Options for Addressing the Cost of Pilot Training

SYSTRA

NORTHPOINT
Aviation, Travel and Tourism Consultants

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1. INTRODUCTION

1.1 Background

1.1.1 The total cost for attainment of an Air Transport Pilot Licence (ATPL) or a Multi-pilot licence (MPL) in the United Kingdom (UK) ranges between £60,000 and £150,000. Most new cadets rely on the use of unofficial family loans and gifts to finance their training; others use savings or take on substantial debt to fund themselves. Some private loans are available, but these are scarce, there is little evidence of their use, and they tend to require families to secure finance through property. This heavy reliance on self-funding creates barriers to entry to the pilot profession, disproportionately effecting some demographic groups more than others. Not only does this play a key role in limiting the pool of talent that the profession can draw on to deliver a high quality service, but it also hampers the diversity of the pilot community.

1.1.2 Moreover, there is concern that cost of training to secure a pilot's licence in the UK, may begin to put UK airlines at a competitive disadvantage relative to their European Union (EU) counterparts, where pilot training is less expensive.

1.1.3 The Department for Transport (DfT) wishes to understand the extent of the problems associated, currently or prospectively, with the high cost of pilot training in order to be able to address finance as a barrier to entering the pilot profession, and in so doing:

- Increase the pool of talent entering the pilot profession;
- Increase accessibility and diversity within the pilot profession, by enabling those from less affluent backgrounds to access training; and
- Enable the UK pilot profession and UK flight schools to compete on the global stage.

1.2 Study Objectives

1.2.1 With these goals in mind, the DfT commissioned specialist researchers from transport consultancy SYSTRA Ltd, and aviation expertise from Northpoint Aviation, to undertake a study to help industry and Government understand what options there might be for addressing the high cost of pilot training in the UK. The specific objectives of the study are therefore to:

- Assess the level of demand for commercial airline pilots that is likely to exist over the coming several years in the UK, and the level of risk of a shortage of qualified pilots relative to this demand;
- Identify a range of potential alternative methods for funding cadets' pilot training, including the First Officer Apprenticeship (FOA); and
- Evaluate these methods for addressing the high cost of pilot training to determine their viability for use in the UK.

1.2.2 A number of factors are likely to have influenced demand and supply for commercial airline pilots in the UK, as well as worldwide, at the time this study was undertaken,

including the global COVID-19 pandemic[1] , war in Ukraine, high energy costs, the UK cost of living crisis, EU Exit[2], and the potential implications of climate change policy on demand.

1.3   Report Structure

1.3.1   This report systematically addresses each of the three study objectives, and is structured as follows:

- **Chapter 2** provides a summary of the study approach;
- **Chapter 3** explores current and future demand and supply issues for commercial pilots, as well as a review of data sources to provide an indicative quantification of the potential scale of future pilot shortages;
- **Chapter 4** describes a range of approaches to address potential pilot shortages, focussing primarily on alternative funding methods for pilot training;
- **Chapter 5** provides an evaluation of alternative methods for addressing the high cost of pilot training, to determine their viability for use in the UK; and
- **Chapter 6** provides conclusions and recommendations.

1.3.2   The following appendices are also provided:

- Appendix A – Quantitative Analysis Methodology;
- Appendix B – Online Survey;
- Appendix C – Interview Topic Guide;
- Appendix D – Evaluation Matrix; and
- Appendix E – Glossary of Acronyms.

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[1] Covid-19 is an infectious disease caused by a Coronavirus. The spread of this disease resulted in a global pandemic in which a number of restrictions on travel and activity were put in place by national governments. In the UK, restrictions were first introduced on 16th March 2020, with the first official 'lockdown' introduced on 23rd March 2020, asking that all non-essential travel be stopped, and that people work from home, where possible.   Progression of the pandemic had a significant effect on the operation of the aviation industry. For example, UK air arrivals were almost 90% lower between April 2020 and January 2021 compared to the equivalent pre-COVID period. Additionally, many airports were closed, and many aviation staff, including pilots, were furloughed, made redundant or took early retirement.   The COVID-19 pandemic therefore meant that the long term trend towards pilot shortages was halted and reversed; but as the industry grows back there is evidence from other major aviation markets, and our own analysis, that shortages of UK pilots may quickly re-emerge.

[2] Post EU Exit, the decoupling of common CAA/EASA certification of pilot licences means that pilots require two separate licences, which requires the completion of separate exams, to allow them to fly for both UK and EU registered airlines, whereas previously duplication of time and resources of this sort was avoided. The result is material additional cost and time implications for trainees who may wish to pursue a career both within the UK and EU. Additionally, non-UK pilots and cadets are now subject to visa restrictions to live, work and study in the UK, reducing the pool of pilots UK airlines can draw from. These consequences of the UK's EU Exit mean that the dynamics of how the EU and UK aviation markets operate and how that impacts the supply of UK pilots has changed.

2. METHODOLOGY

2.1 Introduction

2.1.1 This Chapter provides an overview of the approach undertaken in conducting this study.

- Section 2.2 and 2.3 describe our approach to the literature review and stakeholder engagement, respectively. Both were used to gain an understanding of pilot supply and demand issues, and of alternative financial models for addressing the high cost of pilot training;
- Section 2.4 provides a summary of our approach to reviewing a range of data sources to provide an indicative quantification of the potential scale of future pilot shortages; and
- Section 2.5 describes our approach to evaluating different funding approaches to determine their viability for use in the UK.

2.2 Literature review

2.2.1 A thorough literature review of existing data and reports was undertaken to understand whether there is any existing information providing evidence of:

- An existing or potential shortfall in suitably qualified commercial pilots[3] within the UK, but also more generally in other benchmark mature aviation markets, including North America, Europe and Australasia;
- Barriers to entering the pilot profession, including those that have led to under-representation amongst women, ethnic minorities and lower socio-economic groups, and how these barriers might be addressed; and
- Examples of funding models used in the UK and overseas – both theoretical or from elsewhere – that improve the affordability of training and so may offer potential solutions to the shortfalls in the number of commercial pilots.

2.2.2 The literature review comprised:

- Online searches using metasearch engines to find relevant news articles, industry reports and policy documents;
- Use of Google Scholar to identify academic journals/published data bases;
- Use of references in other publications to track-down relevant supporting documentation and data sources; and
- Information suggested by interviewees in the stakeholder engagement exercise.

2.2.3 In total, over 50 references were reviewed including 15 substantive reports and policy documents from Government and industry[4], a similar number of academic articles, a range of statistical databases[5], company websites and prospectuses and a large number of general and industry news reports.

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[3] Taken as airlines offering commercial air transport services (passenger and freight), business aviation on demand and special mission operations.

[4] Including International Civil Aviation Organization (ICAO), International Air Transport Association (IATA), Civil Aviation Authority (CAA) and Department for Transport (DfT).

[5] Including CAA, DfT and Statista.

2.2.4   Documents were reviewed based on subject relevance, the geographical markets we were looking at, date of publication (with emphasis on more recent analysis i.e. from 2010 onwards), and use of known reliable sources and/or authors and publishing institutions.

2.3   Stakeholder engagement

2.3.1   A stakeholder engagement exercise was undertaken to capture industry perspective on:

- Current and future pilot requirements in the UK;
- Current funding methods used for pilot training; and
- Alternative methods used for funding pilot training in different parts of the world, and their potential impacts on the future pipeline for pilots in the UK.

2.3.2   Working alongside DfT, a prioritisation exercise was undertaken to identify in-scope stakeholders, covering a range of different types of airlines, training providers/flying schools, airports/airport operators, and other organisations (including Government departments, trade associations, manufacturers, financiers and unions). More than 100 industry stakeholder organisations were invited to take part in one or both of the following tasks:

- An online survey, open between 28th June 2022 and 25th July 2022. Respondents were invited to take part in the survey by email, to a named representative where possible, with an attached letter from the DfT explaining the purpose of the survey. The email contained a link to the survey; and/or
- An in-depth interview, conducted by core members of the SYSTRA and Northpoint team via Microsoft Teams or Zoom. Interviews followed a semi-structured topic guide, tailored to the stakeholder of interest.

2.3.3   Some organisations who were asked to take part in the survey were also asked if they would cascade the invitation and survey link to their members.

2.3.4   Materials for both of these tasks were designed in partnership with DfT and are provided in **Appendix B** and **Appendix C** of this report.

2.3.5   Overall, **31 stakeholders** provided inputs into the research, of which:

- 12 took part in an in-depth telephone interview only;
- 9 provided a response to the online survey only; and
- 10 both took part in an in-depth telephone interview and also provided a response to the online survey.

2.3.6   Due to the small sample size achieved in response to the online survey, findings from both the online survey and telephone interviews have been reported together, using thematic analysis. With an overall sample size of 31, the findings of this report should not be interpreted as representative of the views of the overall sector, but as providing in-depth views from across the sector.

2.3.7   Stakeholders came from a variety of industry organisations, of varying sizes, specifically:

- ⭕   8 **Trade Associations**, including 2 international associations;
- ⭕   7 **Airlines**, of which:

  - ●   4 provide passenger services only;
  - ●   1 provides cargo services only;
  - ●   1 provides passenger and cargo services; and
  - ●   1 provides cargo and wet lease services.

- ⭕   6 **training providers / flying schools**;
- ⭕   4 **airports / airport operators**; and
- ⭕   6 **other organisations**, including Government departments, unions, interest groups, manufacturers, financers and consultants.

2.4   Quantitative analysis of secondary data

2.4.1   A range of other data sources were examined in an attempt to develop an indicative quantification of the potential scale of future pilot shortages in the UK, as most of the better known industry reports on the subject[6] present their analysis at a more aggregated spatial scale (e.g. USA, Europe, Global), rather than at an individual state level.

2.4.2   The different data sources, and a summary of the key findings from the quantification are set out in Chapter 3, alongside the conclusions of the stakeholder engagement and literature review. A more detailed account of the approach used, data sources and findings are provided in **Appendix A.**

2.5   Funding model assessment

2.5.1   Following stakeholder interviews and the literature review, a series of alternative models for funding pilot training in the UK were identified and developed. These were assessed against an evaluation framework which was developed with DfT, and considered practical feasibility from a Government, industry and cadet perspective, as well as potential risks in delivery.

2.5.2   More detail on the assessment approach can be found in Chapter 5, alongside the outcomes of the assessment undertaken.

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[6] From Boeing, CAE and Oliver Wyman

3.   DEMAND AND SUPPLY OF PILOTS

3.1   Introduction

3.1.1   This chapter examines potential demand and supply issues for/surrounding pilots over the next 5-10 years.

- Section 3.2, 3.3 and 3.4 examine the future demand for pilots, the future supply of pilots, and prospective shortages of pilots, respectively. These sections are based on evidence from the literature review, and the views of stakeholders in the airline industry who were engaged as part of this project.
- Section 3.5 provides further evidence of potential pilot shortages based on our quantitative analysis using a range of academic and industry data sources. A series of pilot demand and supply forecasts are used to predict future supply and demand levels for pilots in the UK, and thus provide an indicative quantification of the potential scale of future pilot shortages. See **Appendix A** for more details.

