Department for Education

Your Future | Their Future: impact of the Department for Education's marketing campaign

Main report

January 2019, initial findings

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Glossary

CRM	Customer Relationship Management
Display	Advertising which incorporates text, logos and pictures or images positioned on a website or search engine
ITT	Initial Teacher Training
NQT	Newly Qualified Teacher
OLS	Ordinary Least Squares
Search	Advertisement within the sponsored listings of a search engine, which is usually paid for each time the ad is clicked
TVRs	TV Rating points - a given percentage of a base population watching a TV programme, where that base is defined as a given target audience in a given geographical area
UCAS	The Universities and Colleges Admissions Service
VOD	Video-on-Demand – an overarching term for online advertising in video format
Website registration	A submitted registration form on the 'Get Into Teaching' website
Website session	A visit to the 'Get Into Teaching' website

1 Introduction

This study examines the impact and effectiveness of DfE's teacher recruitment marketing campaign Your Future | Their Future. The structure of this report is as follows:

- Chapter 1 describes the motivation and context for this study and includes a short summary of the findings of the initial feasibility study undertaken by London Economics;
- Chapter 2 provides a brief description of the methodology (with further detail provided in the Annex);
- Chapter 3 presents the results of the analysis, looking at the impact of marketing on each outcome in turn and comparing the cost effectiveness of each marketing activity; and,
- Chapter 4 concludes.

1.1 Aims of the study

The key research objectives of the study were:

- to establish the impact of DfE's marketing campaign on the number of people considering teaching, registering an interest in teaching, and applying for initial teacher training;
- to combine the estimated impacts from the econometric analysis with marketing campaign costs to undertake a detailed analysis of the relative cost effectiveness of the various strands of marketing activity (i.e. which types of marketing activities achieved highest 'returns on investment'); and
- to establish the 'indirect' effect on these outcomes through the analysis of the relationship between intermediate and long term outcomes, despite the fact that the level of data availability may not allow for a direct analysis of the impact of the campaign on initial teacher training (ITT) entry

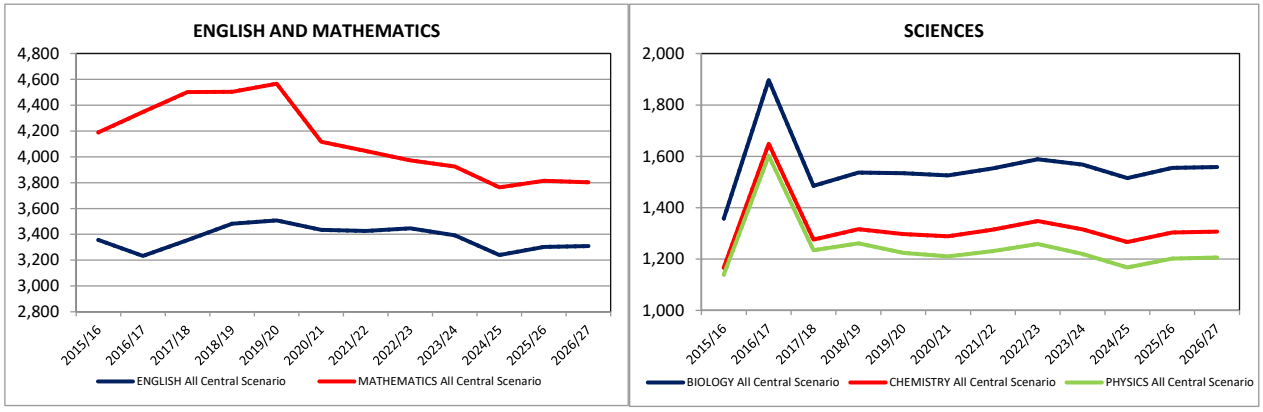
1.2 Background

1.2.1 Context

One of the main aims of the Department for Education (DfE) is *to ensure that enough high-quality trainees enter teacher training to meet the needs of the sector*. Looking forward, to address growing vacancy rates within the teaching profession and population increases, the DfE has forecasted that the need for entrant teachers in all secondary subjects will continuously grow in the coming years. Specifically, the demand for entrant

teachers is predicted to increase by approximately 7.5% in mathematics and by 9% for the sciences between 2015 and 2017[1].

Figure 1 Requirement for entrant teachers - forecast



Source: DfE Teacher Supply Model (2016/17)

To address this gap and to deliver the necessary number of entrant teachers, the DfE has employed a marketing campaign to attract and recruit trainee teachers. However, given the wider fiscal constraints facing the UK economy, there is a clear requirement to ensure that all marketing and advertising expenditure undertaken by the government has impact, but also provides value-for-money.

As part of this process of assessing both impact and value for money, the evaluation of the *Your Future ¦ Their Future* marketing campaign is a key element in determining the extent to which the campaign achieved against the specific initial teacher training recruitment targets, as well as understanding the cost effectiveness of the campaign.

This report describes initial findings from analysis carried out in 2016 and published in 2019, along with an updated analysis.

1.2.2 DfE's teacher recruitment marketing campaign

The DfE's marketing approach considered here includes the following activities:

- Paid-for channels, with a focus on digital;
- Owned channels such as the *Get Into Teaching* website, Events, CRM (Customer Relationship Management) programme, and social media channels;
- Earned channels such as PR and wider social media;

[1] DFE Teacher Supply Model (2016/17)

- Partnerships, including increased collaboration and partnership with subject associations such as the Institute of Physics and other influential parties such as career advisers and schools;
- Television advertising.

1.2.3 Feasibility study

In advance of the full teacher marketing evaluation, London Economics carried out an in-depth feasibility study. The aim of the study was to:

- Identify appropriate outcome measures for assessing the effectiveness of DfE's marketing activities;
- Review the availability and quality of the data that might be used in subsequent analysis; and,
- Develop a methodology for assessing the effectiveness of DfE's marketing activities.

As part of the study, several alternative methodological options were considered including various Ordinary Least Squares-based models, Bayesian models and a difference-in-difference approach. The methods were compared in terms of the robustness of the results they might produce, and their suitability with respect to the available data relating to the marketing activities undertaken. Consideration was also given to the timescale and resources needed to implement each approach.

