

# **Factors associated with predicted and achieved A level attainment**

**August 2016**

## Key findings

Applicants can apply to higher education (HE) ahead of examination results and include predicted grades for each qualification in their application. They represent an estimate of what the school or college thinks the applicant may be able to achieve and are typically provided in December or January, six months or so before the examinations. The most commonly held qualification among applicants is the A level, with 70 per cent of English 18 year olds studying for three or more A levels when they apply.

The achieved A level grades are on average lower than those indicated by the predicted grades, typically by one or two grades in total across their best three A levels. This analysis report looks at factors associated with the difference between predicted grades and achieved grades. The predictions and results for 600,000 English 18 year old applicants between 2010 and 2015, with three or more A levels, are used for this.

The proportion of applicants achieving their best three predicted grades has fallen over recent years. In 2015, just over half of all English 18 year old applicants missed their predicted attainment over three A levels by two or more grades; an increase of 34 per cent since 2010.

The following factors show an overall association (on their own, without taking other factors into account) with a greater chance of applicants missing their predicted grades by two or more grades.

- Having lower predicted grades.
- Having lower levels of GCSE attainment (for a particular level of predicted grades).
- Certain A level subjects (e.g. physics, chemistry, biology, and psychology).
- Applicants in the Asian, Black, Mixed, and Other ethnic groups.
- Applicants from disadvantaged areas.
- Applicants with a firm choice at a higher education provider where average qualifications on entry are typically lower than average.
- Applicants with a firm choice that has no academic conditions attached to it (sometimes called an 'unconditional offer').

These associations consider only one factor at a time, so they cannot, for example, indicate whether the lower attainment against prediction associated with applicants from disadvantaged areas is simply a reflection of the pattern of other characteristics of those applicants (for instance, lower levels of GCSE attainment).

To give an indication of the nature of these associations, several statistical models were used that could consider factors simultaneously. They investigated whether these associations remained when factors such as GCSE grades, predicted grades, subjects, demographic characteristics, HE provider, offer type and other factors are considered simultaneously.

This found that, even after taking other factors into account, lower attainment relative to predicted grades was associated with the following factors.

- Having higher predicted grades (in contrast to the overall association).
- Having lower prior GCSE attainment (for a particular level of predicted grades).
- Those studying certain A level subjects, such as the combination of biology, chemistry, and mathematics.
- Applicants with a firm choice at a provider with lower average qualifications on entry.
- Applicants in the Asian, Black, Mixed, and Other ethnic groups.
- Applicants with a firm choice that has no academic conditions attached to it (sometimes called an 'unconditional offer')
- Applicants from disadvantaged areas.
- Women applicants.

The effect associated with setting an offer with no academic conditions as firm was investigated further. This indicated that the overall size of this association was 4 to 5 percentage points (8 to 10 per cent proportionally). In 2015, this equated to around 340 additional applicants achieving two grades or lower than predicted – some 0.6 per cent of all applicants missing their predicted grades by that margin in that year.

## Introduction

Many applicants to higher education (HE) want to start their university course in the September shortly after A levels and other qualifications are awarded in July and August. To support this, applicants can apply to higher education ahead of examination results and include in their application predicted grades for each qualification. They represent an estimate of what the school or college thinks the applicant may be able to achieve and are typically provided in December or January, six months or so before the examinations. It is only after HE providers have made their offers, and applicants have chosen their preferred offer (referred to as their 'firm' choice or offer), that the applicants receive their achieved grades.

The most commonly held qualification amongst applicants are A levels, with 70 per cent of English 18 year olds studying for three or more A levels when they apply. The achieved A level grades are on average lower than indicated by the predicted grades, typically by one or two grades in total across three A levels. This analysis report looks at factors associated with the difference between predicted grades and achieved grades.

### Measuring predicted and achieved A level attainment

Predicted and achieved A level attainment is measured by assigning points to different grades. An A\* grade is equal to six points, an A grade is equal to five points, and so on down to an E grade, which is assigned one point. The points corresponding to the best three predicted A levels are added together to give the total predicted A level points score for each applicant, and, similarly, the points for the best three grades achieved are added together to give the total achieved points score. The total predicted points score is then subtracted from the total achieved score to give the difference, which is the measure used here to assess the relationship between predicted and achieved attainment. Where this difference is less than zero, the total predicted attainment is greater than the total achieved attainment, and the applicant is described as not meeting their predicted attainment. If the difference is greater than zero, the applicant exceeded their predicted attainment. When the difference is zero, the applicant met their predicted attainment.

This analysis focuses on the group of applicants most likely to apply with a set of predicted grades – 18 year old English domiciled applicants who applied by the June deadline. It considers applicants with at least three predicted A levels with a total predicted point score of 12 (typical grade profile of BBB) or higher, who applied during the 2010 to 2015 application cycles.

Treating predicted and achieved attainment in this way means that the specific predicted and achieved grade profiles are not considered when assessing if an applicant meets their predicted attainment. For example, an applicant with a predicted grade profile of ABC will have the same total predicted point score (12) as another applicant who is predicted BBB. Nor does it consider the subject of the

predicted and achieved A levels. For example, an applicant could be predicted and achieve a grade profile of ABB, but the subject in which the A grade is predicted might be different to that in which the achieved A grade is in. However, the use of such a measure does not restrict us from understanding how the specific grade profiles, or A level subjects, affect the relationship between predicted and achieved grades, since we can consider the difference between predicted and achieved attainment for groups of applicants with, for example, different predicted grade profiles, or for applicants studying specific subjects.

## Patterns of predicted and achieved attainment

Figure 1 shows the proportion of English 18 year old applicants predicted three or more A levels who met or exceeded their predicted A level points score from their best three predicted A levels, shown for a range of selected predicted grade profiles. In 2010, 37.1 per cent of applicants met or exceeded their predicted attainment, but this proportion has fallen each year since. In 2015, 25.5 per cent of applicants met or exceeded their predicted attainment, a proportional fall of 31 per cent.

The proportion of applicants that met or exceeded their predicted attainment differed across the selected predicted grade profiles. Throughout the period applicants predicted BBB were the least likely to meet or exceed their predicted attainment. For predicted grade profiles from BBB to AAA, applicants with higher predicted grades profiles were more likely meet their expected attainment. In most years applicants predicted A\*AA were less likely to meet or exceed their predicted attainment compared to those predicted AAA, while those predicted A\*A\*A were even less likely.

The pattern for applicants predicted A\*A\*A\* is noticeably different to the pattern for the other grade profiles. In 2010, 41.5 per cent of applicants predicted A\*A\*A\* achieved their predicted attainment. Despite this proportion falling during the period, to reach 38.1 per cent by 2015, the proportional decrease is less than the reductions seen for other grade profiles. This meant that, by 2015, applicants predicted the very highest grades were the most likely to achieve them, being twice as likely to achieve their predicted attainment as those predicted BBB. This different pattern may be due to the censoring effect of being predicted the highest grades, where the upper limit of predicted attainment is unknown, potentially resulting in a group of applicants whose predicted attainment is less uniform than those in other groups.

**Figure 1 Proportion of applicants who met or exceeded their predicted attainment by best three predicted grade profile**

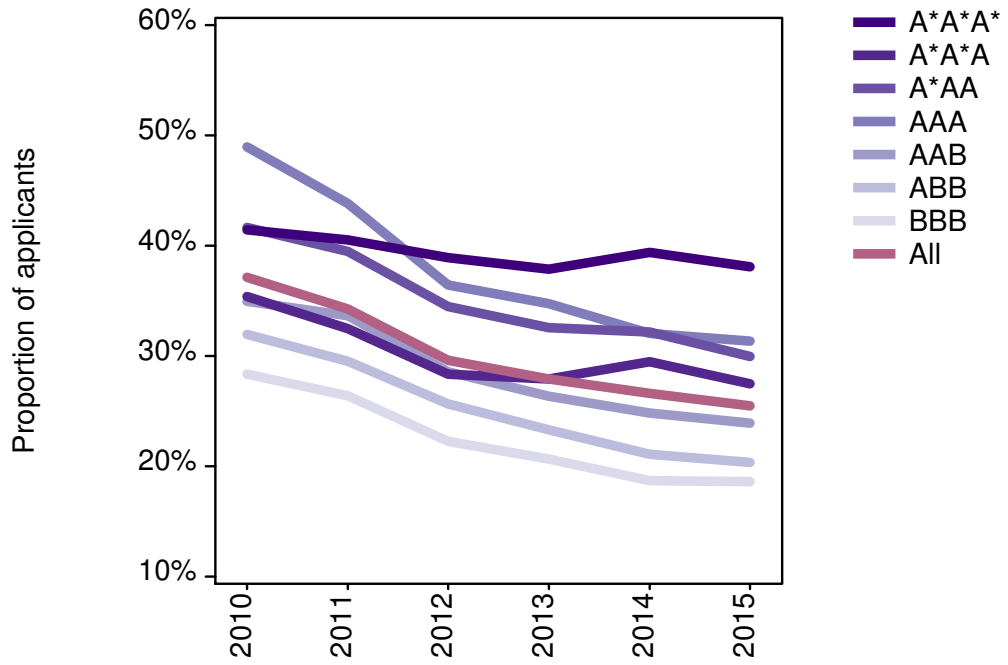
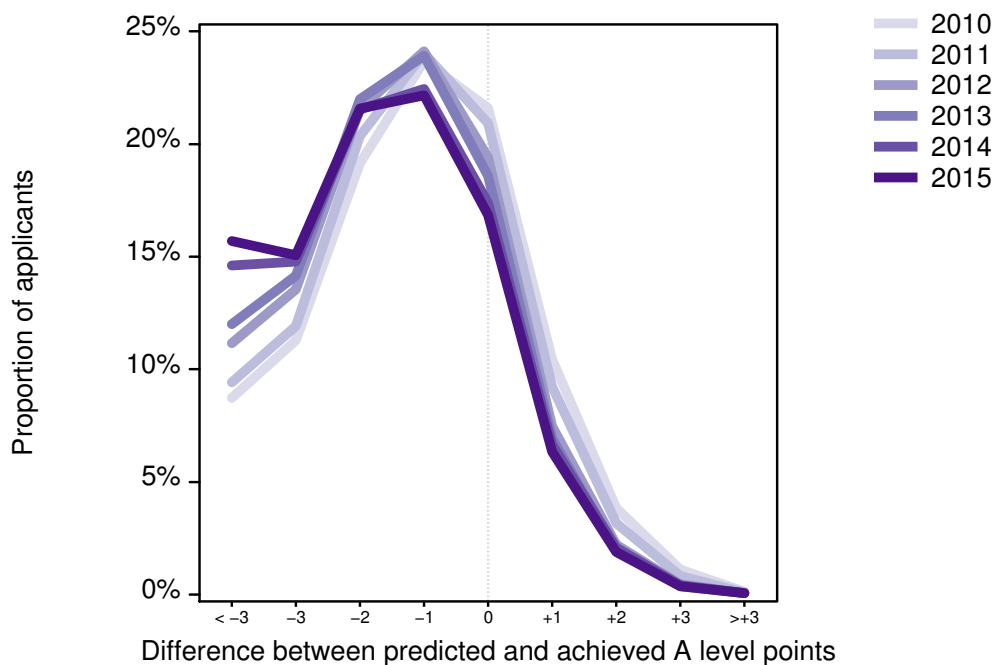