3.1.2   Overall, all sources of evidence indicate that the UK could face a shortage of airline pilots as the UK aviation industry recovers from the COVID-19 pandemic and begins to approach and exceed pre-pandemic demand.

3.2   Future demand for pilots

Literature Review Findings

3.2.1   To captain an aircraft for commercial transportation services, a pilot must hold an Air Transport Pilot Licence (ATPL(A); '(A)' indicating aeroplanes) licence. At the end of 2018, the Civil Aviation Authority (CAA)[7] recorded 12,653 valid ATPL(A) licences (for holders up to the age of 65). The vast majority of these were EASA licences (12,322) with only 2.8% being national UK licences (331).

3.2.2   In 2011, International Civil Aviation Organisation (ICAO) research formulated projections which indicated that by 2030 the global air transportation market would need 980,799 pilots. This study subsequently generated further reports that are regularly updated assessing future pilot demand. Specifically:

- In 2017 CAE Aviation (CAE), a supplier of flight training services, projected a need for 255,000 new pilots by 2027, which implied an average of 25,000 new pilots per year (CAPA Centre for Aviation, 2018); by 2020 CAE were predicting demand for 27,000 *new* pilots[8] by the end of 2021 and 260,000 *new* pilots over the next decade (CAE, 2020);
- In 2018 Boeing's Pilot Outlook[9] forecasted a 20-year demand for 790,000 new pilots (an average of 39,500 per year) – two years later that forecast had declined slightly to 763,000 new pilots by 2039 (Boeing, 2020); and

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[7] Civil Aviation Authority, "Pilot licence transactions by type and rating", 2019. https://www.caa.co.uk/data-and-analysis/approved-persons-and-organisations/personnel-licensing-statistics/pilot-licence-transactions-by-type-and-rating/
[8] Additional as opposed to replacement
[9] Boeing: Pilot and Technical Outlook (2018)

○ The management consultancy Oliver Wyman provides a regular analysis of the issue and Wolfsteller (2021) reports that its 2020 conclusions point to a gap in the global supply of pilots which is expected to reach 34,000 by 2025.

3.2.3   Whilst the analysis in these reports utilises slightly different methodologies and assumptions, each is from a respected source which attracts a lot of attention from within the industry and at national aviation authority/Government level.

3.2.4   In the present day, Boeing's 2022 Pilot and Technician Outlook (PTO) has reduced their 2020 projections to 602,000 new pilots needed to fly the global commercial aviation fleet over the next 20 years. This estimate assumes continued investment and returning industry growth following the COVID-19 pandemic, whilst recognising that some personnel were furloughed, retired or made redundant during the pandemic, may not be persuaded to return.

3.2.5   It should be noted that predicted demand for pilots is likely to be impacted by the age profile of the profession, which does not show an even distribution across ages. Specifically, at the end of 2018, the CAA[10] recorded 12,653 valid ATPL(A) licences (for holders up to the age of 65), with a noticeable peak in the number of licence holders aged 50 – 53 years old (0). In 2022, these pilots would be aged 54 – 57 and due to take mandatory retirement over the next decade. The data also shows that the number of licence holders drops significantly beyond the age of 59.
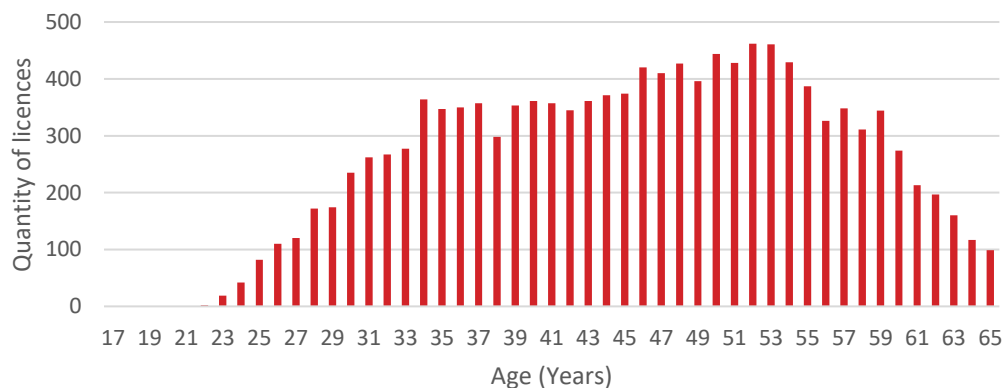
Figure 1.   Aggregated EASA and UK ATPL(A) licences by licence holder age (2018[11])

3.2.6   Looking at the data prior to 2018 (Figure 2), the rate at which young ATPL(A) holders (age < 35) are added to the dataset has broadly remained consistent across the decade from 2008 – 2018, however, the peak age of pilots has increased with each new dataset, suggesting that mandatory retirement has had a larger impact on pilot demand over time.

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[10] Civil Aviation Authority, "Pilot licence transactions by type and rating", 2019. https://www.caa.co.uk/data-and-analysis/approved-persons-and-organisations/personnel-licensing-statistics/pilot-licence-transactions-by-type-and-rating/
[11] These values represent the number of valid licences, not the number of individual licence holders (in cases where a pilot holds both an EASA and UK licence, they are counted twice). However, the impact of this double counting can be considered negligible, given that only 331 UK licences were recorded (only 2.8% of the total dataset).
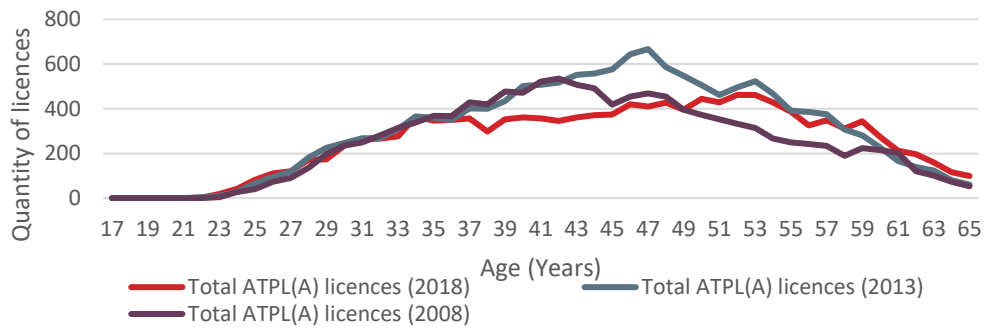
Figure 2.   **Aggregated EASA and UK ATPL(A) licences by licence holder age (2008, 2013, and 2018)**

3.2.7   Evidence is similar for rotary pilots. Specifically, in 2018, there was a peak of rotary licence holders aged 46 – 55. Licence rates also drop dramatically beyond the age of 60.
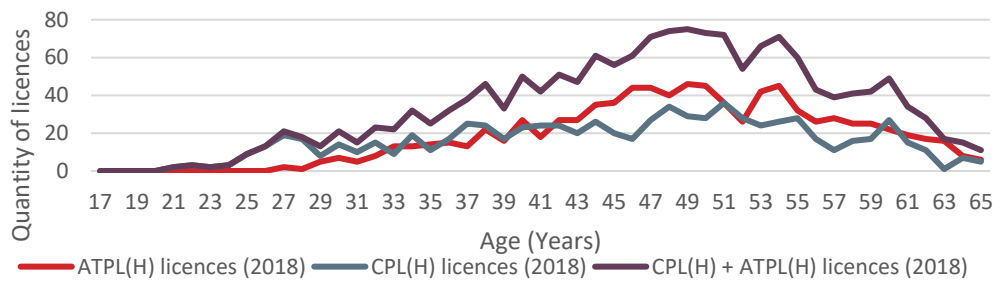
Figure 3.   **Valid commercial helicopter pilot licences by licence holder age (2018)**

Stakeholder Engagement Findings

3.2.8   When prompted, the majority of those responding to the survey who offered employment to pilots suggested that currently they have sufficient pilots to be able to operate the schedule they would like to offer[12].

3.2.9   For those who felt they could not currently operate the schedule they would like to offer, a lack of pilots was perceived to be the main contributing factor, with respondents noting that they are between two and ten pilots short to run their current schedule. Looking at shortages relative to current pilot employment, those currently employing 50 or fewer pilots reported requiring up to five additional pilots (10% of their pilot workforce), whereas those employing 500 or more pilots were more likely to report needing up to 10 additional pilots. A lack of ground staff and flight instructors were also of concern.

3.2.10   Looking to the future, those responding to the survey were asked to consider a number of future scenarios and provide an estimate of the number of additional pilots they might need in such circumstances. Overall, demand for additional pilots increased over time, in line with the findings of the literature review.

3.2.11   Specifically, when considering the schedule they would like to run in summer 2022, those responding to the survey noted that they anticipated that they would be short of between

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[12] It should be noted that many airlines may not have returned to their pre-COVID levels of activity when completing the survey.

2 and 50 additional pilots. Thinking about a full post-COVID schedule saw this estimate increase to between 1 and 280 additional pilots. Furthermore, running an optimum schedule in 2030, saw this estimate in future demand increase to between 5 and 400 additional pilots. For all of these findings, reported demand for additional pilots was proportionate to the size of respondents' current pilot workforce.

3.2.12 Stakeholders generally acknowledged that there are a variety of factors that are likely to contribute to an increased future demand for pilots, including pilots retiring earlier than they used to, or looking for more flexible, part-time roles.

3.2.13 There was also some recognition that predicting future demand for pilots is challenging, especially due to the impacts of the COVID-19 pandemic and increasing environmental concern in relation to international travel.

3.3 Future supply of pilots

Literature Review Findings

3.3.1 Analysis of the literature points to a number of factors that influence the current supply of pilots. Specifically:

- Flight school capacity and efficiency in training;
- Cost of pilot training;
- Quality of life for pilots; and
- The COVID-19 pandemic.

3.3.2 In considering the impacts of **flight school capacity** on current supply, attempts were made during the course of this study to reach out to the UK's larger flight schools, to understand the capacity they can potentially offer to train commercial pilots in the UK, but without success. In order to allow a comparison between the demand for new pilots and the capacity of the pipelines provided by commercial flight training providers, we have therefore attempted to estimate[13] the number of potential annual places on offer at the UKs four principal schools. These estimations are shown in Table 1.

Table 1. Estimated UK flight school capacity per annum

	LOW ESTIMATED CLASS SIZE (16)	HIGH ESTIMATED CLASS SIZE (26-30)	NUMBER OF SCHOOLS	LOW ESTIMATE OF TOTAL CAPACITY	HIGH ESTIMATE OF TOTAL CAPACITY
Large School (17 Classes per annum)	272	510	2	544	1,020
Small School (10 Classes per annum)	160	260	2	320	520
Estimated Total Capacity				**864**	**1,540**

[13] Estimates of class sizes and the number/regularity of intakes are based on our own awareness and informal discussions with former cadets.