Based on the detailed analysis, the final recommendation for evaluation was to use a type of Ordinary Least Squares-based model adapted to time series data. This method is described in more detail in Section 2.2.1.

2 Methodology

This section includes a brief description of the data collected and the econometric model developed for analysis. It explains how the impact estimates from the modelling were then combined with cost data to produce a comparison of cost effectiveness for each marketing channel. Additional detail on the methodology can be found in the Annex.

2.1 Data

The first stage of the project involved gathering all necessary data for the econometric modelling and collating it into a clean and consistent dataset covering the full modelling period. Data was collected from a number of sources, including the DfE marketing department and their commissioned marketing agencies, The Universities and Colleges Admissions Service (UCAS), as well as publicly available national statistics sources (e.g. the Office for National Statistics (ONS) and Department for Education).

The final dataset compiled covers data for the period from 1st September 2012 to 31st January 2016, thus covering three full recruitment cycles (the academic years 2013/14, 2014/15 and 2015/16) and the first part of the 2016/17 recruitment cycle. The data was either collected at (or converted into) 'week commencing Monday' format. The main reason for this choice was that the majority of variables providing information on marketing activities were also available on a weekly basis.

2.1.1 Outcomes of interest

The feasibility study identified a number of key outcomes of interest across the entire 'customer journey'[2] undertaken by prospective teachers for which data could be collected in the required format for analysis. These outcome variables included website visits, website registrations, UCAS applications, acceptances, ITT entries and NQTs, which are discussed in greater detail in the Annex.

Shortage subjects

In addition, the DfE identified certain harder-to-fill subject areas, the eligible graduates for which might have a very different customer journey (as well as different competing opportunities in the wider graduate labour market). In addition to considering the outcome variables listed above in relation to all secondary subjects, it was also of interest, where possible, to consider the same outcomes in relation to *shortage*[3] ITT subjects only.

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[2] The process from learning about ITT opportunities, through considering them, to taking action towards applying for such opportunities.

[3] Shortage subjects included chemistry, mathematics, physics, computer sciences, modern foreign languages and design & technology for the recruitment cycles from 2012/13 to 2014/15. For the 2015/16 recruitment cycle, this definition has been updated to exclude design & technology and instead include biology and geography.

Although the set of subjects considered ‘shortage subjects’ adjusts slightly over time, this analysis focused on the set of subjects which have been classified as shortage subjects consistently over the entire duration of the modelling period. These are referred to as ‘core shortage’ subjects (chemistry, mathematics, physics, computer science and modern foreign languages).

2.1.2 Marketing activities and contextual factors

Multiple marketing activities were undertaken in the period from 1st September 2012 to 31st January 2016 with varying intensity. One of the key challenges of the analysis related to *disentangling* the impact of each activity given the fact that many of the activities appear (deliberately) in bursts and at similar times. Data on each of the activities undertaken was provided by the DfE’s marketing team and their contractors, and a number of alternative measures of the impact of each activity have been tested whenever available to achieve the most appropriate model for each outcome variable.

In addition to the information on the main activities undertaken as part of the marketing campaign and associated outcome measures, data was collected on a range of wider contextual factors (e.g. unemployment and wages). Such factors can impact an individual’s decision to express an interest and apply for a teacher training course, either in the presence or in the absence of marketing activities.

The table below provides an overview of the types of marketing and contextual factors which were considered during the modelling process.

Table 1 Marketing activities and contextual factors

Marketing activities	Contextual factors
TV	Unemployment
Press	Graduate unemployment
Paid search (generic)	GDP growth
Radio	Salaries of competing professions
Digital Radio	Average secondary teacher salary
Display	ITT bursaries and scholarships
Video-on-Demand/ YouTube	Tuition fees
Social media marketing (Facebook, Twitter, LinkedIn, Instagram)	Holidays and notable events
Out-of-home advertising (OOH)	Seasonality[4] variables, constructed from e.g. data on search terms from Google Analytics
Emails	

2.2 Analysis

2.2.1 Econometric analysis

General econometric framework

The DfE is interested in understanding what contribution their latest marketing campaign *Your Future | Their Future* has made towards teacher recruitment, and which specific marketing channels had a key contributory role. Econometric analysis provides a useful tool for disentangling the impact of the different marketing activities on recruitment outcomes from the impact of the contextual factors. In addition to establishing what level of outcome would have been achieved in the absence of marketing, the econometric modelling results can be used to measure the impact of each marketing channel separately.

The formula below describes a simple econometric model. The brackets below list the outcome variables modelled, as well as some of the marketing activities and contextual factors considered in the process.

[4] Seasonality refers to a pattern of the outcome variable, which repeats every year and is solely due to time and not any other factor.

Figure 2: General form of the econometric model

$$Outcome_t = \alpha + \beta \times Marketing\ activities_t + \gamma \times Contextual\ factors_t + \varepsilon$$

- Website sessions
- Website registrations - all secondary subjects
- Website registrations – core shortage subjects
- Registration starts
- UCAS applications – all secondary subjects
- UCAS applications – core shortage subjects

- TV
- Press
- Search
- Display
- Social media
- Video
- Radio
- Outdoor
- CRM

- Seasonality
- Holidays and notable events
- Graduate unemployment
- Salaries of competing profession in the public and private sectors
- Average secondary teacher salary
- ITT bursaries

Source: London Economics

An econometric model attempts to determine the relationship between the variables on the right-hand side of the equation and the variable(s) on the left-hand side. The left-hand side variable, or dependent variable, is the outcome variable that is being estimated. The variables in the centre are the ones expected to influence the outcome variables, known as explanatory variables whilst the variables on the right handside are included to control for contextual factors. A separate model was estimated for each of the outcomes of interest. A number of robustness checks and adaptations for the time series nature of the data were adopted. A detailed description of these is provided in the Annex.

The outputs of this model can then be used to compare incremental impacts from each marketing activity (or 'channel') and to establish the impact of the campaign as a whole.

2.2.2 Cost effectiveness analysis

Costs data

The cost effectiveness analysis relies on comparing the incremental impacts (as estimated using the approach above) of each marketing activity to the cost of those marketing activities. The costs included in the cost effectiveness analysis were gross costs incurred by the DfE marketing department, wherever these were available.