Figure 2 shows the proportion of applicants by the difference in their achieved and predicted attainment, as measured by the difference in best three achieved and best three predicted A level point scores. In each year more applicants missed their predicted attainment than met or exceeded it. In 2015, 22.2 per cent of applicants missed by one point, and 21.6 per cent missed by two points. 15.1 per cent missed by three points while 15.7 per cent missed by more than three points. Around half of applicants missed their predicted attainment by two or more points.

In 2015, 16.8 per cent of applicants met their predicted attainment exactly, while 6.3 per cent exceeded by one grade, 1.9 per cent by two grades, 0.4 per cent by three grades and less than 0.1 per cent by three or more grades.

Since 2010, the proportion of applicants that met or exceeded their predicted attainment has fallen, from 37.1 per cent to 25.5 per cent in 2015. The proportion of applicants missing by one point also fell, from 23.7 per cent in 2010 to 22.2 per cent in 2015. However the proportion missing by two or more grades increased from 39.2 per cent in 2010 to 52.3 per cent in 2015 (34 per cent proportionally). The largest increases over the period were for applicants missing by three points (33 per cent proportionally) and for those missing by more than three points (80 per cent proportionally).

**Figure 2 Distribution of difference between achieved and predicted attainment by year**



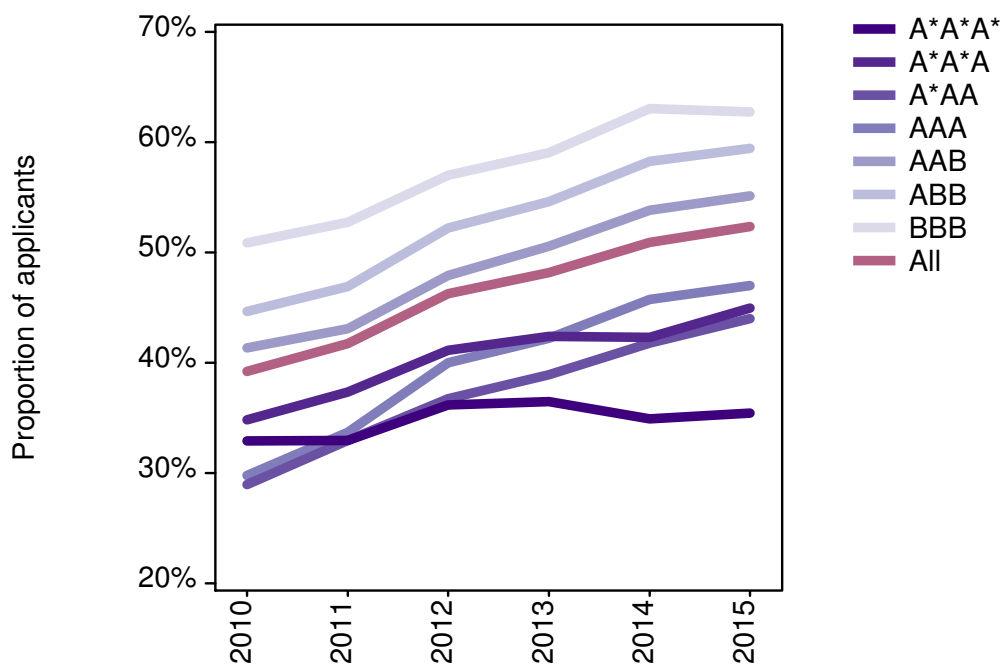


Around half of applicants missed their predicted attainment by two or more points in 2015. Separating applicants into two broadly equal sized groups makes missing by two or more points a useful measure for understanding the relationship between predicted and achieved attainment. Furthermore it represents a more substantial difference between predicted and achieved attainment than missing by just a single point. Figure 3 shows the proportion of applicants who missed their predicted attainment by two or more points for each predicted grade profile. For all predicted grade profiles the proportion of applicants missing by two or more points has increased since 2010.

For most predicted grade profiles, the chances of missing by two or more points decreases with higher predicted attainment. For example applicants predicted BBB are more likely to miss by two points than those predicted ABB, who are in turn more likely to miss by two points than those predicted AAB. This pattern continues up to those predicted A\*AA.

In 2015, 35.4 per cent applicants predicted A\*A\*A\* missed their predicted attainment by two or more points, the lowest of any predicted grade profile. In comparison, 62.7 per cent of applicants predicted BBB missed by two or more points, meaning they were 77 per cent more likely to miss by two or more grades, compared those predicted the very highest grades.

**Figure 3 Proportion of applicants who missed their predicted attainment by two or more points by best three predicted grade profile**



## Patterns of predicted and achieved attainment by A level subject

Figure 4 shows the proportion of A level qualifications where the predicted grade was higher than the achieved grade for nine of the most commonly studied A level subjects. We used this measure of missing by one point or more for a single A level because it is closely aligned to the miss by two or more points statistic used when assessing the relationship between predicted and achieved attainment across an applicant's best three grades.

The proportion of A level qualifications where the predicted grade was higher than the achieved grade varies by A level subject.

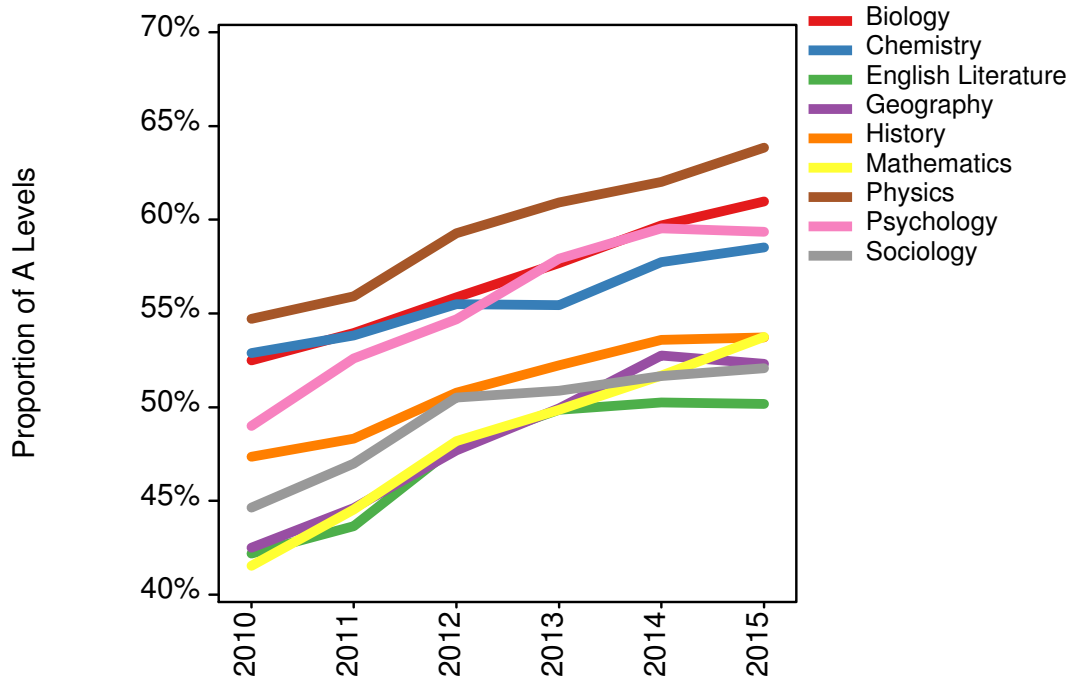
The predicted grades for A levels taken in physics were most likely to have been higher than the grade achieved, with the predicted grades in 63.8 per cent of A levels in this subject being higher than the grade achieved in 2015. The proportion of predicted grades that were higher than those achieved was also relatively high for A levels in biology (61.0 per cent), psychology (59.4 per cent) and chemistry (58.5 per cent). Throughout the period more than half of all predicted grades in these four subjects were higher than those achieved.

For A levels in history, mathematics, geography, sociology and English literature, a lower proportion of A levels had predicted grades higher than attained than the first group of A level subjects for each year. However, by 2015 more than half of the predicted grades for each of these five subjects were higher than attained.

The proportion of predicted A level grades that were higher than those achieved increased across the period for all subjects. The smallest increase was for A levels in chemistry, which increased by 11 per cent proportionally, while the largest increase was for A levels in mathematics which increased by 29 per cent proportionally.

Looking at the overall association between A level subject and the chance of missing predicted grades does not take into account other factors. For example, there may be different patterns of GCSE attainment between subjects or differences in grade distribution within each A level subject.