3.3.3   Given that not every class will be 100% full it is unlikely this capacity can be taken as indicative of the overall annual supply figure, but equally there are also many other smaller organisations offering commercial pilot training in the UK[14]. When these two opposing considerations are taken into account, we estimate that there are probably between 900 and 1,600 places available for students wishing to secure their pilots licence in the UK annually.

3.3.4   Furthermore, analysis shows that the industry (the airlines and training sector) are not very **efficient** at delivering the pipeline of new pilots that the industry needs. Beckett (2016), for example, noted that of the thousands of potential pilots who start flight training every year, about 80% leave it; and Martin (2016) argues that **failure to fully fund tuition** is a major reason for this level of dropout.

3.3.5   Looking at **quality of life factors**, Smith (2020) shows that the most important retention-influencing factors for supply of pilots are: being based at home; a competitive salary; job security; working a fixed roster pattern; a financially stable employer; recognition as a professional by their employer; and a good work environment through well maintained aircraft and skilled colleagues. Pilots over 55 also indicate a preference for a competitive salary, recognition of length of service and reduction of pilot workload.

3.3.6   For airlines, the **COVID-19 pandemic** has caused significant uncertainty and change which has impacted pilot supply issues, alongside supply of other airline staff.

3.3.7   Research commissioned by the Department for Transport[15] showed that increasingly dynamic market conditions in light of COVID-19, meant that:

- Training organisations and airlines suffered financially from lack of operation during the pandemic and lockdowns;
- Pilots who lost their jobs or were furloughed may not return as the industry recovers, having changed careers and left the industry altogether; and
- Re-training, re-licencing and updated medical checks may be required, with financial burden placed on the workforce and airlines.

3.3.8   Research by Boeing (2022)[16], states the effects of COVID-19 on pilot supply were a perfect storm in the US:

- The pandemic exacerbated a pilot shortage by slowing down training and hiring, and creating a wave of early retirements;
- Airlines offered pilots early retirements to cut labour bills during the depths of the pandemic;
- The process to become airline-qualified in the US is lengthy and expensive, making the barrier to entry high[17]; and

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[14] 128 flight schools are listed on https://www.bestaviation.net/flight_school/united-kingdom/
[15]   https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1011033/dft-general-aviation-research-report.odt
[16]https://www.cnbc.com/2022/05/15/us-pilot-shortage-forces-airlines-to-cut-flights-scramble-for-solutions.html
[17] It costs close to $92,000(USD) for a seven-month, full-time program to get initial licences in the US. Although this fee is lower than in the UK (£80,000 at Q4 2022 exchange rates), commercial pilots are required to accumulate 1500 flying hours in the US which can take about 18 months or longer.
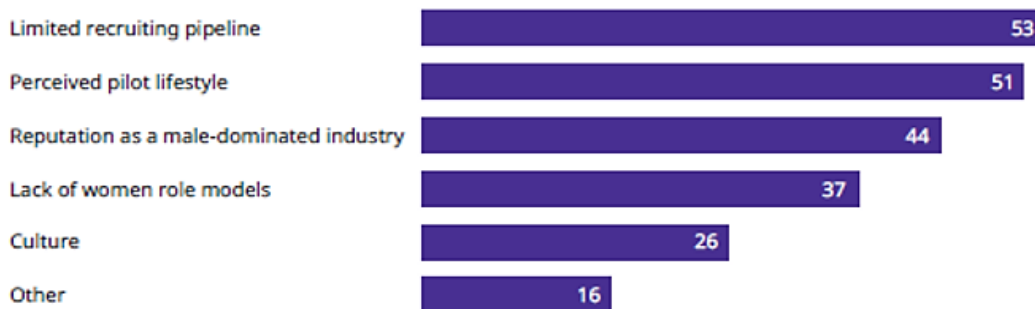
- About a third of the airline-qualified pilots in the US are between the ages of 51 and 59, and 13% of the country's airline pilots will reach retirement age within the five years.

3.3.9 Creedy (2021) also notes that demand for flight training was low during the period of the pandemic, with training demand at L3Harris cut in half, and Lufthansa Aviation Training "suspended its ab initio training offering its 850 students full refunds".

3.3.10 Such was the impact of COVID on the pilot population, that IATA initiated a formal monitoring process through a series of Airline Survey Reports. The second of these from April 2021, noted that 64.17% of airline respondents maintained 80%-100% of their pilot population on duty (i.e. average grounded time of 0-3 months). This meant that more than 33% of the respondents had pilot grounded time that went beyond three months, requiring airlines to have training options in place to bring pilot supply back to operations.

3.3.11 Notwithstanding the effects of COVID-19 on pilot supply, recent UK research[18] shows that the high cost of pilot training and the tendency for training to be self-funded, has a significant negative **effect on supply of female pilots**, with a number of practical considerations seen to create risks for return on investment in funding pilot training for women, including:

- health requirements; and
- the time and cost required to take parental leave and recover piloting skills after a long break.

3.3.12 Having a "*Lack of role models for young girls and women in aviation*", "*Cultural sexism*" and "*Lack of acceptance from male peers and passengers*" are also of significance for supply of female pilots[19]. In fact, women often need to earn the respect of their male colleagues to be recognised as a skilful professional in the aviation industry (Winter et al., 2014) and 51% of British passengers admit that they were less likely to trust a female pilot[20], despite research showing that pilot errors are not gender specific (Bazargan and Guzhva, 2011).

3.3.13 Hoppe (2011), in a broader transnational piece of research, found that aviation has long been considered a "white man's industry", and gender discrimination within commercial aviation includes the gender wage gap, sexism involving stereotypical and patronising jokes and comments, sexual harassment, lack of role models for young girls and women in an aviation context, lack of acceptance from male peers and passengers.

3.3.14 A recent study by Oliver Wyman (2020), summarises these findings. When asked, "Why is your company experiencing challenges in recruiting/retaining women as pilots" the following results were reported:

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[18] Kristina Marintseva, Artjoms Mahanecs, Mukesh Pandey, Neil Wilson – Ibid (2022)

[19] Winter, S. R., Rice, S., & Mehta, R. (2014). Aviation Consumers' Trust in Pilots: A Cognitive or Emotional Function. *International Journal of Aviation, Aeronautics, and Aerospace, 1*(1). https://doi.org/10.15394/ijaaa.2014.1003
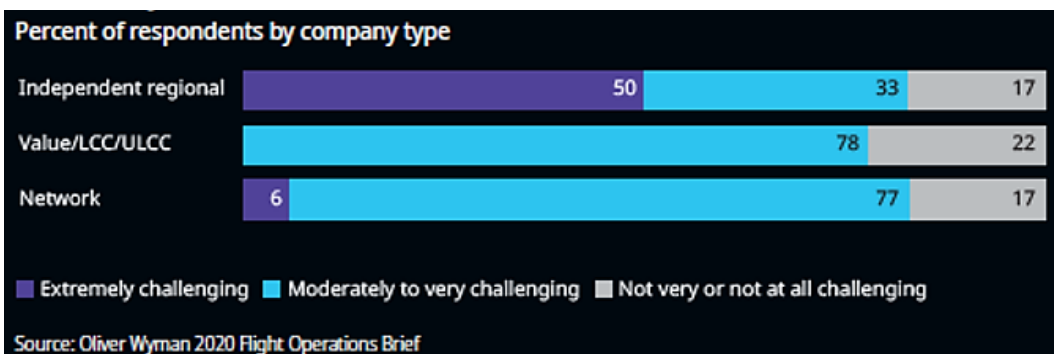
[20] UK-based online travel site sunshine.co.uk (2013)

Percent of survey respondents, selecting all that apply

Limited recruiting pipeline	53
Perceived pilot lifestyle	51
Reputation as a male-dominated industry	44
Lack of women role models	37
Culture	26
Other	16

Note: Answers solicited only from survey respondents who had indicated on a prior question that it was moderately, very, or extremely challenging to recruit and retain women as pilots.
Source: Oliver Wyman 2020 Flight Operations Brief

3.3.15   The study by Oliver Wyman[21] also notes that the challenge of recruiting pilots is likely to be different for different size airlines including Low Cost Carriers (LCC) and Ultra Low Cost Carriers (ULCC).

Percent of respondents by company type

	Extremely challenging	Moderately to very challenging	Not very or not at all challenging
Independent regional	50	33	17
Value/LCC/ULCC		78	22
Network	6	77	17

■ Extremely challenging ■ Moderately to very challenging ■ Not very or not at all challenging

Source: Oliver Wyman 2020 Flight Operations Brief

Stakeholder Engagement Findings

3.3.16   When prompted, survey respondents reported having a number of vacancies currently open for pilot roles, predominantly for pilot cadets and trainees and First Officers. Vacancies for Captains and Training Captains were also available.

3.3.17   Generally, airlines reported using a number of recruitment methods to fill vacancies, recognising that this provides benefits in terms of candidate variety (e.g. training undertaken, demographics) and wider employee retention. The two main methods of recruitment currently used were:

○   Recruiting those who are already qualified, including recent retirees, flight training instructors, pilots from other airlines or the military. Recruitment from other airlines included via Airline Flow Agreements, where major airlines recruit from their regional subsidiary airlines; and

○   Recruiting those without commercial flying experience directly from flight schools. This approach could involve working with a specific training organisation.

3.3.18   Despite undertaking a variety of methods to fill vacancies, with reported successes, stakeholders did note that there is a decreasing supply of candidates available, from the

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[21] Oliver Wyman - Ibid (2020)

UK and elsewhere. The following supply issues, some of which are also outlined in the literature review findings above, were reported by stakeholders as contributing to the decreasing pool of UK candidates:

- The **cost of pilot training**, licensing and type rating, with costs perceived to range from £60,000 to £150,000. Access to funding to cover the cost was also of concern, including a perceived lack of airlines sponsoring pilots;

- Changes resulting from **EU Exit**, such as:

  - Potential non-UK candidates now requiring settled status to live and work in the UK; and
  - Changes in training and licensing from the end of 2022, which mean that those undergoing pilot training in the UK will be required to sit separate exams and get license approvals to fly in both the UK and the EU, which has cost and time implications for trainees. As a result, there is an expectation that trainees will opt to train and fly using an EU licence only, potentially reducing the pool of available pilots in the UK. This could explain why those responding to the survey were less likely to report recruiting pilots from overseas currently than in the past 5 years.

- The **length of time** required for pilot training, licensing and type rating, meaning there is a lag in those starting training becoming fully qualified and employable. This was felt to be exacerbated by a lack of available flight instructors;

- The impact of the **pandemic** on aviation, causing candidates to look for roles in other industries, delay training or fail medical tests as part of their training, due to the impacts of COVID-19 on their ongoing health;

- Increasing **environmental concern**, causing candidates to look for roles in other industries; and

- A **poor perception** of the industry in terms of the pay and benefits available, exacerbated by recent strike action.