Costs of marketing channels are calculated as the sum of the costs of all the marketing activities included in the respective channel (e.g. all types of TV; press adds in all newspapers, etc.), regardless of whether all activities falling within that channel had been found to be statistically significant (e.g. all social media costs were considered even if only Facebook was found to have an impact).

When calculating cost effectiveness of marketing for a given outcome, all costs have been allocated to that outcome. In reality, a marketing activity may have affected multiple outcomes (e.g. a TV advert induces an individual to visit the website, register and apply for initial teacher training). However, this assumption is necessary in comparing the relative cost effectiveness of each channel since it is not possible to disentangle the costs of the channel by ultimate outcome.

Further details of the methodology of this analysis, as well as a discussion on the assumptions, the challenges and the limitations of the econometric approach, are presented in section A1 of the Annex.

3 Findings

This section presents London Economics' findings on the impact of marketing on website sessions, website registrations for all secondary subjects and website registrations for core shortage subjects. UCAS applications were also modelled as an outcome variable. However, due to the distance from the initial stages of customer journey and the high seasonality of the variable, the cost effectiveness results relating to UCAS applications are less reliable than the results relating to the other outcome variables. As a result, it is not recommended to use these to guide future marketing decisions. Instead, it is recommended that marketing planning be based on the cost effectiveness results relating to the website sessions and website registration models. However, for completeness, the results from these models are presented in full in section A3 of the Annex of results. UCAS applications as well as acceptances and entries to ITT have also been analysed as long-term outcomes and are presented in full in section A4 of the Annex of results.

The results from the econometric modelling show that depending on the outcome, a slightly different set of marketing activities drives the response. Thus, in order to answer the question of which marketing activities have resulted in a particular outcome, the results of the relevant model should be considered. Considered all together, the models presented provide an overall picture of the set of marketing activities that were impactful.

Furthermore, some smaller marketing channels that do not appear in the results were not selected as they would have entered the model with a negative sign. As such, the implied interpretation is that they had no impact. However, this is not necessarily the case – instead, their negative sign might be a symptom of multicollinearity[5].

Last but not least, the impact and cost effectiveness estimates have been constructed by outcome variable to allow us to compare the impact and cost effectiveness of various channels within a model.

3.1 Impact of marketing on website sessions

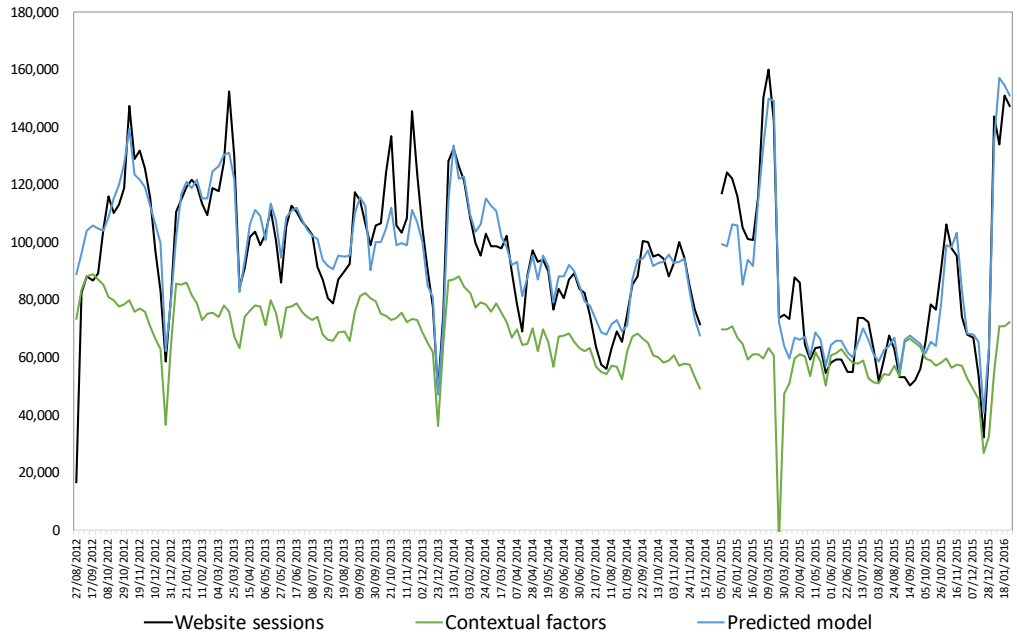
Impact of marketing and contextual factors

Our analysis decomposes total website sessions into those website sessions attributable to marketing activities and those attributable to other contextual factors. The website sessions attributable to other contextual factors can be interpreted as those that would have occurred in the absence of any marketing activity.

[5] Multicollinearity is a statistical phenomenon in which two or more explanatory variables in a multivariate regression model are highly correlated. Multicollinearity can result in inaccuracies in the estimation of the impacts of individual marketing activities.

Demonstrated in Figure 7, the **black line** provides the actual number of website sessions that occurred over the period. The **green line** gives the estimated number of website sessions explained by contextual factors, while the **light blue line** provides the estimated number of website sessions explained by the combination of contextual factors and marketing variables. As such, the gap between the **light blue line** and the **green line** represents the estimated incremental impact of marketing activities on website sessions.

Figure 3: Estimated impact of marketing and contextual factors on website sessions



Sample size = 174; R-squared = 0.81
Note: Gaps in series are due to data loss caused by technical issues at the source.
Source: London Economics' analysis of DfE data

An R-squared value of 0.81 indicates that the marketing activities and contextual factors included in the model explain 81% of the variation in website sessions. Although peaks and troughs in the predicted model (**light blue line**) generally match well to actual website sessions (**black line**), there are some peaks that have not been fully captured by the model. This could be due to some data not being available at weekly level (e.g. Display in 12/13) or due to unobserved or inaccurately measured activities.