Figure 4 Proportion of A level qualifications where the predicted grade was higher than the achieved grade



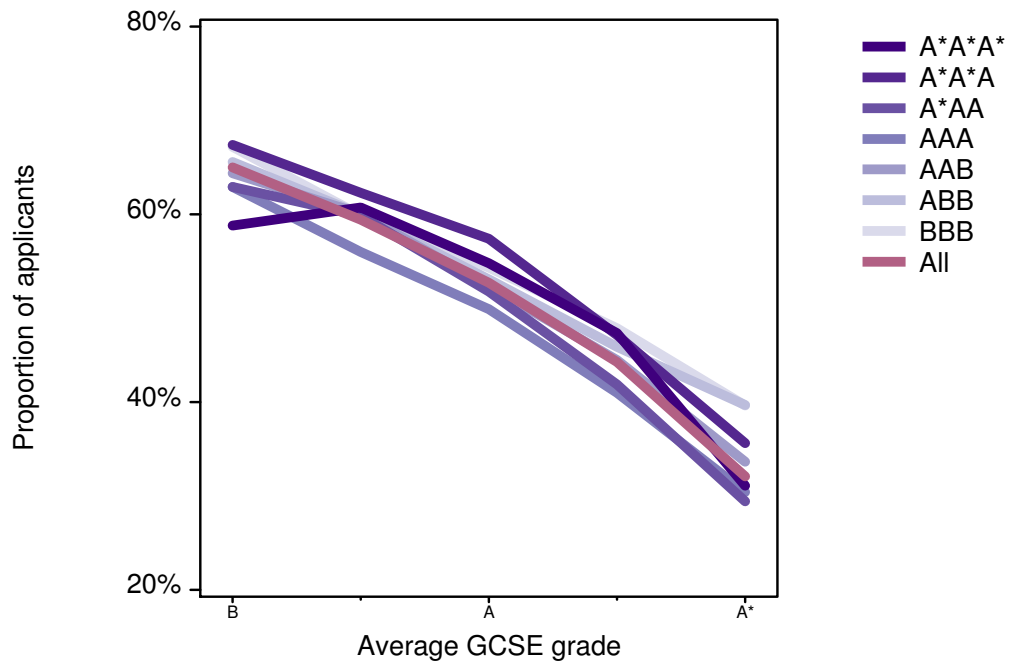
## Patterns of predicted and achieved attainment by GCSE attainment

Figure 5 shows the proportion of applicants that missed their predicted attainment by two or more grades against average prior GCSE attainment, split by selected predicted A level grade profiles. For all A level grade profiles the proportion of applicants who missed their grades was higher when prior GCSE attainment was lower. For applicants who averaged a B grade in their best eight GCSEs, 65.0 per cent of applicants missed their predicted attainment by two or more grades, falling to 32.1 per cent for applicants who averaged an A\* in their best eight GCSEs.

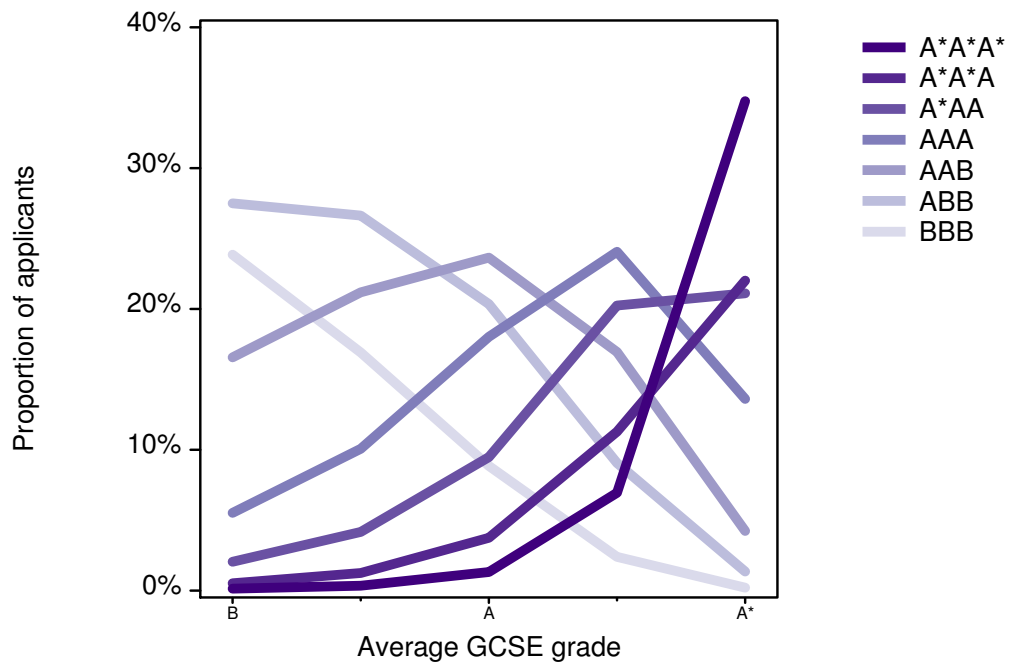
Although higher GCSE attainment is associated with lower chances of missing predicted attainment by two or more grades, the relationship is slightly different across the different predicted grade profiles. For applicants who averaged a B grade at GCSE, those who were predicted A\*A\*A were the most likely to miss their predicted attainment, while those predicted A\*A\*A\* were the least likely. For applicants who averaged an A\* grade at GCSE, those predicted BBB or ABB were most likely to miss their predicted attainment, while those predicted AAA, A\*AA or A\*A\*A\* were the least likely.

The GCSE attainment of applicants is strongly associated with their predicted A level grades. Figure 6 shows how the proportion of applicants predicted different grade profiles varies according to prior GCSE attainment. Those with higher GCSE attainment are much more likely to be predicted higher grades, and those with lower attainment are much more likely to be predicted lower A level attainment. This means that the relationship between missing predicted grades and GCSE attainment is best viewed as an effect within those predicted a particular set of A level points.

**Figure 5 Proportion of applicants who missed their predicted attainment by two or more points by GCSE attainment and best three predicted grade profile**



**Figure 6 Proportion of applicants predicted different grade profiles by prior GCSE attainment**



## Patterns of predicted and achieved attainment by sex, area background and ethnic group

Figure 7 shows the proportion of applicants that missed their predicted attainment by two or more grades by sex. Over the period the proportion of male and female applicants missing by two or more grades has been broadly similar. In 2010, 40.0 per cent of male applicants, and 38.6 per cent of female applicants missed their predicted attainment by two or more points. In 2015 these proportions had increased to 51.9 per cent for male applicants and 52.7 per cent for female applicants (proportional increases of 30 and 36 per cent respectively).

**Figure 7 Proportion of applicants who missed their predicted attainment by two or more points by sex**

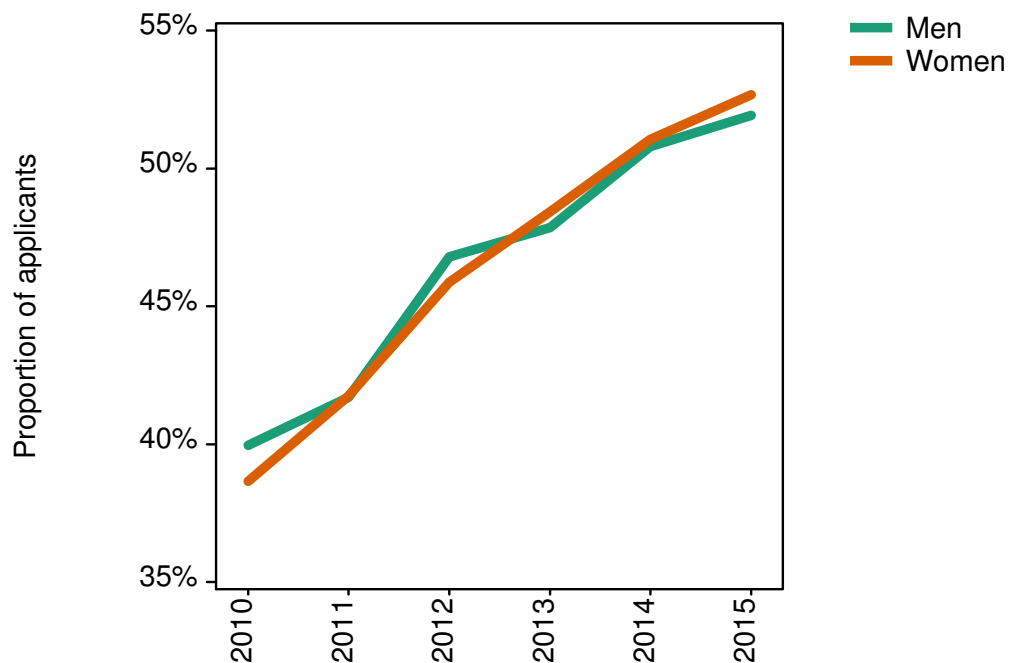


Figure 8 shows the proportion of applicants that missed by two or more points by area background, as measured by the POLAR3 classification. The POLAR3 measure of background classifies small geographical areas across the UK into five groups according to their level of young participation in higher education. Each group represents around 20 per cent of young people and is ranked from quintile 1 (considered most disadvantaged) to quintile 5 (considered most advantaged).

Applicants from more disadvantaged areas were consistently more likely to miss their predicted grades than applicants from more advantaged backgrounds. The proportion of applicants missing their predicted attainment by two or more grades increased for all groups during the period.

In 2010, 44.2 per cent of applicants from the most disadvantaged areas (quintile 1) missed their predicted attainment by two or more grades. In comparison, 36.0 per cent of applicants from the most advantaged areas (quintile 5) missed their predicted attainment by the same amount, meaning that applicants from the most disadvantaged areas were 23 per cent more likely to miss their predicted attainment by two or more grades than those from the most advantaged areas. By 2015, 58.9 per cent of applicants from quintile 1 missed their predicted attainment by two or more grades, compared to 48.2 per cent from quintile 5, meaning the proportional difference between the groups was 22 per cent. This observed pattern across applicants from different areas does not take into account other ways that these groups of applicants could differ.