3.3.19   As with the literature review, supply of the following types of candidate was of particular concern and thought to be a priority in the next ten years:

- **Female** pilots, with only a small proportion of those undertaking the ATPL exam identifying as female; and
- Individuals from **low socio-economic** groups, due to the prohibitive costs of training.

3.3.20   Those taking part in the survey also noted concerns for the supply of pilots able to operate the following types of aircraft, when prompted:

- Wide bodied twin engine aircrafts;
- Aircraft in the A320 Family;
- Aircraft in the B737 Family;
- Regional jets;
- Turboprop; and

○ Piston GA type aircraft used for training - DA40 and DA42.

3.3.21 In line with the literature review, supply issues were thought to be more pronounced for smaller airlines and operators, due to larger airlines being able to attract candidates by offering higher pay and better benefits packages. However, there was also some suggestion that pay and benefits packages are not as good as they used to be.

3.4 Potential shortages of commercial pilots

Literature Review Findings

3.4.1 As outlined in Section 3.2, ICAO's 2011 research estimated that the air transportation market would need 980,799 pilots by 2030. The research also identified an estimated global shortfall of training capacity equivalent to 160,000 pilots to deliver this required volume of pilots (see Table 2)[22].

Table 2.   ICAO's 2011 estimates on pilot demand and shortages

PERSONNEL CATEGORY	CURRENT POPULATION (2010)	POPULATION NEEDED (2030)	TRAINING NEEDS *	TRAINING CAPACITY *	SHORTAGE *
Pilots	463,386	980,799	52,506	44,360	8,146
Maintenance	580,926	1,164,969	70,331	52,260	18,071
Controllers	67,024	139,796	8,718	6,740	1,978

estimated on an average annual basis

3.4.2 As it takes 18 months, on average, to qualify as a pilot on a full-time training course, and two years on a part-time course, extensive recruitment and training efforts will need to take place imminently to mitigate any shortage based on 2030 pilot estimates.

3.4.3 Research shows that the emerging shortage of qualified pilots is of high priority for airlines, with 62% of respondents to Oliver Wyman's 2020 Flight Operations Survey noting upcoming pilot shortages as a top 5 focus and 22% as the leading focus[23].

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[22] Although this research was published in 2011 and has been superseded by more up to date information, this data source is highly regarded and is understood to be the first time ICAO had systematically analysed the aviation industry's future pilot requirements.
[23]Oliver Wyman - The Pilot Dilemma 2020

Exhibit 1. "Which disruptors will warrant the greatest attention by your company over the next five years?"

Disruptor	Percent who ranked as most effective	Percent selecting up to five
Increased cost pressure	41	66
Shortage of qualified pilots	22	62
Pilot behavior & engagement	11	75
Increased coordination	11	41
Non-cockpit technology advances	4	30
Regulatory constraints/changes	4	21
Changes to flight safety standards	4	11
Modernization programs		33
Professionalization of training		30
New training approaches		26
Cockpit technology advances		16

■ Percent of respondents, selecting up to five   ■ Percent of respondents who ranked as most effective

Source: Oliver Wyman 2020 Flight Operations Brief

3.4.4   Looking at a pilot shortage in the context of COVID-19, a survey undertaken in September 2021 as part of IATA's formal monitoring surveys, attempted to quantify the expected pilot shortage in light of COVID-19. Whilst 64.13% of the respondent airlines said that they did not foresee a pilot shortage, a material percentage (35.87%) said they did.

3.4.5   In fact, Boeing (2022) notes that a pilot shortage is more significant in light of the COVID-19 pandemic, because the industry was already heading toward a global pilot shortage *before* the pandemic[24].

3.4.6   Furthermore, being able to prioritise activities that address the shortfall of pilots will be more difficult in light of the impact of the COVID-19 pandemic on the industry. For example, evidence suggests that US airlines are desperate to hire and train pilots, but growth plans may only be possible with a trim in capacity. For example, SkyWest told the US Transportation Department it plans to drop service to 29 smaller cities that the Government subsidises through the Essential Air Service, the equivalent of UK Public Service Obligation (PSO) routes, and the shortage is therefore particularly acute at regional carriers that feed major airlines' hubs from smaller cities.

Stakeholder Engagement Findings

3.4.7   As outlined in Section 3.2, stakeholders anticipated high demand for additional pilots in the future, and bearing in mind the issues to supply outlined in Section 3.3, it is

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[24]https://www.cnbc.com/2022/05/15/us-pilot-shortage-forces-airlines-to-cut-flights-scramble-for-solutions.html

unsurprising that stakeholders also anticipated potential shortages, in line with the literature review.

3.4.8   Table 2 provides detail on where, when and to what extent survey respondents anticipated pilot shortages to come into effect, when prompted. Overall, survey respondents anticipated a growing shortage over time.

Table 3. Pilot shortages anticipated by survey respondents

	IN THE NEXT YEAR	IN THE NEXT 5 YEARS	IN THE NEXT 10 YEARS
Pilot shortages in your organisation	Small shortage	Small shortage	Large shortage
Pilot shortages in the UK	Small shortage	Large shortage	Large shortage
Pilot shortages worldwide	Small shortage	Large shortage	Large shortage

3.4.9   By way of contrast, airlines taking part in interviews tended to suggest that the upcoming shortage of commercial pilots would only be temporary, with demand often decreasing and increasing in a cyclical fashion, due to the lead times associated with training. However, interviewees noted that because of the limitations in the UK aviation market listed in Section 3.3.18, the UK will be likely to experience a pilot shortage before any other European country.

> *"There appears to be a shortage now. I do not think that the existing capacity in flight schools is enough to fulfil the demand… And given the long lead time of two years, you know that's something that's going to need to be addressed." (Manufacturer)*
>
> *"Early retirement programmes (with pilots permanently leaving the industry)… mean that airlines are beginning to recruit once again… this will rapidly result in the UK industry again facing the same shortages that we did immediately prior to the pandemic… We believe it is essential to improve the flow of pilots into the industry, and to take action now to pre-empt future shortages given the lead times associated with pilot training." (Airline)*
>
> *"It's very cyclical… the pilot demand goes up and down like a sine wave." (Trade Association)*

3.4.10   Addressing the cost of pilot training and licensing was felt to be a key solution to addressing any commercial pilot shortage. Suggestions for how this could be achieved are provided in the next chapter.

> *"Finance is one of the single biggest obstacles because it's a very specific sort of person who finds the money. There isn't the open access to getting into a pilot career that there is in other professions and that's where the Government has a role." (Airline)*

3.5 Demand and Supply Quantification

Introduction

3.5.1 The previous three sections have examined future demand for pilots, future supply of pilots, and potential shortages of commercial pilots, based on evidence from the literature review, and the views of stakeholders in the airline industry.

3.5.2 This section provides further evidence of potential pilot shortages, based on a range of academic and industrial data sources. A series of pilot demand and supply forecasts are used to predict future supply and demand levels for pilots in the UK, and thus provide an indicative quantification of the potential scale of future pilot shortages.

3.5.3 The nine models used are defined in Table 4 on the following page:

- Model 1: Airline pilot demand, using industry forecasts;
- Model 2: Airline pilot demand, using historical data;
- Model 3: Airline pilot demand, using worldwide industry data;
- Model 4: Business + Air Taxi pilot demand, using historical data;
- Model 5: Regional airline pilot demand estimated from historical UK fleet data;
- Model 6: Commercial transport pilot supply, based on historical data;
- Model 7: Commercial transport pilot supply, using industry forecasts;
- Model 8: Rotary pilot demand, based on historical data; and
- Model 9: Rotary pilot supply, based on historical data.

3.5.4 **Appendix A** provides a complete breakdown of each model, including the underlying assumptions and methods used to achieve forecast estimates. Tables 9 and 10 in Appendix A also provide a summary of the numerical outputs generated from each model.

Table 4. Summary of demand and supply data sources

DATA MODEL NUMBER	PILOT TYPE	DATASET FOCUS	DATASET(S)
1	Airline pilots	UK commercial fleet growth, as a proportion of industry forecasts (demand)	• Airbus' 2022 Global Market Forecast • Oliver Wyman's 2021 Global Fleet Forecast
2	Airline pilots	UK commercial fleet growth, based on historical airline fleet data (demand)	• CAA's UK Airline data, Table 1.11.2 • DfT Aviation Statistics AVI0203
3	Airline pilots	UK commercial pilot demand, as a proportion of worldwide industry forecasts (demand)	• Boeing's 2022 Pilot and Technician Outlook • Oliver Wyman's 2021 Pilot Forecast • CAE Inc.'s 2020 Pilot Demand Outlook
4	Business Aviation and Air Taxi pilots	Business Aviation + Air Taxi Pilot demand inferred from historical aircraft movement data (demand)	• CAA's UK Airport data, Table 3.1 • CAE Inc.'s 2020 Pilot Demand Outlook
5	Regional airline pilots	Regional pilot demand estimated from historical UK fleet data (demand)	• CAA's UK Airline data, Table 1.11.2
6	Commercial transportation pilots	ATPL(A) + CPL(A) licence issuance in the UK, based on historical data (supply)	• CAA's Pilot Licence holder statistics dataset
7	Commercial transportation pilots	UK commercial pilot supply, as a proportion of worldwide forecasts (supply)	• Oliver Wyman's 2021 Pilot Forecast
8	Commercial Rotary pilots	Rotary Pilot demand inferred from historical aircraft movement data (demand)	• CAA's UK Airport data, Table 19
9	Commercial Rotary pilots	Rotary pilot supply via historical ATPL(H) + CPL(H) licence issuance (supply)	• CAA's Pilot Licence holder statistics dataset

Note: These models have been developed using industry forecasts. Their accuracy is dependent on the accuracy of the source data

3.5.5   The models described above have been established using two types of datasets:

(1) Industrial Forecasts from Airbus, Boeing, Oliver Wyman, and CAE; and
(2) Data accessed directly from CAA and DfT statistics[25].

3.5.6   Whilst these data sources are regarded across the aviation industry as being authoritative, this analysis has not attempted to assess the accuracy of the data, and therefore the models developed should be viewed as estimates of the future demand and supply for pilots, implied by the industry forecasts.

3.5.7   Whilst the recent short-term effects of COVID-19 are noted in each of the industrial forecasts from Oliver Wyman, Airbus, Boeing, and CAE, detailed analysis of the long-term effects of COVID-19 on the demand for and supply of pilots has not been considered in this analysis.

3.5.8   The remainder of this section provides:

- Forecasts for demand and supply of airline, business aviation, air taxi, and regional pilots (collectively referred to as **'Fixed-wing'** pilots), and for pilot surplus/deficit;
- Forecasts for demand and supply of **rotary** pilots, and for pilot surplus/deficit; and
- Conclusions for future total surplus / deficit of pilots.

Fixed-wing pilots

3.5.9   In this report, 'Fixed-wing' refers to pilots that are qualified for:

- Airline Transportation (e.g. LCC, Long-haul, Freighters);
- Business Aviation;
- Air Taxi services; and
- Regional Airline Transportation (small aircraft, <100 passengers).