Incremental impact by marketing activity

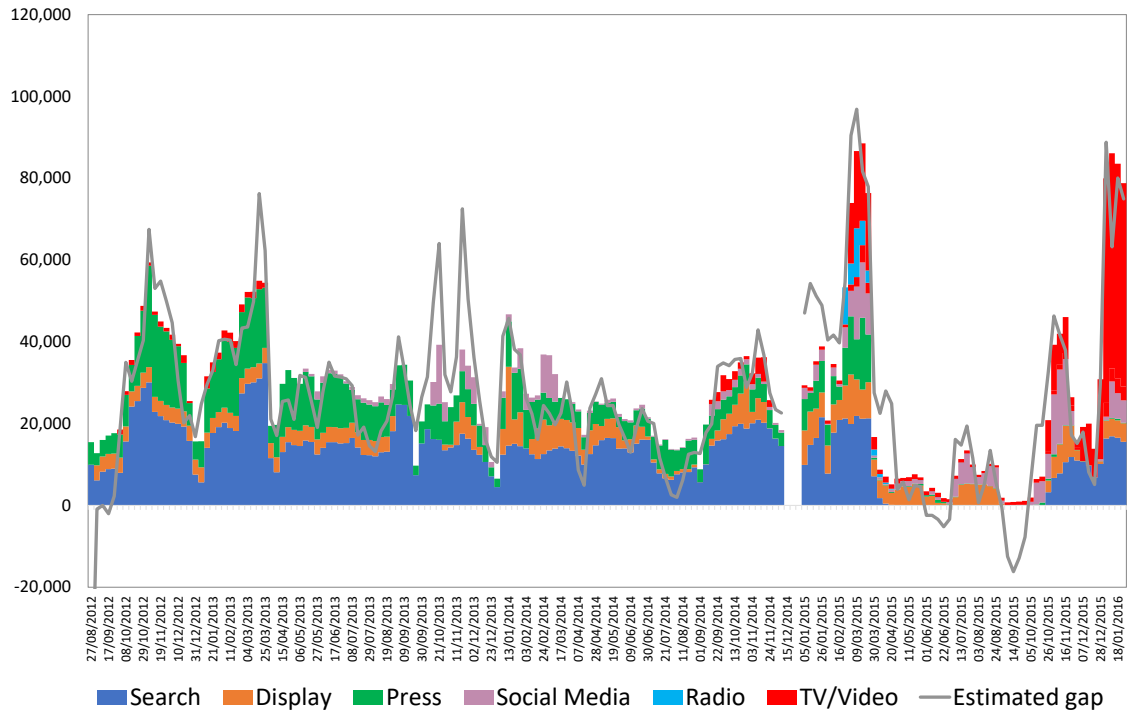
Figure 4 provides a further focus on the estimated impact of the marketing activities on website sessions, represented by the **grey line**. This corresponds to the gap between the **light blue line** and the **black line** shown in Figure 3. Over the 3.5 academic cycles covered by the model, marketing activities are estimated to have generated 4.8 million additional website sessions in aggregate.

The coloured areas represent the incremental impacts of different marketing channels. Of the 4.8 million website sessions attributable to marketing activity, generic Paid Search appears to have contributed the largest share of website visits (2.2 million or approximately 46%) of any marketing activity. This is due in part to the consistency with which generic Paid Search has been utilised across the period covered by the model.

Press and Display marketing contributed a further 1.1 million and 0.6 million website sessions, respectively. We also estimate that Social Media and Radio also had a positive impact, albeit smaller than the aforementioned channels, on the number of website sessions.

The red area represents the estimated number of website sessions attributable to TV & Video (0.5 million in total across the period). However, it should be noted that TV marketing activity only took place on 3 occasions throughout the period (March 2015, October 2015 and January 2016). During these periods, website sessions experience their highest peaks over the time period covered by the model and the estimated impact of TV/Video is high relative to other channels.

Figure 4: Incremental impact of marketing activities on website sessions



Sample size = 174; R-squared = 0.81
Note: Gaps in series are due to data loss caused by technical issues at the source.
Source: London Economics' analysis of DfE data

Cost effectiveness by channel

We compared the estimated impact of each marketing channel on website sessions with the cost of undertaking each marketing activity to produce a measure of cost effectiveness by channel. The estimated cost per website session by channel is shown in section A2 of the Annex of results.

To enable comparison by channel, we assume that the entire cost of marketing is allocated to generating website visits only. In other words, we ignore any impacts on website registrations and other outcomes which are modelled and analysed separately in further sections.

Overall, the analysis suggests that the cost of an additional website session was on average £2.50 across all marketing channels. The cost of achieving a website session varied across channels. For instance, it stood at £0.40 for Paid Search[6] compared to £2.30 for Press and £8.70 for TV and Video jointly. Thus, this suggests that Paid Search, perhaps unsurprisingly, was the most cost effective means of achieving website sessions.

It should be noted that a large spike in the cost effectiveness of Press was observed in 2015/2016 (£64.20 per website session versus £2.40 per website session across all three years). This change in cost effectiveness is likely to be due to substitution of the 'call-to-action' phrases in the Press creatives with user-friendly URLs, which might have led to:

1. Poorer ability to track the weekly variation in customer engagement with Press advertisements and thus to measure their impact; and
2. A potentially lower effectiveness of the Press advertisements when URLs are used as opposed to when 'call-to-action' phrases are used.

Therefore, the lower effectiveness of Press advertisements when using URLs could suggest that Press adverts are more likely to engage customers when combined with 'call-to-action' phrases than with URLs. Whilst including the same 'call-to-action' phrases in both TV/Video and Press advertising would make it more difficult to disentangle the impact of these channels if they take place simultaneously, the effectiveness of the marketing campaign as a whole could potentially benefit.

[6] The figure is based on the cost of all paid search but the impact of generic paid search only.

3.2 Impact of marketing on website registrations

The impact of marketing on website registrations was measured separately for all secondary subjects and in relation to shortage subjects only.