**Figure 8 Proportion of applicants who missed their predicted attainment by two or more points by POLAR3**

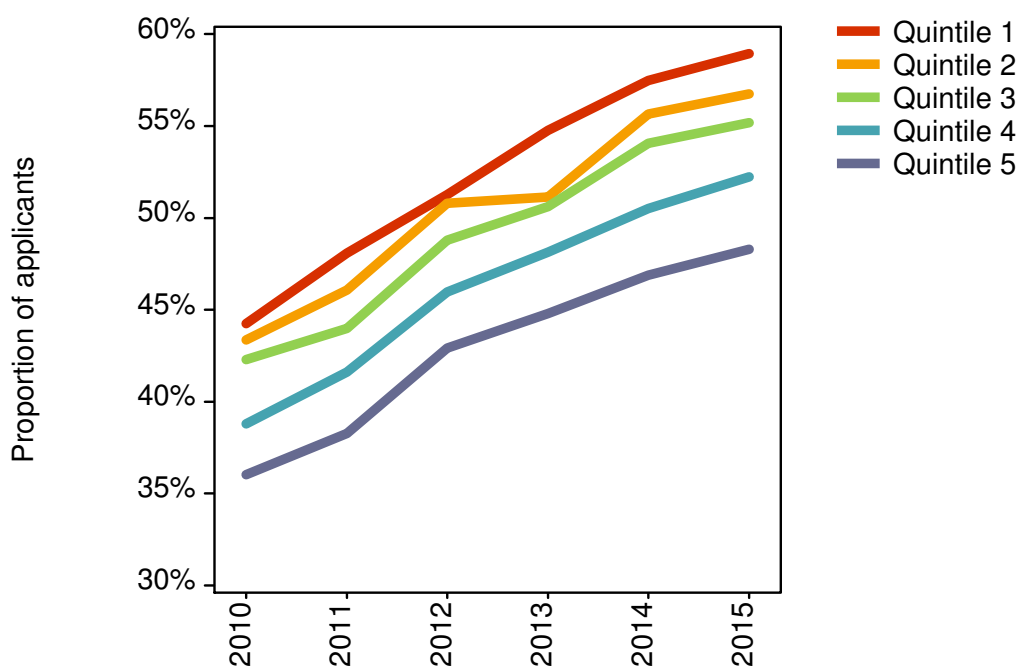
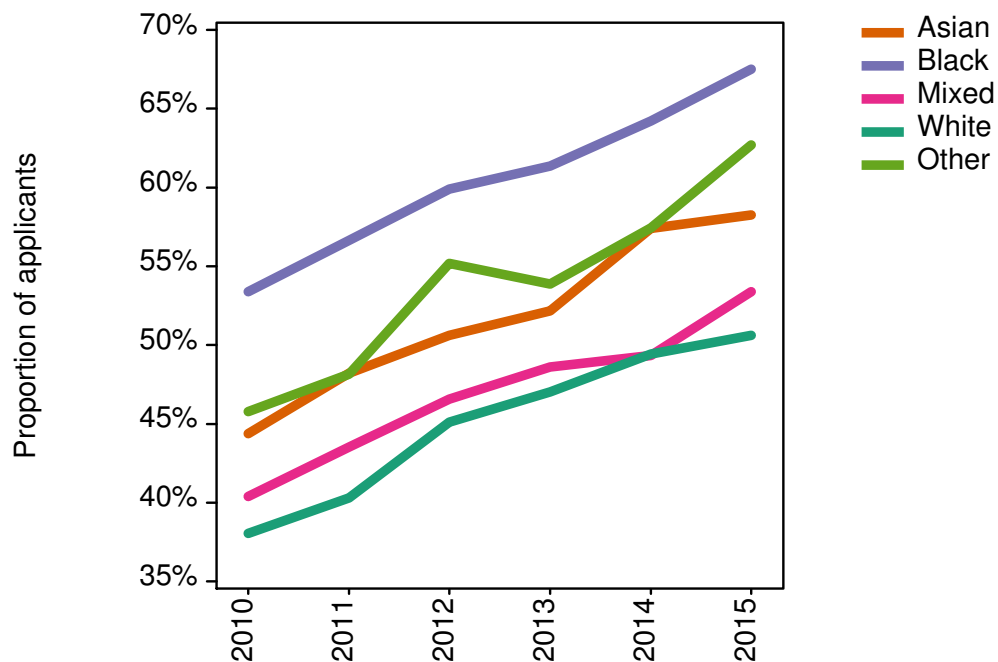


Figure 9 shows the proportion of applicants that missed by two or more points for different ethnic groups. Large differences in the proportion of applicants missing their predicted attainment exist between ethnic groups throughout the period. Applicants from the White ethnic group were least likely to miss by two or more grades, ranging from 38.0 per cent in 2010 to 50.6 per cent in 2015. In comparison, applicants from the Black ethnic group were the most likely to miss their predicted attainment, increasing from 53.3 per cent in 2010 to 67.5 per cent in 2015. The proportion of applicants from the Other, Asian and Mixed ethnic groups that missed their predicted attainment was lower than for the Black ethnic group, but higher than for the White ethnic group throughout the period.

In 2015, compared to the White ethnic group, applicants from the Black ethnic group were 33 per cent more likely to miss their predicted attainment (a 16.9 percentage point gap). Applicants from the Other, Asian and Mixed ethnic groups were, respectively, 24 per cent, 15 per cent and 5 per cent more likely to miss their predicted attainment than the White ethnic group (differences of 12.2, 7.6 and 2.7 percentage points respectively).

As with the analysis by POLAR3 this observed pattern across applicants from different ethnic groups does not take into account other ways that these groups of applicants could differ.

**Figure 9 Proportion of applicants who missed their predicted attainment by two or more points by ethnic group**





## Patterns of predicted and achieved attainment by type of provider and offer

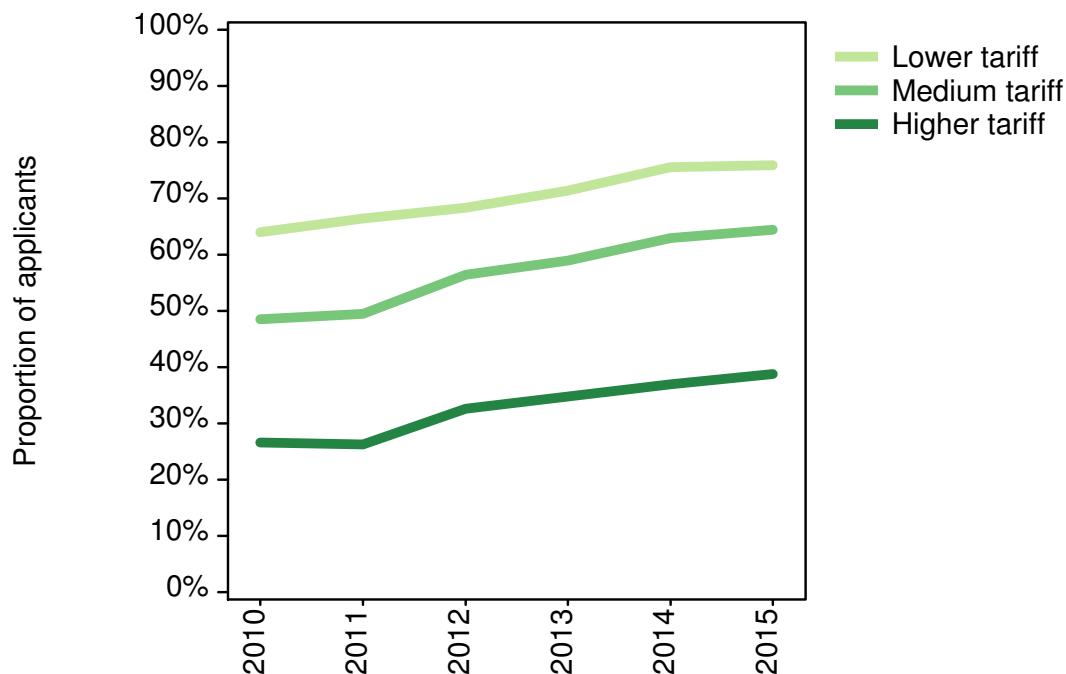
One way in which HE providers differ is through the level of attainment of those who are placed at the courses they offer, and can be grouped into higher, medium and lower tariff groups that reflect this. Providers where the level of attainment of their entrants is (on average) higher, are likely to make offers where the academic conditions for acceptance are relatively high. In contrast, providers where the level of attainment of entrants is lower are likely to make offers where the attainment threshold is lower.

One way in which the difference between achieved and predicted grades could vary is by the academic requirements associated with the offer an applicant receives. For example, consider an applicant predicted a total of 12 points who selects as their firm choice an offer that requires them to achieve a total of 13 points to be accepted. To guarantee entry onto their chosen course, this applicant must exceed their predicted attainment by one grade. Now consider the same applicant, but who instead chooses a firm choice which requires them to achieve a total of 11 points, meaning they could afford to miss their predicted attainment by one grade. It may be that different offer levels could act as a differential incentive for attainment. Since the level of offer is unknown when grades are predicted, but is known before final examinations are taken, it is possible that the level of the offer could be associated with the difference between predicted and achieved attainment.

Due to the many ways in which providers can set the academic conditions associated with an offer they make to an applicant (for example, in many cases there may be multiple sets of conditions expressed in unstructured text of which an applicant only has to satisfy one) using academic requirements of the offer to understand their effect in relation to the predicted and achieved grades is far from straightforward. However it is reasonable to assume that the effective level of an offer from a provider with typically high grades on entry will be higher than an offer from a provider with typically lower grades on entry. So the type of provider that the firm offer is held from can be used as a proxy for the level of the offer to see if there is an association with the difference between predicted and achieved grades.