Demand Forecasts

3.5.10   At the end of 2018, the CAA[26] recorded 12,653 valid ATPL(A) licences (for holders up to the age of 65), of which the vast majority were EASA licences (12,322), with only 2.8% being national UK licences (331).

3.5.11   Figure 4 shows the historical trend of valid ATPL(A) licences from 2004, collated from CAA data[27].

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[25] DfT also provided forecasts from UK Gov's Jet Zero Strategy report (Scenario 1), which could be used as a proxy for pilot supply and demand. Detail on how the models shown in Table 4 compare with these forecasts can be found in Appendix A.
[26] Civil Aviation Authority, "Pilot licence transactions by type and rating", 2019.   https://www.caa.co.uk/data-and-analysis/approved-persons-and-organisations/personnel-licensing-statistics/pilot-licence-transactions-by-type-and-rating/
[27] Civil Aviation Authority, "Sex and age of pilot licence holders", 2019. https://www.caa.co.uk/data-and-analysis/approved-persons-and-organisations/personnel-licensing-statistics/pilot-licence-holders-by-age-and-sex
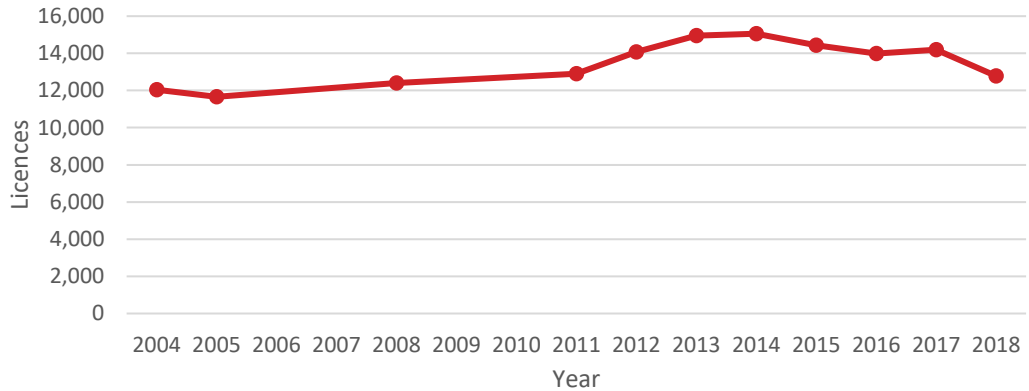
Figure 4. **Valid EASA + UK ATPL(A) licences from 2004 - 2018**

3.5.12 Overall, the total number of licences has remained consistently within a bound of ~12,000 – 15,000. However, the age demographics of this cohort have changed over time, as outlined in section 3.2, which, amongst other factors, is increasing demand for new cadets.

3.5.13 Figure 5 presents an overview of the Fixed-Wing Airline Transport pilot demand as calculated by Models 1 – 3 (see Appendix A for a description of each model), provided in the available data sources. The estimates based on Models 1 and 3 are broadly similar, whereas the estimate from Model 2 shows a slower rate of growth which has a significant impact on forecast pilot demand over a long time-horizon. A tabular breakdown of the output values from each of these models is available in Appendix A.
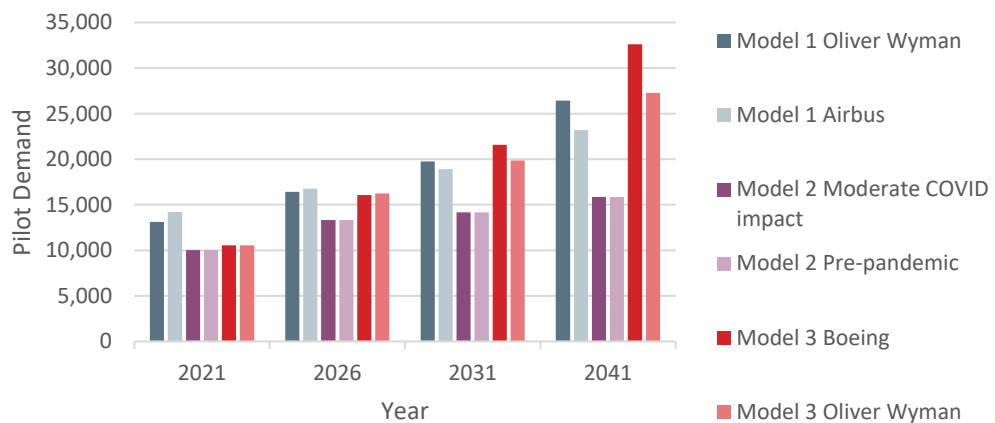
Figure 5. **Airline transport pilot demand forecasts**

3.5.14 Figure 6 provides an overview of the **demand** forecasts obtained for **Business Aviation and Air Taxi** services, and for **Regional** airline services. Although the scale of demand for these categories is smaller than for Airline Transportation (~1/5th of Airline pilot demand), licencing requirements mean that these services draw from the same supply pool of pilots as Airline services.

3.5.15 Looking at the Business Aviation projections, both historical and CAE forecasts predict increasing demand for pilots, with a gradual upward growth rate. However, the growth

in demand is not expected to be as significant as for Airline Transportation pilot projections. Specifically, between 2026 and 2041, Model 4 predicts business pilot demand to grow by an average of 15% (averaged across the historical and CAE estimate), whereas the commercial models (Models 1 – 3) estimate an average 50% growth over the same period. For the Air Taxi category, the forecast (based on historical data) predicts that demand will decline by 12% between 2026 and 2041. Regional pilot demand shows a similar trend, declining marginally by 3% over the same time (see Appendix A for tabled values for model 4 that indicate this). In total, these estimates for Business Aviation, Air Taxi and Regional services predict an additional 4,629 – 5,409 pilots will be required by 2041.
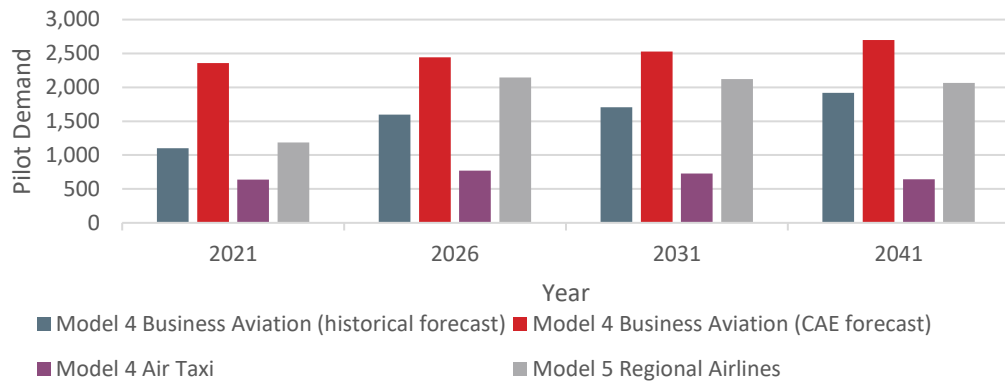
Figure 6.   Forecasted business aviation and air taxi pilot demand

Supply Forecasts

3.5.16   Figure 7 presents a comparison of the commercial transport fixed-wing pilot **supply** results obtained from Models 6 and 7. Model 6 predicts that the supply of pilots will grow, but at a slowing rate. Despite this, the retirement/attrition rate of pilots leaving the workforce (taken as 3.8% from CAE's 2020 - 2030 forecast – Assumption 4 of Appendix A) does not outstrip the addition of new pilots at any point in the forecast. Model 7 predicts a similar rate of growth but smaller levels of supply. A more detailed view of these values is provided in Appendix A.

Figure 7.   Fixed-wing transport pilot supply forecasts

Fixed-Wing Shortages

3.5.17   Combining the demand estimates for Airline pilots, with Business Aviation, Air Taxi, and Regional services shows that there is a possibility that future supply of commercial pilots will not meet demand.

3.5.18   By comparing the lowest demand and highest supply forecasts predicted across Models 1 – 7 (i.e., the 'low estimate'), Figure 8 shows that in the 'low estimate', a 15,682 surplus of pilots may exist by 2041. Conversely, after comparing the highest demand and lowest supply value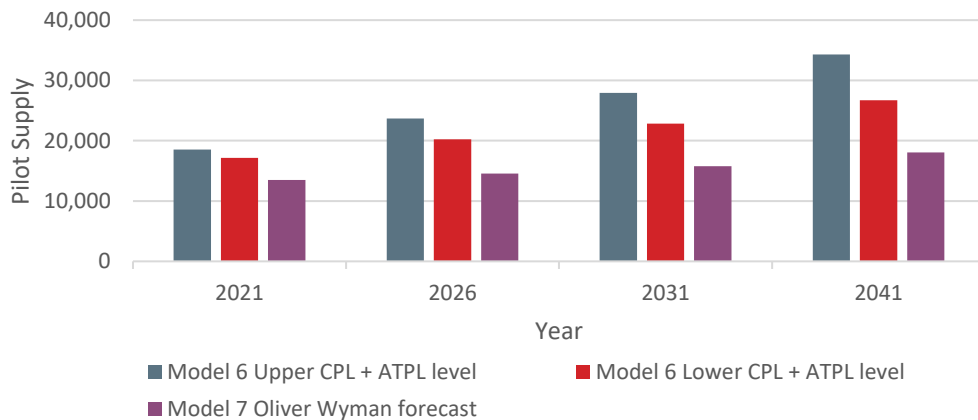s across models 1 – 7 (i.e., the 'high estimate'), Figure 8 shows that a deficit of ~19,957 pilots could emerge by 2041. The 'mean estimate', which compares mean demand and supply values across models 1 – 7 also shows a growing deficit which could reach ~2,100 pilots by 2041. The underlying assumptions which drive the lowest and highest forecasts in each model (as well as how the mean estimate case is calculated) are explained in detail in Appendix A.
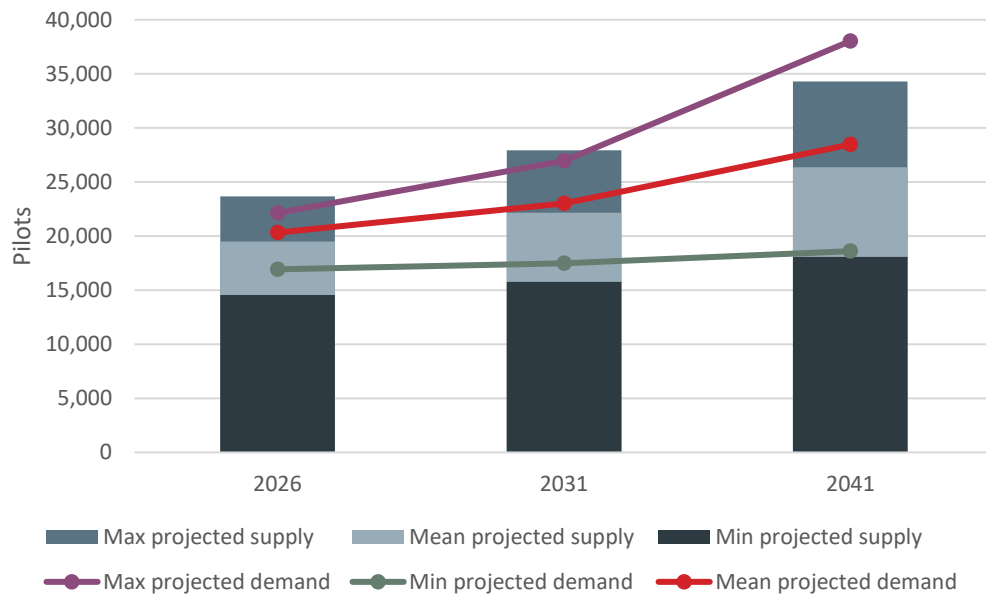
	2026	2031	2041
Pilot Surplus/Deficit (low demand, high supply)	+6,758	+10,435	+15,682
Pilot Surplus/Deficit (mean demand, mean supply)	-819	-855	-2,111
Pilot Surplus/Deficit (high demand, low supply)	-7,564	-11,189	-19,957