3.2.1 All secondary subjects

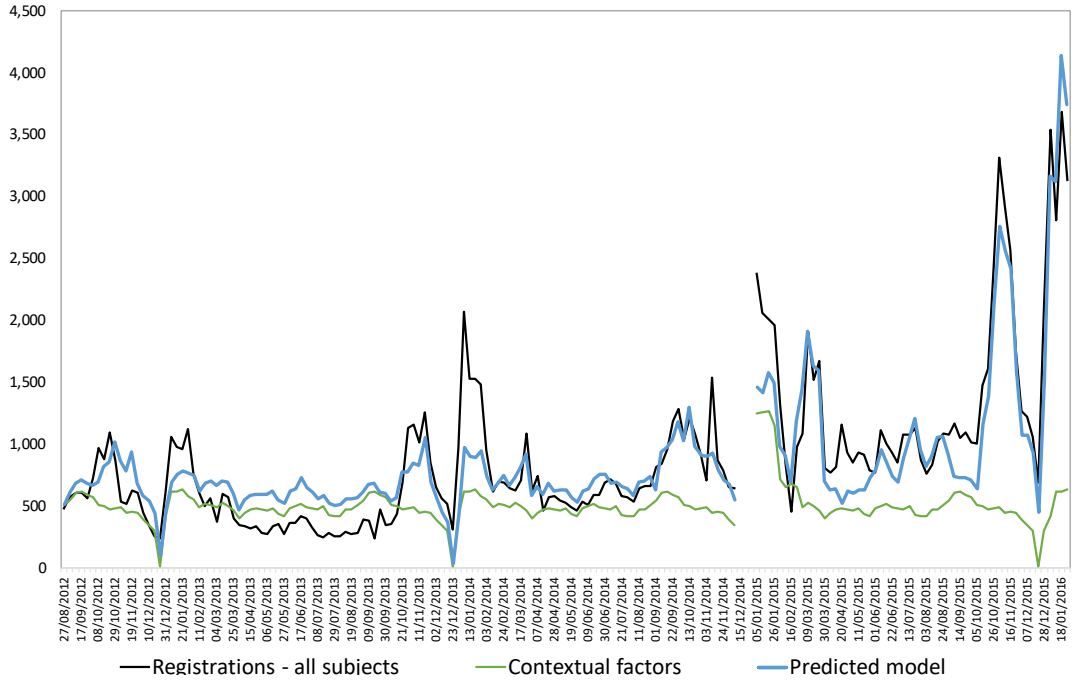
Impact of marketing and contextual factors

As with website sessions, our analysis decomposes total website registrations into those attributable to marketing activities and those attributable to other contextual factors. Website registrations attributable to other contextual factors can be interpreted as those that would have occurred even in the absence of any marketing activity.

Figure 5 shows the actual number of website registrations (**black line**), the estimated number of registrations explained by both contextual factors and marketing activities (**light blue line**), and the estimated number of registrations explained by contextual factors only (**green line**). In broad terms, registrations have followed an increasing pattern since autumn 2012. This potentially reflects in part an improving conversion rate associated with the website switchover[7], with the new website bringing in an estimated additional 90 registrations per week compared to the previous website. It should also be noted that the estimated share of registrations for all secondary subjects attributable to contextual factors has been falling slightly over time, while the relative impact of marketing activities on registrations has been increasing.

[7] The website switchover occurred in April 2015.

Figure 5: Estimated impact of marketing and contextual factors on website registrations (all secondary subjects)



Sample size = 174; R-squared = 0.74
Note: Gaps in series are due to data loss caused by technical issues at the source
Source: London Economics' analysis of DfE data

The R-squared value suggests that the marketing activities and contextual factors included in the model explain approximately 74% of the variation in website sessions. One reason why this is lower than the R-squared value of the website sessions model (81%) is the immediacy of the website sessions outcome. For instance, while a click on a Display advert will be mirrored in real time by a website session, there is likely to be a lag between clicking on an advertisement and website registration. Where there is a lag between the marketing activity and the outcome, the impact can be more challenging to identify using a time series econometrics model.

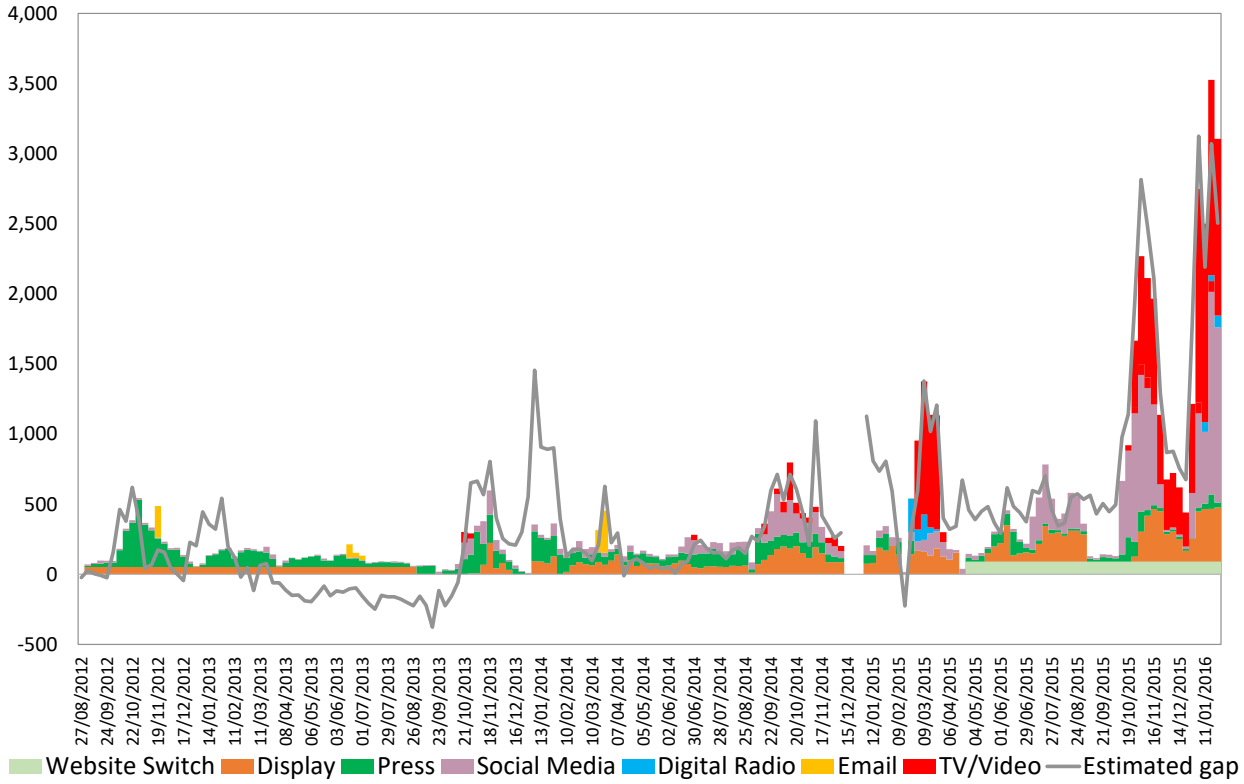
Although contextual factors and marketing activities account for a large proportion (74%) of the variation in website registrations, the model does not fully explain the January peaks (except for 2016). This suggests that there was some factor driving peaks in January that could not be identified or captured with the available data. The period between April and September 2015 also has some unexplained registrations.