Figure 10 shows the proportion of applicants who miss their predicted grades by two or more points by the tariff group of the provider with which they hold a firm choice. Applicants holding firm offers at lower tariff providers are more likely to miss their predicted attainment than applicants holding firm choices at medium tariff providers, who are in turn more likely to miss than applicants holding firm offers at higher tariff providers. This is the pattern we would expect under the assumptions that the offers made by higher tariff providers are higher (compared to offers from lower tariff providers), and that the effect of holding a higher firm offer in relation to a set of predicted grades is to increase the likelihood that predicted attainment is met or exceeded. However, this simple association does not take into account other ways that these groups of applicants could differ.

**Figure 10 Proportion of applicants who missed their predicted attainment by two or more points by the tariff group of the provider their firm offer was held**

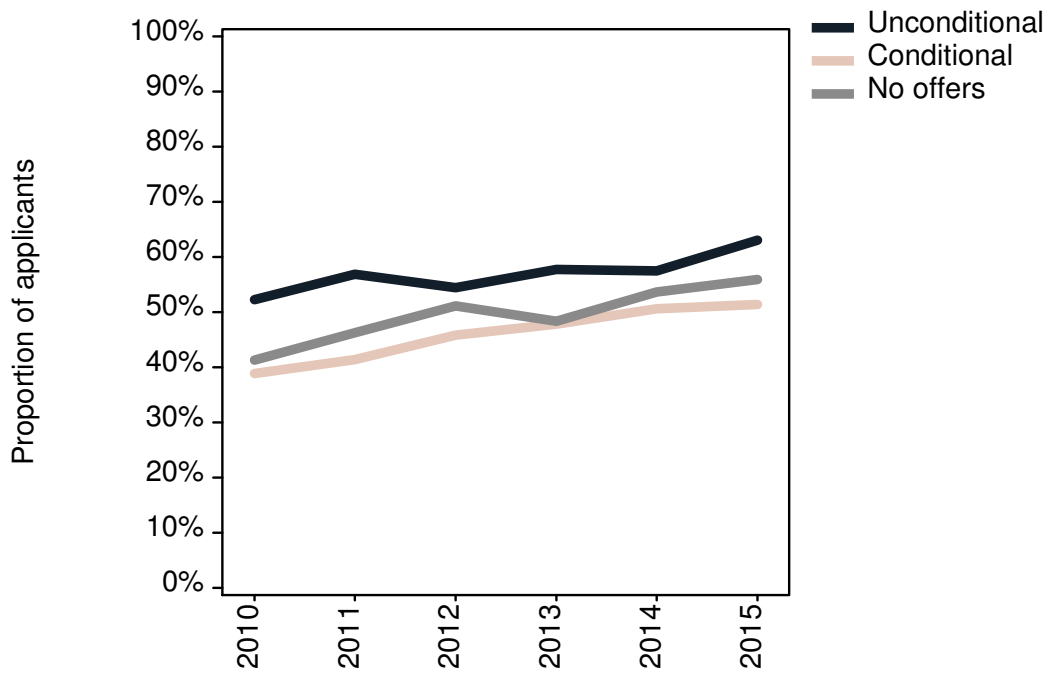


Although we are unable to use the detailed offer conditions, an alternative is to consider the type of offer, in terms of whether it has any academic requirements (a conditional offer), or not (an unconditional offer), that applicants select as their firm choice. If there was an association between the detailed level of an offer and the difference between predicted and achieved attainment then it is reasonable to expect to see that reflected in a difference between conditional offers and unconditional offers.

Figure 11 shows the proportion of applicants who miss by two or more grades by whether the level of the firm offer is simplified to conditional or unconditional. Throughout the period, applicants holding unconditional firm choices were more likely to miss their predicted attainment by two or more grades, compared to applicants holding conditional firm choices. In 2015, applicants holding unconditional firm offers were 23 per cent more likely to miss their predicted attainment by two or more grades, compared to applicants holding conditional firm offers. Those applicants with no offers, who had neither a conditional offer to work towards or the certainty of a place, were more likely to miss their predicted attainment by two or more grades than those with a conditional offer, but less likely to do so than those with the certainty of a place.

As with the analysis by type of provider, this association does not take into account any other differences there may be between applicants holding these different types of offers.

**Figure 11 Proportion of applicants who missed their predicted attainment by two or more points by whether they had a conditional or unconditional offer, or whether they received no offers**



## **Investigation of predicted and achieved attainment using statistical modelling**

Analysis above has shown that the relationship between predicted and achieved attainment varies with respect to a number of factors. There may be direct relationships between some of the factors already considered that result in some of the patterns observed. For example, applicants from some ethnic groups may be more likely to study combinations of A level subjects where the probability of missing the predicted grades are higher. If this were true for ethnic minority groups then the pattern of predicted and achieved attainment observed by ethnic group may simply be a consequence of the A levels studied by the different groups, which if controlled for, would result in smaller differences between ethnic groups. It might also be the case that any effect of say, GCSE attainment, may vary by the exact level of the predicted grades.

We can assess the combined effect of each of these factors on the relationship between predicted and achieved grades through a statistical modelling approach. For example, using a statistical model allows us to assess the association between ethnic group and the difference between predicted and achieved attainment for fixed levels of other factors. Statistical models also allow us to estimate what the relationship between predicted and achieved grades might be for different applicants and what factors seem to have the largest contribution to that difference.

### **Modelling the chances an applicant will miss by two or more points**

This analysis uses a logistic regression model, built using data from nearly 600,000 applicants that applied during the 2010 to 2015 cycles, to estimate the chances that an applicant will miss their predicted attainment by two or more grades. Included in the model are factors that have already been identified as showing an overall association in terms of an applicant's chances of missing by two or more points. These include measures of predicted A level attainment, achieved prior GCSE attainment, applicant background, HE provider at which any firm offer is held, and whether the firm offer is conditional or unconditional. In addition we include factors that describe subject of degree course of any firm offer held, region of applicant domicile, and type of school or college where the applicant is studying.

The measures of predicted A level attainment include the total predicted point score from the best three grades, and the predicted grades for each of the three A levels, along with the subjects studied.

For prior GCSE attainment, the measures include the average point score of the best eight GCSE grades (eight points for A\*, seven points for A, down to one point for G), the number of GCSEs achieved at each grade, and the GCSE grade for each subject.

The model also includes a measure of the interaction between total best three predicted A level points and average best eight GCSE point scores. This means that

within the model GCSE attainment is considered relative to the level of the predicted grades.

The measures of applicant background in the model are sex, POLAR3 quintile and ethnic group.

We have shown that, on average, differences in predicted and achieved A level attainment vary by the tariff group of the HE provider at which a firm offer is held. However, rather than include the tariff group in the model, a control for the actual HE provider is added. This term allows the model to adjust for any differences in the relative attractiveness of either the offer or securing a place between providers. As well as the academic conditions of an offer being relatively easy or difficult to meet, these differences might include the perceived attractiveness of a place at that provider including, for example, any guaranteed accommodation or bursary support if the academic conditions of an offer are met.

The type of firm offer held identifies any differences in the chances of missing predicted attainment by two or more grades by whether the firm offer is conditional or unconditional. This measure can be used as a simplified proxy, in the way described earlier, that allows the effect of the academic conditions (summarised to some conditions versus no conditions) associated with a firm offer, relative to the predicted attainment, on the chances of missing predicted attainment by two or more grades to be estimated. Since unconditional offers have no academic requirements attached to them, this factor can be taken as indicating an approximate maximum size of the effect of more typical changes to the detailed level of a conditional offer.

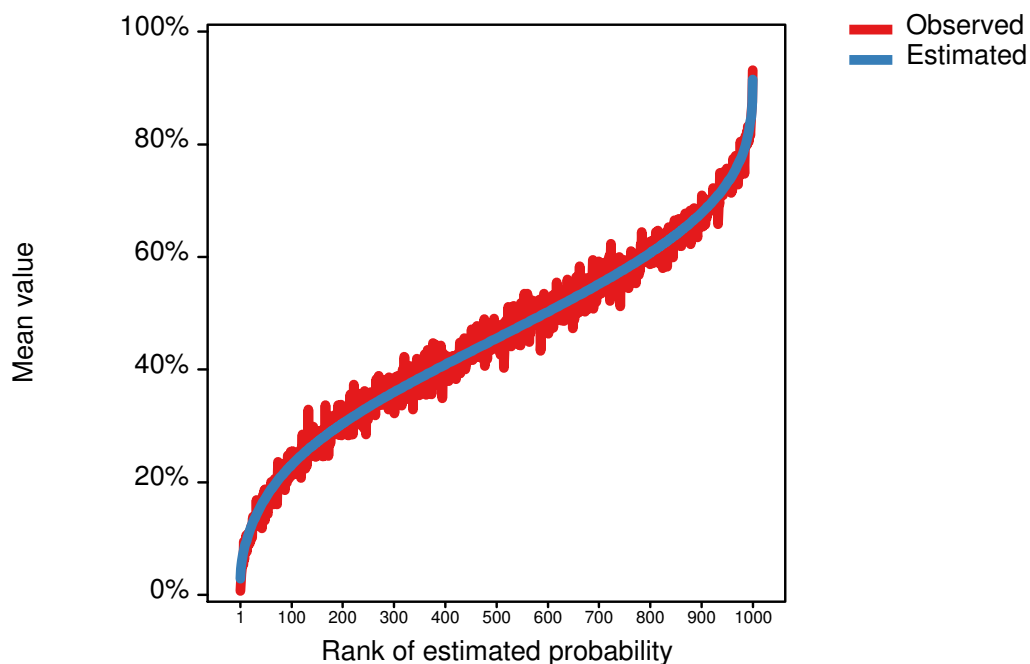
The trend in predicted attainment relative to achieved attainment has changed over time, with the proportion of applicants missing their predicted grades increasing each year since 2010. Because of this a term in the model that controls for the application cycle is included.

Furthermore, previous analysis by UCAS (2015 UCAS end of cycle report) has shown how the number of unconditional offers being made has increased over recent years, particularly among a subset of HE providers. The model includes a measure that identifies applicants holding a firm offer at these providers so that any differential effect that selecting a firm offer (conditional or unconditional) from one of this subset of providers in this period has on the chances of missing predicted attainment.