Figure 8.   **Forecasted commercial pilot surplus/deficit (range of cases)**

3.5.19 The Figure above shows it is possible that a pilot deficit will emerge. However, as highlighted in Figure 3 of Appendix A, the 'implied' historical demand of Model 2 does not follow the same trend as the actual historical pilot demand, and so the validity of Model 2 is questioned. Given that a strong correlation was not found, it is recommended that Model 2 be excluded from the analysis results. In this scenario, the surplus in the 'low estimate' is cut by more than half. By 2026, the surplus is estimated at ~3,000 pilots and grows slightly to ~6,500 by 2041. The 'high estimate' retains its values of ~7,500 pilots in 2026, growing to ~20,000 pilots by 2041. The 'mean estimate' case also deteriorates, as the deficit of pilots by 2041 is estimated to grow to ~5,500 (up from ~2,100).
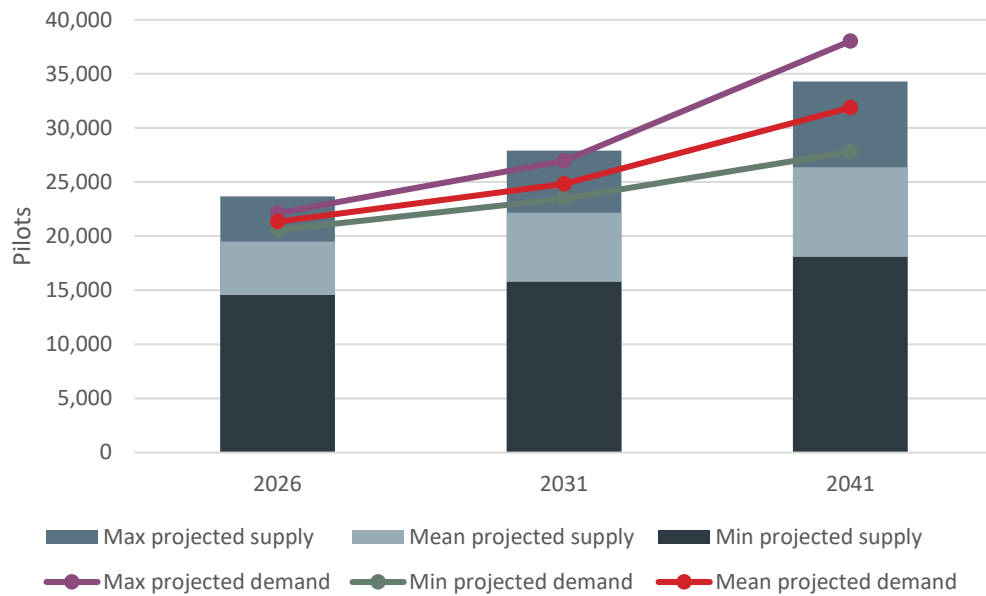
	2026	2031	2041
Pilot Surplus/Deficit (low demand, high supply)	+3,112	+4,459	+6,476
Pilot Surplus/Deficit (mean demand, mean supply)	-1,830	-2,663	-5,525
Pilot Surplus/Deficit (high demand, low supply)	-7,564	-11,189	-19,957

Figure 9.   Forecasted commercial pilot surplus/deficit excluding Model 2 results

3.5.20 This analysis of fixed-wing pilot demand and supply was built from several models, each of which were founded on underlying assumptions as described in Appendix A. Some of these assumptions were made as best-estimates in the absence of relevant, first-hand data relating to UK aviation. To test the reliability of this analysis, a sensitivity analysis was conducted on the model inputs which had the greatest levels of uncertainty. The full process of this analysis is documented in Appendix A. In summary, the results showed that the overall conclusions described above remained valid in each test case, as each test showed a possibility of a growing pilot shortage emerging by 2026, 2031, and 2041.

Rotary Pilots

3.5.21 The demand and supply of Rotary pilots requires separate analysis to Fixed-wing pilots. To qualify as a helicopter pilot, a Helicopters Commercial Pilot Licence (CPL(H); '(H)' indicating helicopter) must be held, or a ATPL(H) to pilot multi-crew, multi-engine helicopters. Therefore, because of different licencing and training requirements Rotary demand/supply does not draw from the same pool as Fixed-wing and should be considered as a separate category.

Demand Forecasts

3.5.22 Figure 10 shows that Rotary aircraft movements have fluctuated over the past two decades but remained within a range of 52,200 to 78,700 per annum. No clear increasing/decreasing trend has been observed in the historical data and so predicting the level of future demand is difficult. However, it can be said that through this period, Model 8 estimates that rotary pilot demand ranged between 600 – 900 pilots, per annum.

Figure 10.   Estimate of historical demand for rotary pilots (2002 – 2018)

Supply Forecasts

3.5.23 On the supply side, historical trends show that between 2004 and 2011 there has been a large growth in CPL(H) licence holders which contrasts to a decrease in the number of ATPL(H) licence holders (Figure 11). In more recent years, the number of valid CPL (H) and ATPL(H) licence holders have been more similar, and both licence types now show a slight declining trend. However, over the long term, the combined number of licences shows a lateral movement which fluctuates between ~1,750 - ~2,250. Based on these results, it is not certain what direction the future level of Rotary pilot supply may travel in. If both ATPL(H) and CPL(H) numbers continue their recent trends there may be a period of supply decline.
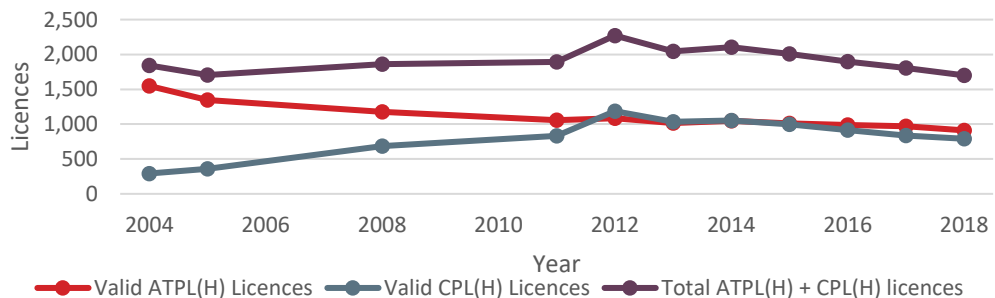
Figure 11.   Valid ATPL(H) + CPL(H) licences (2004 – 2018)

3.5.24　Looking at records for new ATPL(H) and CPL(H) licence issuance (shown in Figure 12) suggests this may be a probable outcome, given that the number of new pilots joining the supply each year has decreased gradually between 2008-2018.
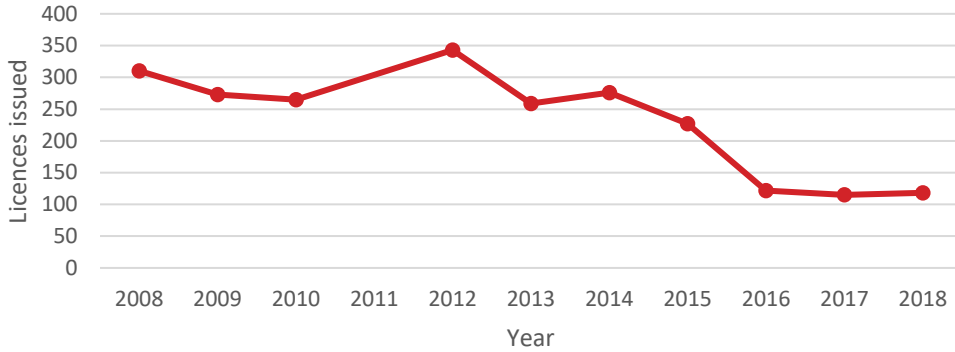
Figure 12.　**ATPL(H) + CPL(H) licences issued (2008 – 2018)**

3.5.25　Based on these trends, it is likely that future supply levels of rotary pilots will be lower than historically recorded.

Rotary Shortages

3.5.26　Despite concerns about a potential shortage of specialist rotary pilots, mapping the demand forecasts against supply levels shows that supply of such pilots exceeds demand by a comfortable margin, as shown in Figure 13. If demand remains consistent as measured over 2004-2018, a decrease in supply would not risk a shortage of pilots, unless supply levels were to fall significantly (e.g. approaching ~1000 pilots). It should be noted however that the supply levels shown in Figure 13 should be considered as the upper limit that could be achieved. This is because the values use the number of licences that have been issued and hence assume that pilot employment is at 100%. In reality, the real available supply of pilots will be lower than the historical values shown in Figure 13.
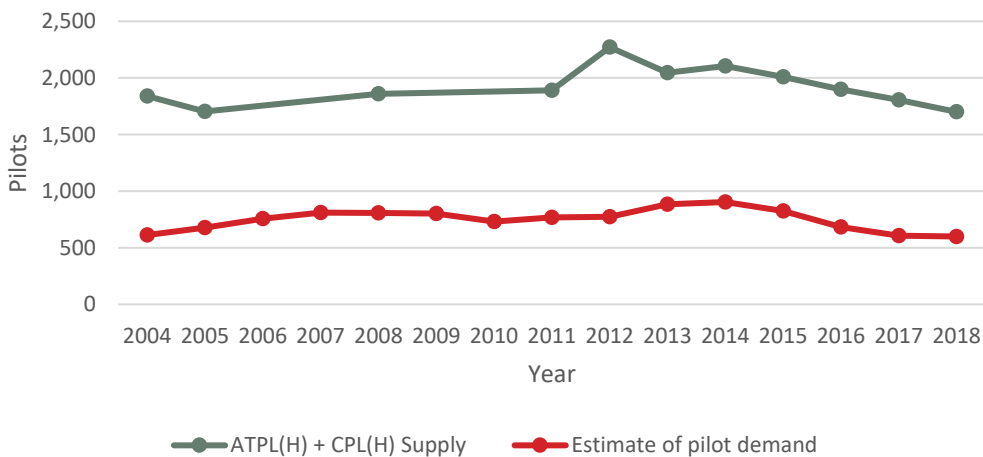
Figure 13.　**Rotary pilot demand estimate vs licence supply (2004 – 2018)**

Demand and Supply Quantification Conclusions

3.5.27   The results of this investigation have found that it is possible that a sustained deficit of commercial UK fixed-wing pilots will emerge within the next 20 years. The high, low, and mean estimates, when demand for Airline Transportation, Business Aviation, Air Taxi, and Regional services are aggregated, is shown in Table 5.

