The model was initially trained on a 75% sample of the modelling population, and validated on the remaining records. Area under the ROC[3] curve (AUC) was used to assess model performance. Model AUC was 0.72 in both training and validation datasets.

The final model was built using the entire modelling population.

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[3] Receiver Operating Characteristic

Results

Key findings from the model are summarised below[4]. It is important to note that estimated effects are based on controlling for the factors that can be quantified and are available within UCAS data. Other factors that may impact applicant attainment (for example, motivation) are not controlled for in the model. Estimation of percentage point differences is based on the marginal effect of holding an unconditional firm offer for the subgroups of applicants described below.

Key implication	The model estimates that
Applicants with an unconditional offer are more likely to miss their predicted grades.	> Applicants with an unconditional offer are, on average, 11.5 percentage points more likely to miss their predicted grades by three or more grades (than if they had received a conditional offer).
Holding an unconditional offer affects males more than females.	> Males receiving an unconditional offer are, on average, 15.5 percentage points more likely to miss their predicted attainment by three or more grades than if they had received a conditional offer. > Females are, on average, 9 percentage points more likely than if they had received a conditional offer. > However, males with conditional offers are less likely to miss their predicted attainment by three or more grades than females with conditional offers. The net effect of the above is that males and females with an unconditional offer have similar attainment relative to predicted grades.
There is little difference between advantaged and disadvantaged applicants in the effect of holding an unconditional offer.	> Overall, POLAR4 quintile 5 applicants are least likely to miss their predicted attainment by three or more grades (and quintile 1 most likely). > However, modelling did not show a significant difference between POLAR4 quintiles in the impact of an unconditional offer on attainment.

In addition to the findings shown above, and controlling for all other variables in the model:

> Applicants with better average GCSE performance were less likely to miss their predicted grades.

> Applicants with higher predicted grades were more likely to miss their predicted grades.

Analysis of the relationship between predicted and achieved grades in the 2019 cycle can be found in Chapter 8: Qualifications[5].

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[4] These findings are also reported in the insight report: Unconditional Offers – The Applicant Experience: https://www.ucas.com/data-and-analysis/undergraduate-statistics-and-reports/ucas-undergraduate-end-cycle-reports/2019-end-cycle-report

[5] https://www.ucas.com/data-and-analysis/undergraduate-statistics-and-reports/ucas-undergraduate-end-cycle-reports/2019-end-cycle-report

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