### How well does the model estimate the chance of missing by two or more grades?

Figure 12 shows how the model provides a good fit to the data. The applicants are ranked by the model-estimated probability that they will miss their predicted A level attainment by two or more grades, and then split into 1,000 equally sized groups (each group contains around 600 applicants). Figure 12 shows the average model-estimated probability (blue line) and the average observed probability (red) for each of the ordered groups. The red and blue lines show a good overlap, with no evidence that the model estimates are systematically above or below the observed values across the entire range of possible values. The difference between the modelled probability and the observed values across the groups (averaging 1.6 percentage points) is consistent with the random variation expected from the small groups used (600 applicants).

**Figure 12 Mean observed and model-estimated probabilities of missing by two or more grades for 1,000 equally sized groups ranked according to model-estimated probabilities**



The contribution of each of the factors included in the model is assessed by comparing the difference each factor makes to the chances of missing predicted attainment by two or more grades to a typical applicant. This method of reporting means that every measure included in the model, including the measures that are considered in combination such as predicted A level attainment and prior GCSE attainment, contribute to the resultant changes to the estimated probabilities. We can also focus the assessment on meaningful comparisons of factors, such as between POLAR3 quintile 1 and quintile 5, and realistic levels and combinations of values, for example for predicted attainment and prior GCSE attainment.

By identifying the most common characteristics of applicants and the choices they make, we define the reference (typical) applicant to be a woman in the White ethnic group, from a POLAR3 quintile 5 area in the South East of England who attended an academy when applying, holding four GCSEs at grade A\* and a further four at grade A, and predicted to achieve AAB in biology, chemistry and mathematics A levels respectively. Furthermore we assume application in 2015, holding a conditional firm offer for a course in biological sciences at a typical higher tariff provider.

The model estimates that the probability of such an applicant missing their predicted attainment by two or more grades is 49 per cent. Table 1 shows similar estimated probabilities for the same applicant, but where just one of the characteristics of the applicant, the predicted A level or prior GCSE attainment, or some aspect of the firm choice held, has been altered.

Many of the largest changes in estimated probability result from altering the prior GCSE attainment, the predicted A level grade profile, and the subjects of the predicted grades.

Keeping all other measures unchanged, including predicted A level attainment, lower prior GCSE attainment is associated with increased probability of missing predicted attainment by two or more grades. Decreasing the average GCSE grade across an applicant's best eight GCSEs, for a fixed level of predicted attainment, increases the chances of missing to 71.6 per cent (+22.6 percentage points, 46 per cent proportionally).

Higher predicted A level attainment is also associated with increased probability of missing predicted attainment by two or more grades. Increasing the best three predicted A level grade profile from AAB to A\*A\*A increases the probability to 68.3 per cent (+19.3 percentage points, 40 per cent proportionally). This is a reversal of the chance of missing by two or more grades that we reported when looking at predicted grade profile without considering other factors.

Changing the subjects of the predicted A levels from a set of scientific subjects (biology, chemistry, maths) to a set of art subjects (English, history, art) decreases the chances of missing to around 30 per cent (-19.1 percentage points, -39 per cent proportionally). Changing only two of the subjects, chemistry and maths, to psychology and sociology has a similar effect.

The nature of the firm offer held is also associated with differences in the chances of missing predicted attainment by two or more grades.

Changing the tariff group of the provider at which the firm offer is held to a typical lower tariff provider increases the chances of missing to 64.9 per cent (+15.9 percentage points, 32 per cent proportionally), while changing it to be a typical medium tariff provider increases the chances to 51.9 per cent (+2.9 percentage points, 6 per cent proportionally).

**Table 1 Effect of altering the values of selected terms in the model on the chances of missing predicted attainment by two or more grades compared to a typical reference applicant**

<b>Factor effects, measured by altering the value of that factor and comparing against that of a typical applicant (attributes of the typical applicant are shown in parentheses)</b>	<b>Estimated probability of missing by two plus grades</b>	<b>Percentage point difference from typical applicant</b>	<b>Proportional difference from typical applicant</b>
<b>Male</b> (vs female)	47.0%	-1.9	-4%
<b>POLAR3 quintile 1</b> (vs quintile 5)	51.7%	2.7	5%
<b>POLAR3 quintile 2</b> (vs quintile 5)	51.0%	2.0	4%
<b>POLAR3 quintile 3</b> (vs quintile 5)	50.6%	1.6	3%
<b>POLAR3 quintile 4</b> (vs quintile 5)	50.0%	1.0	2%
<b>Asian</b> (vs White)	54.1%	5.1	11%
<b>Black</b> (vs White)	58.1%	9.2	19%
<b>Mixed</b> (vs White)	51.3%	2.3	5%
<b>Other</b> (vs White)	54.2%	5.2	11%
<b>Holding unconditional firm</b> (vs conditional firm)	55.4%	6.4	13%
<b>Holding firm offer at a typical medium tariff provider</b> (vs higher tariff provider)	51.9%	2.9	6%
<b>Holding firm offer at a typical lower tariff provider</b> (vs higher tariff provider)	64.9%	15.9	32%
<b>Firm offer in subjects allied to medicine</b> (vs Biological Science)	50.0%	1.0	2%
<b>Firm offer in maths</b> (vs Biological Science)	45.0%	-4.0	-8%
<b>Predicted A levels BBB</b> (vs AAB)	45.4%	-3.6	-7%
<b>Predicted A levels ABB</b> (vs AAB)	46.2%	-2.8	-6%
<b>Predicted A levels AAA</b> (vs AAB)	49.3%	0.3	1%
<b>Predicted A levels A*AA</b> (vs AAB)	55.9%	6.9	14%
<b>Predicted A levels A*A*A</b> (vs AAB)	68.3%	19.3	40%
<b>Predicted A levels A*A*A*</b> (vs AAB)	76.9%	27.9	57%
<b>Predicted A levels in English, history and art</b> (vs biology, chemistry and maths)	29.9%	-19.1	-39%
<b>Predicted A levels in biology, psychology and sociology</b> (vs biology, chemistry and maths)	29.2%	-19.8	-40%
<b>GCSE grade profile of four As and four Bs</b> (vs four A*s and four As)	71.6%	22.6	46%
<b>GCSE grade profile of eight A*s</b> (vs four A*s and four As)	32.9%	-16.1	-33%
<b>Reference applicant:</b> Woman, White ethnic group, POLAR3 quintile 5, living in South East of England, attending an Academy, best eight GCSE grades four A* and four A, holding a conditional firm offer to study biological sciences at a typical higher tariff university (that has not been recorded as making offers that do not have academic conditions), predicted A in biology, A in chemistry and B in maths A levels, applying in 2015.			



Altering the degree subject in which the firm offer is held also has an effect. Switching between holding a firm offer for a degree in a biological sciences course to a firm offer for a mathematics degree decreases the chances of missing by two or more grades by 4.0 percentage points (-8 per cent proportionally).

Holding an unconditional firm offer is also associated with being more likely to miss predicted attainment by two or more grades. Switching the type of firm offer held from a conditional firm to an unconditional firm increases the chances of missing by two or more grades by 6.4 percentage points (13 per cent proportionally).

Once other factors were held at a fixed level, being female, from a more disadvantaged area or from an Asian, Black, Mixed or Other ethnic group were all associated with statistically significant increases in the chances of missing predicted attainment by two or more grades.

The estimated probability of missing by two or more grades for a man with the same set of factors was 1.9 percentage points lower (-4 per cent proportionally) than a woman.

If the applicant was from the most disadvantaged areas (POLAR3 quintile 1) the modelled probability of missing by two or more grades was 2.7 percentage points (5 per cent proportionally) higher than for an applicant from the most advantaged areas (POLAR3 quintile 5).

The model estimates the probability of missing by two or more grades for a similar applicant from the Black ethnic group to be 9.2 percentage points (19 per cent proportionally) higher. Applicants from either the Asian or Other ethnic group were estimated to have increased the chance of missing by two or more grades by around 5 percentage points (11 per cent proportionally). The Mixed ethnic group had the smallest difference from the White group, with an increased chance of missing by two or more grades of 2.3 percentage points (5 per cent proportionally).

Keeping all other measures unchanged, the estimated probability varied from +2.1 percentage points (4 per cent proportionally) higher for applicants studying for A levels at further education colleges to -2.4 percentage points (-5 per cent proportionally) for applicants studying at sixth form colleges. The classification of schools has been changing over the period in the analysis with schools generally becoming academies, making this association harder to interpret than others.

### **Further investigation into the effect of the firm offer type on the relationship between predicted and achieved attainment**

The analysis above has shown that, when all other factors in the model are fixed, the type of firm offer an applicant holds alters the chances of missing predicted attainment. The nature and size of the impact that the level of academic conditions associated with an offer has on the chance of missing predicted grades is approximated in the model by using the offer type. The two types of firm offer, conditional (almost always academic conditions) and unconditional (with no academic conditions), represent two levels of academic conditions relative to predicted grades.