Incremental impact by marketing activity

As for the website session model, the incremental impacts of different marketing activities are shown in Figure 6. The grey line gives the aggregate impact of marketing (i.e. the number of registrations once those explained by contextual factors have been accounted

for). Over the 3½ academic years covered by the analysis, marketing activities are estimated to have generated 62,000 additional website registrations in aggregate.

Figure 6: Incremental impact of marketing activities on website registrations (all secondary subjects)



Sample size = 174; R-squared = 0.74
Note: Gaps in series are due to data loss caused by technical issues at the source
Source: London Economics analysis of DfE data

The coloured areas represent the incremental impacts of different marketing channels. Social Media contributed the largest share of marketing-induced registrations (approximately 27% or 17,000). This is followed by Display and TV & Video advertising which contributed approximately 25% of registrations each (approximately 16,000) and Press which accounted for a further 20% of marketing induced registrations (approximately 13,000). The model estimated that email and Digital Radio both had smaller impacts on the number of website registrations. However, unlike the website session model, generic search had no identifiable impact on website registrations.

Consistent with the website sessions model, registrations experience their highest peaks in the time periods covered by TV bursts. Interestingly, the estimated impact of TV/Video as well as Press appears to have been boosted by the website switchover in April 2015. This was identified by testing interactions of TV/Video and Press variables with the website switchover variable in the model.

Cost effectiveness by channel

Table 2 in section A2 of the Annex of results shows the estimated cost per website session by channel. To ensure comparability by channel, the entire cost of marketing is allocated to website registrations. For example, we ignore any additional impacts on website sessions that are modelled and analysed separately.

Overall, the cost of achieving a website registration (for any subject) stood at £190 across all marketing channels. The cost differed across channels varying from £200 for Press and £280 for TV & Video jointly, compared to only £62 for Digital Radio and £50 for Social Media.

Although this suggests that TV & Video was a relatively expensive channel for achieving a website registration, it should be noted that TV is typically associated with enhancing the effectiveness of other marketing channels, commonly referred to as the 'Halo' effect[8]. This implies that TV & Video may be more cost effective relative to other channels than the information presented in Table 4 suggests, however, this specific conclusion cannot be drawn directly from the results of this study[9].

3.2.2 Core shortage subjects

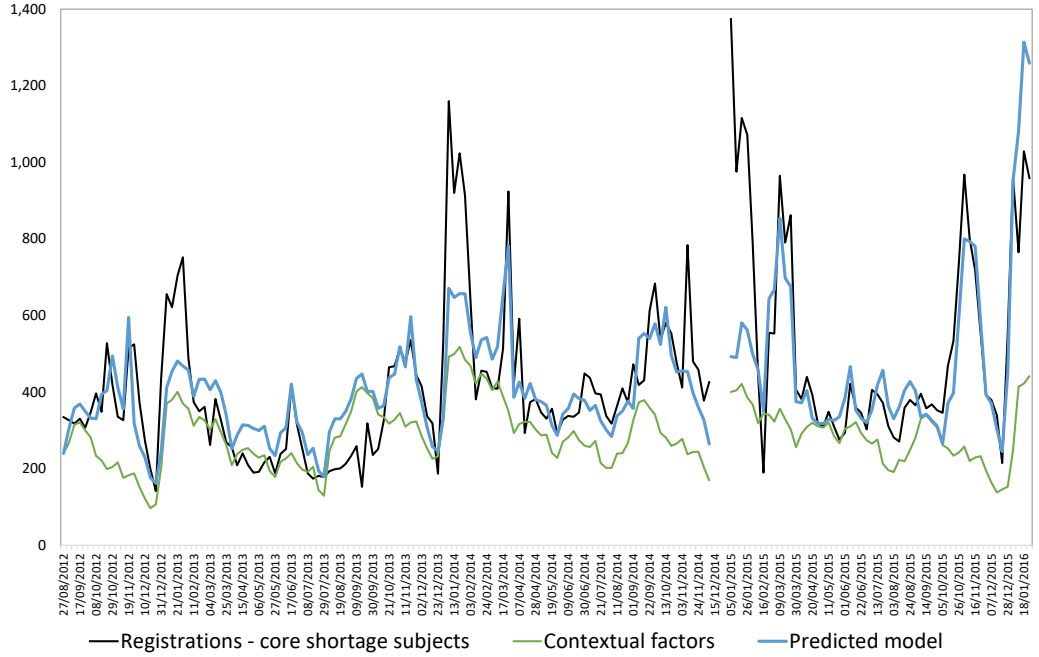
Impact of marketing and contextual factors

Using a separate model, our analysis also examined what proportion of website registrations for shortage subjects was attributable to marketing activities and what proportion was attributable to contextual factors.

This model is shown in Figure 7 below. The **black line** again shows the actual number of shortage subject registrations, while the **light blue line** shows the number of shortage subject registrations estimated by the model, and the **green line** shows the shortage subject registrations attributable to contextual figures. Registrations for shortage subjects do not exhibit the same increasing pattern over time as seen in registrations for all subjects. Moreover, it does not appear that the conversion rate from website visits to registrations following the website switchover has improved for shortage subject applicants compared to applicants across all subjects.

[8] Binet, L. and Field, P. (2008). 'Overview of Marketing in the Era of Accountability'.
[9] This effect could not be tested in this model due to the overlaps in time when the different channels run.

Figure 7: Estimated impact of marketing and contextual factors on website registrations (core shortage subjects)



Sample size = 174; R-squared = 0.55
Note: Gaps in series are due to data loss caused by technical issues at the source
Source: London Economics' analysis of DfE data

Approximately 55% of the variation in shortage subject registrations is explained by marketing activities and contextual factors, which is lower than the equivalent figure for the registrations model for all subjects (74%). This suggests that the response of individuals registering for shortage subjects to marketing activities differs from those registering for all subjects, and that some of the factors driving shortage subject registrations are not captured within the available data. Similar to the registrations model for all subjects, the model does not fully explain the January peaks. Looking at some of the contextual factors affecting website registrations, the decline in graduate unemployment (21-30yrs) appears to have negatively impacted shortage subject registrations (although it had no measured impact on registrations across all subjects). However, this effect was partially offset by the positive effect of increased value and/or availability of scholarships available to entrants to initial teacher training[10].