3.5.28   In summary, this shows that by 2026, up to ~7,500 unfilled pilot positions may emerge, growing to ~20,000 in 2041. For context, models 6 and 7 estimate 2021's supply of pilots to be between ~13,500 and ~18,500. This means that by 2026, the 2021 supply would need to grow by 64% (in the 'low estimate') to meet the estimated demand.

3.5.29   A detailed breakdown of the components that make up the aggregated demand and supply estimates is available in Appendix A, Tables 9 and 10.

Table 5. **Aggregated demand and supply forecasts for commercial transport pilots flying fixed-wing aircraft**

FIXED WING PILOT FORECASTS	2026	2031	2041
Aggregated demand (Low estimate)	20,572	23,462	27,810
Supply (Low estimate)	23,685	27,921	34,286
Aggregated demand (Mean estimate)	21,335	24,838	31,882
Supply (Mean estimate)	19,505	22,175	26,357
Aggregated demand (High estimate)	22,133	26,955	38,030
Supply (High estimate)	14,568	15,766	18,073
TOTAL SURPLUS/DEFICIT	2026	2031	2041
Low estimate	3,113	4,459	6,476
Mean estimate	-1,830	-2,663	-5,525
High estimate	-7,565	-11,189	-19,957

3.5.30   Although the 'low estimate' predicts a surplus of pilots up to 2041, it should be noted that the results are subject to negative supply impacts which have not been modelled, including industry downturn. For example, the assumption of Model 6, include a 100% pilot employment rate, and, in reality, a larger supply would be needed to account for ATPL licence holders who are unemployed/employed in other professions. The fixed-wing supply models also do not account for pilots who qualify in the UK but then move to work abroad, which may be as high as 20% of new qualifiers (reported by FTA in 2016[28]). Together, these factors act to reduce the estimated supply. There are no obvious positive supply impacts which have not been accounted for that might ease pressure on supply

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[28] A. O'Loughlin, "Pilot shortage looms but UK and European commercial pilot licence issues are down," 2016 https://www.fta-global.com/fta-news/pilot-shortage-looms-but-uk-and-european-commercial-pilot-licence-issues-are-down

and reduce demand. However, it should be noted that the emergence of autonomous technologies may reduce pilot demand beyond 2040. The scale of this impact is not considered in the analysis.

3.5.31   For Rotary aircraft, no clear trends in pilot demand growth or decline exists and so the Rotary forecast is more uncertain. This is also true for the supply estimate which has broadly trended laterally. It is unlikely that a shortage will be experienced unless supply levels continue to drop, at which point shortages may appear when supply levels fall to ~1000 pilots.

4. APPROACHES TO ADDRESSING PILOT SHORTAGES

4.1 Introduction

4.1.1 The previous chapter outlined the anticipated future demand for pilots, as well as current concerns regarding a pilot shortage. Notably, the cost of pilot training, licensing and type rating, as well as access to funding to cover the cost, were perceived as prohibitive for potential pilot trainees.

4.1.2 This chapter covers approaches to addressing pilot shortages, with a focus on funding methods and their impacts. Section 4.2 examines current funding methods and Section 4.3 examines other alternative funding methods.

4.2 Current UK funding methods and their impacts

Findings from Literature Review

4.2.1 There is minimal literature on existing funding methods in the UK because the predominant method is self-funding, and has been for the last 20-25 years.

4.2.2 Evidence shows that self-funding can require large values of personal savings or loans by new cadets, with the predominant approach being re-mortgaging family assets.

4.2.3 Research suggests that the reliance on self-funding creates barriers to entry in the pilot profession. DfT's research on young people's perceptions of aviation and maritime careers[29], shows that of those young people who would not consider an aviation career, the expense to train or study was a partial reason.

4.2.4 Self-funding is particularly a barrier for people from lower socio-economic backgrounds. This impacts minority ethnic prospective pilots because Black Britons, after housing costs, are more than twice as likely to live in low income households than white Britons. Similarly, Asian (including Pakistani, Bangladeshi, Chinese and Indian) Britons are nearly twice as likely to live in low income households[30].

4.2.5 Self-funding may also directly correlate to the low incidence of females in the pilot profession, because according to several academic studies, women are more risk averse overall, and in financial decision-making, than men, which may lead them into education and training opportunities with less risk[31]. A number of practical considerations are also seen to enhance the risk for return on investment in funding pilot training for women, including:

- ⭕ health requirements, such as passing of medical checks; and
- ⭕ the time and cost required to take parental leave and recover piloting skills after a long break.

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[29] https://www.gov.uk/government/publications/aviation-and-maritime-careers-young-peoples-perceptions
[30] https://www.ethnicity-facts-figures.service.gov.uk/work-pay-and-benefits/pay-and-income/people-in-low-income-households/latest#by-ethnicity
[31] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2741240/

4.2.6 Another current funding approach is military re-training, with those who are already trained as pilots in the military able to access grant funding ranging from £250 to £1,000, to train to be a commercial pilot. However, this will not cover the full cost of re-training, meaning finance remains a barrier[32].

4.2.7 It should also be noted that the overall number of military pilots in the UK has reduced over time, therefore reducing the volume of military to commercial conversions taking place. Additionally, the military profession lacks diversity in its workforce, especially in relation to ethnicity, and therefore this method for funding pilot training should not be seen to address improving diversity in the pilot profession[33].

4.2.8 Prior to a reliance on self-funding and military re-training, the sector was known to provide sponsorship of training through airline funding, bonding and salary sacrifice schemes, with these programmes very common between the 1970s and 1990s.

4.2.9 Other initiatives currently in place within the sector include: First Officer Apprenticeship; and university training and education.

Findings from Stakeholder Engagement

Self-funding

4.2.10 Whilst stakeholders acknowledged the challenges around self-funding, self-funding was thought to be the predominant funding method for covering the cost of pilot training and licensing in the present day.

4.2.11 Stakeholders had an awareness of a number of self-funding approaches, including:

- Self-funding through personal **savings**, or through **gifts** from family and friends;
- Self-funding through private **loans**, most of which must be secured. There was also a perception that unsecured loans, with low interest rates and income-based repayment terms, used to be offered by some lenders, but it was suggested that these have been discontinued; and
- Self-funding through **working whilst training**.

4.2.12 Stakeholders noted that previously self-funding was not the predominant method of covering training, licensing and type rating fees, as airlines would cover costs in full.

> *"Look at the number of people going through flying training at the moment… the airlines have been completely hands off in terms of paying for training… things pivoted from you know you going and getting interviewed and signing up with British Airways or United Airlines or whoever was gonna take on board, they pay for your training and then they take you on… you can talk to any number of pilots who are in their 40s and 50s and that was their route into the cockpit. That's how they did it. That's what happened." (Training provider)*

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[32] https://www.forcesemployment.org.uk/news/everything-you-need-to-know-about-employment-support-grants/; https://www.ctp.org.uk/allowances-grants; and https://www.britishlegion.org.uk/get-support/financial-and-employment-support/employment/employment-grants
[33] https://www.gov.uk/government/statistics/mod-diversity-dashboard-april-2022/civilian-personnel-biannual-diversity-dashboard-report-april-2022

Military Training

4.2.13   Stakeholders were aware that those leaving the military can undertake a conversion course to change their military pilot licence to a commercial pilot licence.   Stakeholders also reported that those leaving the military are eligible for re-training grants and funding which could be used to partially pay for commercial flight training. Specific examples of re-training grants and funding were not provided by stakeholders during interviews.

4.2.14   Those responding to the survey felt that military re-training was an effective solution to the pilot shortage in the short, medium and long-term and similar proportions felt that there should be more military transfers going forwards.

4.2.15   However, stakeholders also stated that the military is training fewer pilots and therefore fewer military pilots are training as commercial pilots.

Airline sponsorship and cadet schemes

4.2.16   Airline cadet schemes varied from receiving full MPL training to undertaking additional training courses after gaining a frozen ATPL through a self-funded approach. Courses on offer from airlines included:

- Type rating;
- Business Development;
- Multi-crew cooperation training; and
- Aerobatics training.

4.2.17   Providing in-house cadet training was thought to result in a number of benefits, including cadets: learning the culture and ways of working for a particular airline; gaining team work experience; undertaking increased training hours; and being more likely to remain within the airline, including due to bonding. Moreover, airlines report that it gives them the ability to produce a pilot with the exact skills they require.

4.2.18   In relation to the funding of these schemes, stakeholders reported that cadet schemes were usually fully or partially self-funded up front by the trainee, with any remaining amount sponsored by the airline. For example:

- One airline reported that their cadets train at reduced cost through economies of scale in which pilots in a cadetship will spend less on training overall because there are more pilots training, but they are still expected to self-fund; and
- One airline reported that the amount paid by the new pilot is then often paid back to the trainee over time, once they are in a full-time role at the airline.

4.2.19   Trade groups and training providers noted the risks of self-funding cadet schemes, especially for MPL training as, in some cases, the airline does not hire the cadet after training. This has happened in the past with an airline training too many cadets and, more commonly, if the cadet is unable to pass a final exam. Additionally, the MPL course cannot be converted to another type of licence such as a CPL, which allows the trainee to fly delivery aircrafts, business jets or fly non-commercial.

4.2.20   Stakeholders noted that fully-airline funded cadet schemes were less common in the UK, due to the costs and risks involved for airlines and the successes of alternative recruitment

and funding methods. Where they do exist, sponsored cadet schemes often have minimal spaces which are linked to company targets.

> *"Training bonds were often used by air operators to recruit and/or retain their flight crew. This legal agreement is that the operator pays for the newly hired pilot's flight training, and requires in consideration that the pilot agrees a term of employment usually within a formal employment agreement. Should the pilot resign before the end of the term agreed in the employment agreement, the pilot must repay the cost of the flight training." (Trade Association)*

4.2.21   The survey findings support this, with airlines tending to report that they no longer deliver cadet schemes or sponsorship, or never offered them. The reasons for this included:

   O   Underlying costs of delivering training;
   O   Poor cadet retention levels, predominantly due to cadets moving to larger airlines;
   O   Success in other recruitment channels, such as recruiting ex-military or experienced pilots;
   O   Uncertainty within the industry as a result of COVID-19;
   O   Uncertainty within the wider UK economy; and
   O   Difficulty in offering cadets the required training, due to the type of operation the airline delivers.