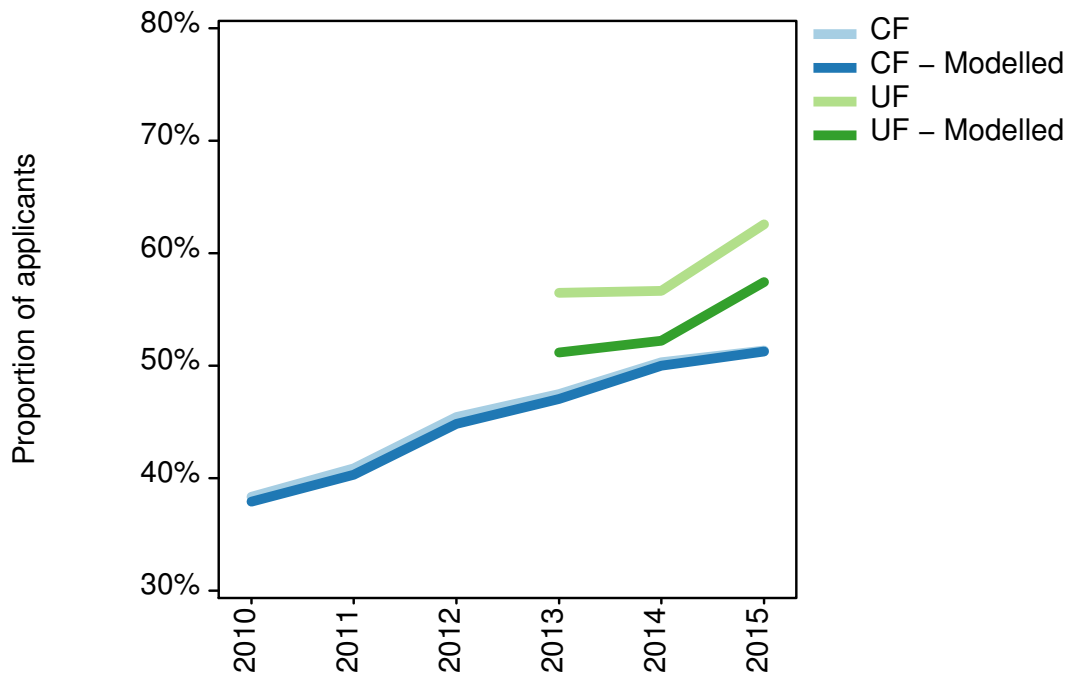
The model suggests that applicants holding a firm offer with academic conditions were, on average, less likely to miss their predicted attainment by two or more grades, compared to an applicant holding a firm offer with no academic conditions to be met.

We investigated this further using a different approach. By comparing the observed proportions of applicants who missed predicted attainment by two or more grades with the estimated proportions from a model that did not include a term for the type of firm offer held, the impact of the level of academic conditions associated with the firm offer can be assessed. This approach has the benefit that the difference in proportions is not based upon a model parameter estimate, giving an alternative way to assess the impact of the level of academic conditions.

Figure 13 shows the observed proportion of applicants that missed their predicted attainment by two or more grades, and the estimated proportions from a statistical model. The model is identical to the one described in the previous section, but does not contain a term for type of firm offer. Observed and modelled proportions are plotted separately for applicants that held conditional firm offers (with academic conditions, CF, blue lines) or unconditional firm offers (without academic conditions, UF, green lines). Proportions for unconditional firm offer holders are plotted from 2013 onwards, when there were more than 400 unconditional offers to this group for the first time.

For applicants holding firm offers with academic conditions to meet (CF), the observed probability of missing predicted attainment by two or more points has increased steadily, from 38.4 per cent in 2010 to 51.3 per cent in 2015. The estimated probabilities given by the model are almost identical to those observed, showing that, the factors included in the model describe very well the chance that these applicants miss their predicted attainment by two or more grades.

**Figure 13 Observed and model-estimated proportions of offer holders missing their predicted attainment by two or more points by year and type of firm offer**



The observed proportion of firm offer holders without academic conditions to meet (UF) that miss their predicted attainment by two or more grades follows a slightly different pattern to that observed for conditional firm offer holders (CF). The observed proportion for this group is higher, increasing from 56.5 per cent of these applicants in 2013 to 62.6 per cent in 2015.

The model-estimated proportion of unconditional firm offer holders who missed by two or more points was also higher than that observed for conditional firm holders. This shows the model estimates that applicants holding firm offers without academic conditions have a combination of factors that would suggest higher proportions missing their predicted attainment by two or more grades than the applicants with firm offers that do have academic conditions to meet. However, in each year the proportion missing by two or more grades estimated by the model is not as high as the proportion observed. That is, for unconditional firm offer holders, the model (without a term for the type of firm offer held) underestimates the chances of missing by two or more grades. This, combined with the fact that the same model accurately estimates the observed proportions of conditional firm offer holders who miss by two or more grades, suggests that since 2013, there were more unconditional firm offer holders who missed their predicted attainment by two or more grades than their prior attainment, predicted grades, application choices and background suggest. It could be that there are other characteristics of those holding an unconditional firm offer compared with those holding a conditional firm offer, that are related to the chance of missing predicted attainment, and that have not been considered in the model. If this

were the case then it could be that such differences lead to the higher observed probability of missing predicted attainment for those holding unconditional firm offer holders.

The number of English 18 year old applicants studying for three or more A levels that hold a firm offer without academic conditions was relatively small, but has grown each year since 2013. Table 2 estimates what the difference between the modelled and observed proportion of applicants missing their predicted attainment by two or more grades means for the group. In each of the three years the proportion of this group of applicants that miss their predicted attainment by two or more grades is 4 to 5 percentage points (8 to 10 per cent proportionally) higher than the model estimates. This equates to around 500 additional applicants over the three years who missed their predicted attainment by two or more grades. The additional 340 applicants estimated to have missed their predicted A level attainment by two or more grades in 2015 represent 0.6 per cent of all applicants who missed their grades by a similar margin.

**Table 2 Observed and model-estimated proportions of unconditional firm offer holders missing their predicted attainment by two or more grades by year**

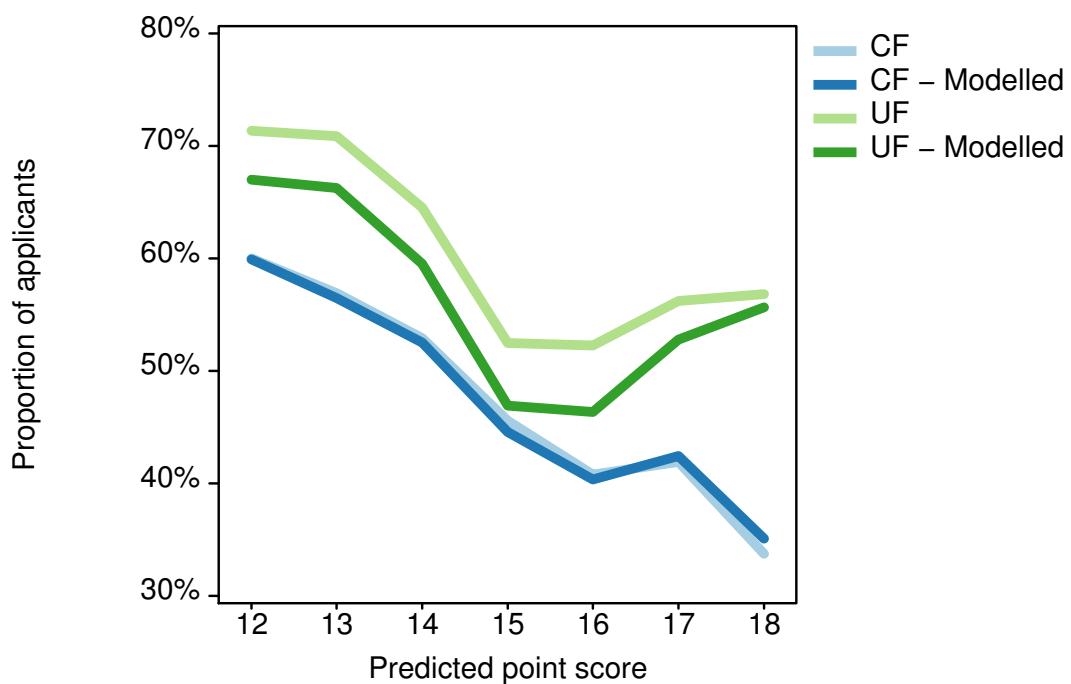
Cycle	Number of applicants	Proportion missing by 2+ grades	Model-estimated proportion	Percentage point difference	Proportional difference	Estimated difference in applicants
<b>2013</b>	430	56.5%	51.2%	5.3	10%	20
<b>2014</b>	2,780	56.6%	52.2%	4.4	8%	120
<b>2015</b>	6,610	62.6%	57.4%	5.1	9%	340

This describes the impact in each year across all levels of predicted attainment. An alternative assessment looks at the estimated probabilities over the three years by each level of predicted attainment. Figure 14 shows, for 2013 to 2015 in aggregate, the observed proportions of applicants that missed their predicted A level attainment by two or more grades by predicted best three A level points, for the two types of firm offer. Also shown are the proportions estimated using the model that does not include a factor for firm offer type.

For applicants holding firm offers with academic conditions to meet (conditional, CF), the observed proportion missing predicted attainment by two or more points is lower for higher levels of predicted attainment. Around three in every five applicants (59.9 per cent) holding conditional firm offers and predicted 12 A level points (equivalent to a predicted A level grade profile of BBB) missed their predicted point score by two or more points. This falls to 35.1 per cent for applicants predicted 18 A level points (equivalent to a predicted A level grade profile of A\*A\*A\*). The proportion missing by two or more grades estimated by the model were almost identical to those observed. This means that this model accurately estimates the proportion of conditional firm offer holders that miss their predicted attainment by two or more grades.

The observed proportion of applicants holding firm offers that do not have academic conditions to meet (unconditional, UF), that miss their predicted attainment by two or more grades, follows a similar pattern to that observed for conditional firm offer holders, although the proportions are higher for all predicted A level points and do not decrease at the same rate for higher predicted grade profiles. Around 71 per cent of applicants predicted 12 to 13 points (equivalent to BBB and ABB grade profiles respectively) missed their attainment, falling to around 52 per cent for those predicted 15 to 16 points (equivalent to grade profiles of AAA and A\*AA), and then increasing slightly for those predicted 17 points (equivalent to A\*A\*A). 56.8 per cent of applicants holding unconditional firm offers predicted 18 points (equivalent to A\*A\*A\*).

**Figure 14 Observed and model-estimated proportions of offer holders missing their predicted attainment by two or more points by predicted A level attainment and type of firm offer (based on 2013 to 2015 cycles only)**



The proportion of applicants holding a firm offer without academic conditions (UF) that were estimated by the model to miss by two or more grades was higher than the group holding conditional firm offers (CF). However, unlike the applicants holding conditional firm offers, the proportion missing by two or more grades estimated by the model was lower than the observed proportion for the group with firm offers without academic conditions.