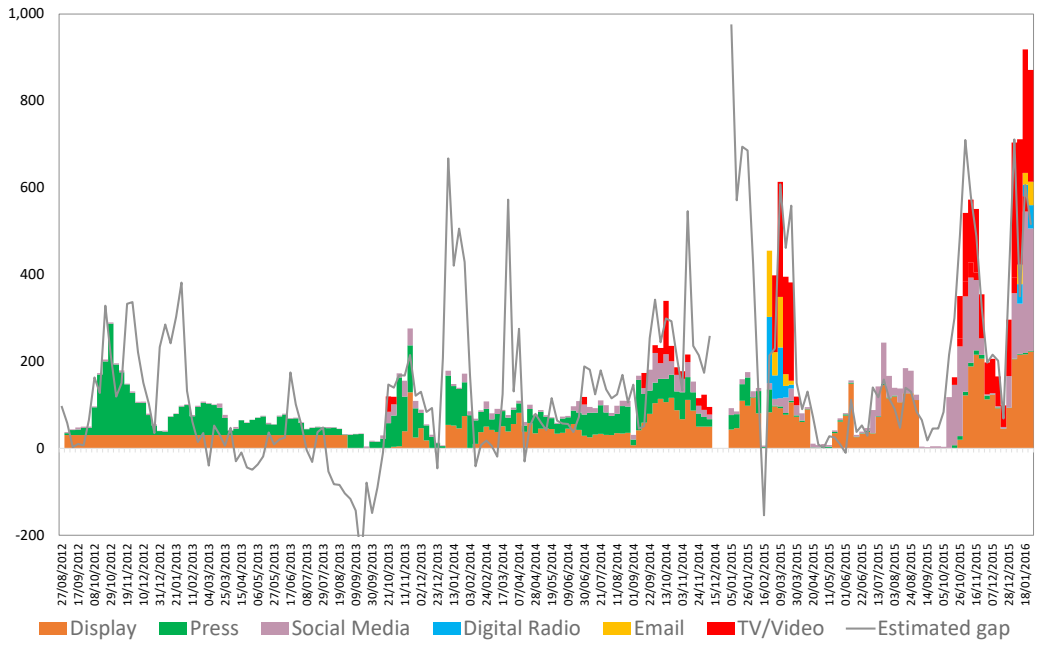
Incremental impact by marketing activity

Figure 8 presents the estimated impact of the marketing activities on shortage subject registrations. The grey line represents the aggregate impact of marketing (i.e. the

[10] The 'graduate unemployment' and 'scholarships' variable coefficients both have a positive sign and are statistically significantly different from 0. The full results from the model are presented in A4.2.2.

estimated remaining registrations once those that are explained by contextual factors have been accounted for). Over the 3½ academic years covered by the model, marketing activities are estimated to have generated 24,000 additional registrations for shortage subjects.

Figure 8: Incremental impact of marketing activities on website registrations (core shortage subjects)



Sample size = 174; R-squared = 0.55
Note: Gaps in series are due to data loss caused by technical issues at the source
Source: London Economics analysis of DfE data

Display appears to have the highest contribution of all channels on registrations for shortage subjects (accounting for 37% of the total marketing contribution equivalent to 9,000 website registrations), followed by Press (approximately 25% or 6,100 registrations), Social Media (approximately 16% or 3,800 registrations), and TV & Video (approximately 15% or 3,700 registrations).

The impact from direct email communication with potential entrants was estimated to be greater than in the model for all registrations, which suggests that the impact from email is either overestimated in the 'shortage registrations' model, or underestimated in the 'all registrations' model[11]. This could be a result of mild multicollinearity with other marketing

[11] For all subjects, emails are estimated to drive 830 registrations whereas for shortage subjects emails are estimated to lead to 930. As shortage subjects are included in all subjects, this indicates that the number of registrations driven by emails indicated by the shortage subject model is likely to be an overestimate.

activities. Nevertheless, the results suggest that email was an effective channel in driving registrations both for all and for shortage subjects.

Cost effectiveness by channel

Table 3 in section A2 of the Annex of results presents a measure of cost effectiveness by channel, calculated as the cost of marketing activities divided by the estimated number of shortage subject website registrations attributable to those marketing activities. Assuming again that the entire cost by marketing channel is allocated to shortage subject registrations, the cost of achieving a shortage subject registration is £490 (based on the entire marketing campaign for the whole period).

The costs per shortage subject registrations for Social Media, Display and Digital radio amounted to £230, £220 and £96, respectively. Press and TV & Video appear more expensive, with £410 and £1,140 per shortage subject registration respectively. However, they were associated with relatively large impacts on shortage subject registrations.

3.3 Long-term outcomes

Econometric modelling also suggested that marketing activity appears to have led to an increase in UCAS applications. However, there are substantial caveats involved in estimating the impact of marketing activity on UCAS applications through time series econometric modelling, primarily due to the expected delayed response between a marketing activity and the resulting UCAS application, the strong seasonality of this outcome and its relatively short time series. These numerous caveats mean that it is not possible to produce a reliable estimate through econometric modelling of the size of impact from marketing, nor to provide estimates of the impacts across different marketing channels. For this reason, the results from these models are presented in section A4 of the Annex of results.

Due to the caveats discussed above, the study uses the results obtained for website registrations and models UCAS applications, UCAS acceptances and entrants to Initial Teacher Training (ITT) courses as long-term outcomes. These results are obtained using assumptions on the relationship between website registrations and long-term outcomes, and not through econometric analysis. Specifically, we have assumed that marketing has an impact on UCAS applications and acceptances which is proportional to its impact on website registrations – an assumption which cannot be verified with the available data.

Due to the issues outlined above an alternative approach was used. The results relating to the increased number of website registrations suggest that marketing activities could have lead to approximately 67,000 additional UCAS applications, of which approximately 17,000 were in core shortage subjects. This in turn resulted in roughly 14,000 UCAS

acceptances and about 13,000 entries to Initial Teacher Training, of which approximately 6,000 were in shortage subjects areas.