Table 3 estimates what the difference between the modelled and observed proportion of applicants missing their predicted attainment by two or more grades means for unconditional firm offer holders with each level of predicted A level points. The largest

proportional difference was for applicants predicted 15 to 16 points (equivalent to AAA and A\*AA respectively). For this group, we estimate that over the three years 2013-2015 an additional 240 applicants missed their predicted attainment by two or more grades while holding a firm offer with no academic conditions. Some of the smallest proportional differences are for those predicted 17 and 18 points (equivalent to A\*A\*A and A\*A\*A\* respectively). For this group we estimate an additional 20 applicants may have missed their predicted attainment by two or more grades while holding a firm offer with no academic conditions over the three years.

**Table 3 Observed and model-estimated proportions of unconditional firm offer holders missing their predicted attainment by two or more grades by predicted A level points (based on 2013 to 2015 cycles only)**

Predicted attainment (point score)	Number of applicants	Proportion missing by 2+ grades	Model-estimated proportion	Percentage point difference	Proportional difference	Difference in applicants
12	1,450	71.3%	67.0%	4.4	7%	60
13	1,720	70.9%	66.2%	4.6	7%	80
14	1,470	64.5%	59.5%	5.0	8%	70
15	2,610	52.5%	46.9%	5.6	12%	140
16	1,630	52.2%	46.4%	5.9	13%	100
17	670	56.2%	52.8%	3.5	7%	20
18	270	56.8%	55.6%	1.2	2%	0

## Modelling the point difference

The measure used so far for investigating the relationship between predicted and achieved attainment is the proportion of applicants that miss their predicted attainment by two or more grades. An alternative measure is the difference in points between predicted and achieved attainment, ie the best three achieved A level points minus the best three predicted A level points. This has the benefit of identifying by precisely how many grades each applicant over or under achieves and can be expressed in terms of the number of A level grades, across the best three predicted grades.

The measure is assessed by a model that includes all the factors used in the original model, but leaves out the type of firm offer held. It then compares the observed and estimated average point difference for applicants with the two types of firm offer.

Figure 15 shows the average observed points differences, along with the points differences estimated by the model, for the two types of firm offer held, by year.

For conditional offer holders the size of the points difference has increased in recent years. In 2010, the average point difference was -1.1 points (just over one grade), and by 2015 this had grown to -1.7 points. The estimated points difference given by the model is very close to the observed difference.

For unconditional firm offer holders the average size of the points difference was bigger, showing how applicants who hold unconditional firm offers miss their predicted grades by a larger amount on average. In 2013, the point difference for unconditional firm offer holders was -2.0 points, and had grown to -2.2 points by 2015.

The size of the points difference estimated by the model for the unconditional firm offer holders was larger than the difference for those holding conditional firm offers. This means that the model estimates that unconditional firm offer holders will miss their predicted attainment by a larger amount than conditional firm offer holders. However, in each year since 2013, the size of the points difference estimated by the model for unconditional firm offer holders was not as large as the observed difference (unlike for conditional firm offer holders where the model estimates very well).

**Figure 15 Observed and model-estimated points difference of offer holders by year and type of firm offer**

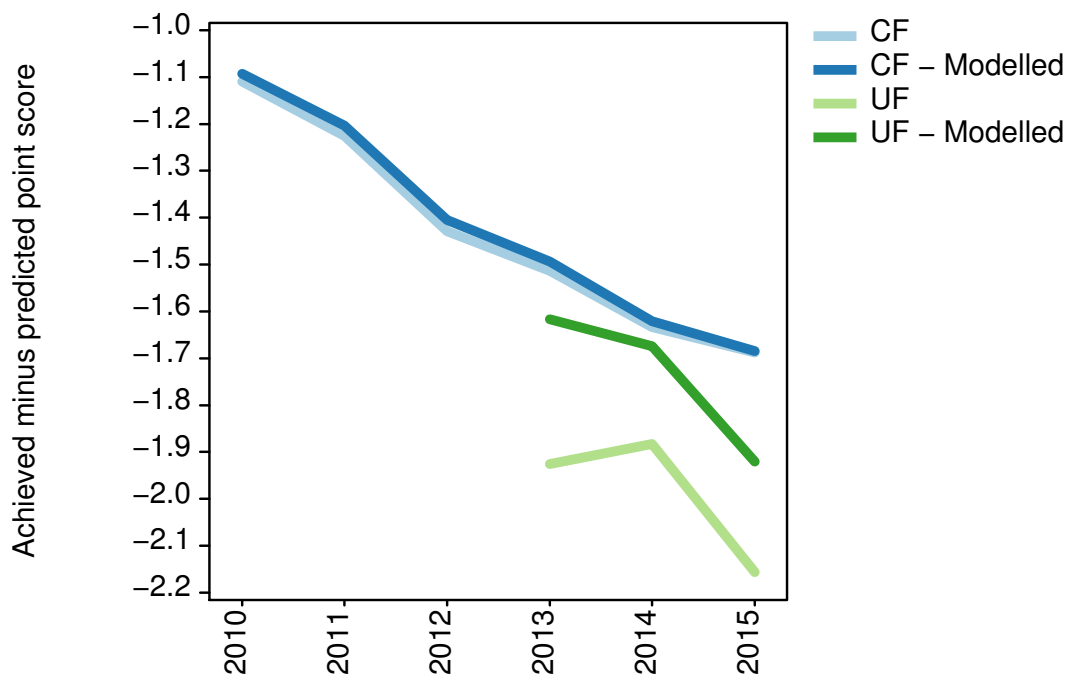


Table 4 estimates the impact in each year by looking at the difference between the observed differences in attainment and the model estimates. Each year from 2013 to 2015 applicants holding firm offers without academic conditions on average miss their predicted best three grades by an additional 0.2 to 0.3 A level points – around a fifth of a grade over three A levels.

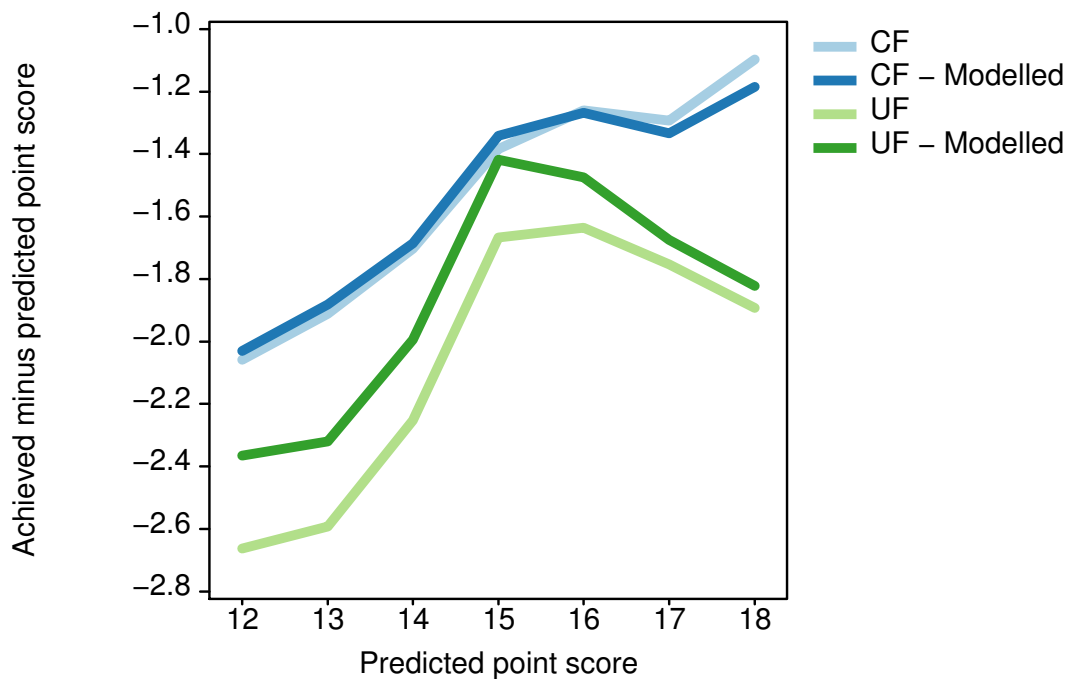
**Table 4 Observed and model-estimated points difference of unconditional firm offer holders by year**

Cycle	Applicants holding unconditional firm offer	Observed points difference	Model-estimated points difference	Observed minus model-estimated	Proportional difference
2013	430	-1.9	-1.6	-0.3	19%
2014	2,750	-1.9	-1.7	-0.2	12%
2015	6,560	-2.2	-1.9	-0.2	13%



A similar pattern can be seen in Figure 16 which shows the average difference in achieved and predicted best three A level points for each predicted point score for applicants between 2013 and 2015. Table 5 shows that applicants holding firm offers without academic conditions on average miss their predicted best three grades by an additional 0.1 to 0.3 A level points – with the smallest additional differences for the applicants with the highest predicted points.

**Figure 16 Observed and model-estimated points difference of offer holders by predicted A level attainment and type of firm offer (based on 2013 to 2015 cycles only)**



**Table 5 Observed and model-estimated points difference of unconditional firm offer holders by predicted point score (based on 2013 to 2015 cycles only)**

Predicted attainment (A level points)	Applicants holding unconditional firm offer	Observed points difference	Model-estimated points difference	Observed minus model-estimated	Proportional difference
12	1,430	-2.7	-2.4	-0.3	12%
13	1,690	-2.6	-2.3	-0.3	12%
14	1,450	-2.3	-2.0	-0.3	13%
15	2,600	-1.7	-1.4	-0.2	17%
16	1,620	-1.6	-1.5	-0.2	11%
17	670	-1.8	-1.7	-0.1	5%
18	270	-1.9	-1.8	-0.1	4%