The preceding feasibility study also set out to estimate the number of Newly Qualified Teachers (NQTs) which are attributable to marketing. Such estimates could be produced following the same methodology and assumptions as for UCAS acceptances and ITTs. However, these assumptions would be even stronger, given the fact that the number of NQTs is an outcome even further along the customer journey from website registrations than UCAS applications, acceptances and ITT entries are. Therefore, in light of the challenges to modelling UCAS applications which have surfaced in this study and the strong caveats around the modelling of long-term outcomes, there would be little added value of producing estimates of the impact on NQTs with the existing data. Therefore, such estimates are not presented in this report.

4 Conclusions and recommendations

4.1 Conclusions

After a careful analysis of the available data, our analysis provides evidence that the *Your Future* | *Their Future* marketing campaign has been effective at increasing website sessions and website registration. Over the period covering September 2012 and January 2016, the *Your Future* | *Their Future* marketing campaign has driven approximately 4.8 million additional website visits and 62,000 website registrations. Of this total amount, approximately 24,000 were for core shortage subjects.

Looking at the role of marketing in each annual recruitment cycle, the marketing campaign has driven an estimated 33% of the website sessions that occurred in the first four months of the 2015/16 cycle (i.e. October 2015 to January 2016), compared to 30% in 2014/15 and 26% in 2013/14. For website registrations covering all secondary subjects, the marketing contribution over the first four months of the 2015/16 cycle was estimated to be even higher – standing at 72%. This compared to 43% in 2014/15 and 29% in 2013/14. Therefore, the analysis suggests that across all years (and in 2015/16 in particular), the number of registrations on the 'Get Into Teaching' website would have been significantly lower in the absence of the marketing campaign.

Looking at a more disaggregated level, amongst the different specific marketing activities, TV & Video and Press were consistently effective in generating website sessions and registrations, albeit relatively expensively. In addition, TV & Video bursts were the most effective approach in generating large and/or immediate increases in website sessions and registrations over a relatively short period of time.

Our results also suggest that both Display and Social Media advertising are the most cost-effective at achieving website sessions and registrations. Paid Search is also a relatively cost-effective approach but is more effective at driving website sessions rather than registrations. However, the wider marketing effectiveness literature suggests this cost effectiveness could be partially boosted by a 'halo' effect from TV and Video on other supporting channels.

4.2 Recommendations

Data continuity

A key condition for the robustness of any time series econometrics is possession of data covering a sufficiently long time period. Although the data supplied by the DfE has been adequate for producing robust estimates of the intermediate outcome models (website visits and website registrations), a longer time series would contain more and richer information, and would therefore improve the robustness of the estimates. The start-date of the information analysed was constrained by prior data loss incurred during a data management system changeover. Moreover, the gathering of marketing data for this study was time-consuming for all parties involved. Therefore, it would be recommended that if possible, data is consistently gathered and recorded and data continuity is

consistently maintained, so that should this analysis be repeated, the analysis benefits from a longer time series.

Time series extension

One challenge of this study has been to disentangle the impact of each and every marketing activity on the outcomes of interest. Over the period under consideration, many of the activities occur simultaneously and are designed to support each other and boost response. From an evaluation perspective, this leads to multicollinearity. If over a longer period there is larger variation in the timing of different marketing activities, the additional data could help overcome the multicollinearity issue and would allow us to capture the impact of marketing activities more precisely. However, we are aware that variation in the timing of activities might not always deliver the most effective outcomes for the marketing campaign itself, so this 'recommendation' is presented for consideration only.

Further data gathering

A further challenge of this research was to identify the impact from marketing on the UCAS applications outcome variables, the reasons for which are twofold:

- Applications data series has a high degree of seasonality. As might be expected, applications are high as soon as the applications process opens, after which there is an on-going decay until the applications process closes. This pattern repeats every year. The data series is currently too short (two and a half years of data) to calculate seasonal indices. Historic data on UCAS applications over a longer span of time would lead to better models of UCAS applications and calculating seasonal indices could be attempted in the future when additional comparable data is available.
- There is anecdotal evidence of a substantial delay between initial engagement of prospective applicants and the eventual submission of an application. This presents an additional challenge in using a time-series econometric model that fundamentally relies on the relationship between the timing of the activity and the timing of the outcome. Although the current study has attempted to model applications, this fundamental characteristic of the applications data has not been overcome.

As such, applications will always be a difficult outcome to model using a time series econometric approach. If the impact of marketing on applications is to be identified robustly, there is a need for further individual-level data to be gathered. To do so, one would have the ability to link website registration and UCAS application records, which would make it possible to identify individuals who initially registered and subsequently applied and entered ITT and obtained NQT status. A time series econometric approach could then be used to assess the relative effectiveness of different marketing channels in terms of inducing these individuals to register.

An alternative approach would be to survey a cross-section of individuals at each stage of their journey, and enquire retrospectively about what drove them to apply to become a teacher. For estimating the impact of long-term outcomes, which are further away from the initial impact of marketing, focus groups and in-depth interviews could also produce valuable estimates. All of the above suggestions could be implemented in a number of ways, although all of which would require further primary data gathering. However, there might be substantial benefits of implementing these primary data collection/linking activities.

Evaluation of market changes

In the academic year in 2016/17 there was a change in market design according to which Initial Teacher Training places are allocated to providers. Concerns were raised that this change would have interfered with the decision-making process of applicants and therefore influenced the applications outcome. We have attempted to incorporate this information in the applications models[12], however, the information relating to the policy change was insufficient to disentangle the effect of the 'market design' change from that of marketing itself. In future, once additional years of data is gathered, it might be possible to isolate those time-periods impacted by the new market design, and investigate whether they exhibit different patterns of seasonality. Alternatively, stakeholder consultations with providers could shed light on the likely impacts of the market design change on providers and applicants.

In general, it is recommended that whenever a structural change to the applications process is made, the DfE consider how the change might influence the effectiveness of marketing; what data should be gathered in order to isolate such an impact from that of marketing; and how such impact could be feasibly and robustly evaluated.

[12] For a detailed outline, see A3 Impact of marketing on UCAS applications.

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