> *"Financing Cadet programmes is costly, with an increase in training risk and retention." (Airline)*

4.2.22   Despite the above concerns regarding airline funded sponsorship and cadet schemes, the majority of those responding to the survey felt that they had potential to be an effective solution to the pilot shortage in the short, medium and long-term. Sponsorship by overseas airlines was also thought to be effective.

4.2.23   The majority of survey respondents also felt that there should be more apprenticeships and cadetships going forwards and that this would be an important step in addressing the UK's need for pilots in the next 5-10 years.

First Officer Apprenticeship

4.2.24   First Officer Apprenticeships provide a Level 6 qualification to train as a co-pilot over a two year period, with up to £27,000 in funding provided.

4.2.25   When asked about the effectiveness of First Officer Apprenticeships, those responding to the survey stated that the apprenticeship had potential to be an effective solution to the pilot shortage in the short, medium and long-term.

4.2.26   However, none of the airlines responding to the survey, nor taking part in the interviews, had employed pilots through the First Officer Apprenticeship to date.

4.2.27   Insight from the stakeholder interviews suggests that there are four main concerns in relation to the current conditions of First Officer Apprenticeships, which could explain the lack of uptake. Specifically:

- The £27,000 cap for First Officer Apprenticeship **funding** was felt to be insufficient to cover full flight training, and as Apprentices cannot be seen to pay for their own training, airlines and training providers felt they would be required to take on large amounts of financial risk to cover the difference;

- The requirement for training to take place over a **maximum of two years** was perceived as creating risk for airlines offering the Apprenticeship, due to potential for Apprentices to leave the airline after full flight training and licences are provided because the apprenticeship prevents any bonding. This risk was noted as being financial, as well as concerning staff retention;

- The restrictions for **bonding** on all apprentices create additional risk for the airline that the apprentice will leave after the training; and

- There are perceived challenges in **identifying provider(s)** to deliver the apprenticeship.

"You can't go to a prospective student and say, 'Look, take this apprenticeship scheme, it's gonna' pay for 1/4 of your training or a third of your training'… it is almost stalled by the nature of its own construction… In its current format, I do not think that it is going to provide a route to produce more pilots in the industry." (Training provider)

4.2.28 Stakeholders made a number of suggestions for improving the First Officer Apprenticeship which could mitigate these concerns. Firstly, in relation to the funding being insufficient to cover the full costs of pilot training, stakeholders put forward two main suggestions for improvement:

1. Increase the funding available for First Officer Apprentices, with suggestions as follows:

   - Mimic the NHS Nursing Degree Apprenticeship model, where Apprenticeship funding is seen as a 'co-investment' and pooled across different employers and the Government by transferring available apprenticeship levy funding between different organisations[34];

   - Offer grant funding to airlines, to encourage them to deliver the First Officer Apprenticeship. When prompted on this, airlines requested grant funding of between £25,000 and £50,000. One training provider requested £100,000 in grant funding; and

   - Increase the upper-limit of £27,000 for apprenticeships, allocating pilot training in the higher band for funding.

2. Allow the £27,000 Apprenticeship funding to be used in a different way, with suggestions as follows:

   - To partially pay for training once ground exams have been passed and self-funded, which would showcase commitment to the airline and profession by the apprentice, and be funded by airlines using 'prior learning' apprenticeship funding rules;

   - To pay for type rating fees only, once a full ATPL has been achieved;

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[34] https://www.gov.uk/guidance/transferring-your-apprenticeship-levy-to-another-business#why-transfer-my-apprenticeship-levy-funds

- To pay for a full ATPL in a series of managed stages, starting with an 'introductory' airline-based apprenticeship and working up to a full pilot licence. This approach was felt to remove some financial risk from airlines and training providers, whilst still providing individuals with useful qualifications and experience;
- To partially pay for the training alongside a Government funded loan, such as those available in Australia for Vocational and Educational Training (see section 4.3.3/4.3.11 below); and
- To partially pay for the training alongside a Government funded loan which would just be used for the cost of specialist training equipment, such as flight simulators and aircraft, used as part of the training. This approach mimics schemes used in the medicine sector, where universities are provided with grant funding to cover the use of specialist medical training equipment, based on time required and hourly rate.

4.2.29   In relation to the length of the First Officer Apprenticeship, stakeholders proposed that the First Officer Apprenticeship should be lengthened, to mimic the NHS Nursing Degree Apprenticeship which runs for 4 years. During this period, stakeholders suggested that apprentices could work 4 days/week on their training and 1 day/week in a part-time role at the airline, improving their wider business knowledge and encouraging buy-in. It also offers airlines an earlier return on investment for the apprentice whist they train as an airline pilot.

4.2.30   Stakeholders also agreed that bonding or salary sacrifice over a 4-7 year period after the apprenticeship would ensure retention of the newly qualified pilot and a return on investment for airlines. There was also a suggestion that standardising the pay and benefits available for First Officers across different airlines, could reduce the risk of movement from one airline to another.

> *"I think a bonded scheme would work and encourage the vast majority where economic wise it is, is a bit of a barrier." (Trade Association)*

4.2.31   Finally, air training organisations noted difficulties in gaining a place on the register of apprenticeship training providers (RoTap), due to the impacts of COVID-19 on financial standing and the requirement to show a gap in current training provision. Additionally, there are currently no Civil Aviation Authority Approved Training Organisations on the RoTap.

University

4.2.32   Occasionally, pilot training was known to have been funded through universities, whether that be through a university funded apprenticeship or through access to further education loans whilst undertaking flight training. When prompted on the effectiveness of this form of funding, those taking part in the survey felt that university funded training would be an effective solution to the pilot shortage in the short, medium, and long-term.

4.2.33   There was an awareness of some airlines working in partnership with universities to offer ATPL training alongside a Bachelor of Science (BSc) in Aviation. This training was thought to be financially supported by a student loan, which is repaid as Pay As You Earn (PAYE).

4.2.34   Availability of a student loan for pilot training received high levels of support from stakeholders during interviews. More detail on this is provided in Section 4.3.

4.3   Other funding methods and policies

Findings from Literature Review

4.3.1   The literature review identified a number of alternative suggestions for funding pilot training, specifically:

   O   Government funded loans;
   O   Other loan approaches; and
   O   Airline funding or incentives.

4.3.2   These are outlined in detail in the remainder of this section.

Government funded loans

4.3.3   Other countries offer low interest, Government-funded loans to cover pilot training and licensing costs, including **Australia**, which offers the Vocational Education and Training (VET) Student Loans (VSL) scheme, an income contingent loan program to assist eligible vocational education and training (VET) students to pay their tuition fees for selected courses at the Diploma level and above. The program is designed to provide financial loan support to students undertaking higher level training in courses that address workplace and industry needs, creating better opportunities for employment. In recognition of the high costs of delivery and training, a loan cap of $75,000 (AUD)[35] (2017 rate, indexed annually) applies to certain aviation courses.

Other loan approaches

4.3.4   Recently, CAE launched a new financing initiative for aspiring pilots in collaboration with financial institutions around the world. With this initiative, aspiring pilots are connected to banking partners that offer specific financing solutions for pilot training, making the profession more accessible to those who wish to pursue their dream of flying for a living. Approved partners will speed up the processing of applications and will offer competitive rates. In addition, future pilots will have access to a dedicated team that understands the reality of future pilots and a centralised point of contact in each of the participating banking institutions.

Full funding or incentives

4.3.5   CAE, the world's largest pilot training organisation, propose that airlines who rethink their approach to training, including partnerships with ATOs (Approved Training Organisations), will go far to improve pilot engagement and operational resilience[36].

4.3.6   US-based major airline, Southwest, have started to re-think their approach, announcing increased budgets for training to create a pilot pipeline program with two regional carriers, SkyWest and Advanced Airlines. The company also restarted work on its pilot

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[35] Approximately £42,171 GBP at the point of reporting.
[36] CAE's Airline and Business Jet Pilot Demand Outlook 10-year view 2020 Update

training centre in Dallas this year, a $13 million(USD) project that will add eight new simulators and help push pilots through training more quickly.

4.3.7   Another airline that is being pro-active in this space is United who have developed a comprehensive plan on "Developing the Aviation Workforce of the 21st Century". This includes establishing their own wholly owned Flight 'Aviate Academy' and plans to hire and train 10,000 new pilots over the next decade, half of whom they intend will come from the United Aviate Academy cadets.

4.3.8   In the UK, training organisation, Leading Edge Aviation, offer a fully funded, "Leading Edge Airline Preparation" and "Flight Instructor" course[37], for a small annual class of cadets[38]. This course provides dual CAA and EASA licensing and a BSc Degree, with a minimum 2-year bonding contract to Leading Edge Aviation as a flight instructor.

4.3.9   In relation to monetary incentives, these are common within US airlines. However, research suggests that they have done little to sustainably improve engagement with potential pilots. Specifically, while 20% of survey respondents report that their airline has offered monetary incentives, only 6% consider those measures to have been effective in improving engagement.

Findings from Stakeholder Engagement

4.3.10   In line with the evidence assessed as part of the literature review, a number of alternative suggestions for funding pilot training were put forward by stakeholders, including:

  ⭕   Government funded loans;
  ⭕   Zero rating Value Added Tax (VAT) on training courses;
  ⭕   Government grants; and
  ⭕   Airline funding or incentives.

4.3.11   These are outlined in detail in the remainder of this section.

Government funded loans

4.3.12   When prompted, the majority of those responding to the survey felt that Government funded loans would be an effective solution to the pilot shortage in the short, medium, and long-term.

4.3.13   Stakeholders taking part in interviews also strongly supported the option for a low or no interest, Government-funded loan to cover pilot training and licensing costs, in full, or just partially.   It was felt that such loans should be offered with the following features:

  ⭕   A low or no interest rate on the borrowed amount;
  ⭕   The option to repay over a long period of time using a PAYE approach – with the suggestion that the Government would recoup their investment at any earlier stage than standard student loans, due to pilots being high income earners;
  ⭕   Unsecured lending, with loan offers not based on existing assets; and
  ⭕   Bonding at the airline who provided the training, encouraging retention of pilots post-training.

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[37] https://leadingedgeaviation.com/combined-pilot-instructor/
[38] Six spaces are available for the 2023 course.

4.3.14   Government funded loans were thought to create opportunities for more and different types of people to become pilots, including strongly benefitting those from low-income backgrounds.

4.3.15   This approach to funding was also thought to mimic the current student loan system for university degrees in the UK.

> *"If training to become a doctor, a lawyer, a teacher or other vocation, student loans can be obtained in relation to the cost of the university degree or course but are not available to pilots. There is no logical or rational reason to preclude pilots from accessing student loans." (Airline)*
>
> *"In other industries, the companies don't pay for the training. They take out a student loan and there are fees to be paid, but the pilot training should be the same. For example, getting the frozen ATPL would be the equivalent of the degree course and then the type rating and line training would be the on-the-job training." (Airline)*
>
> *"We think the Government could bring some parts of the scheme into student loan territory and then maybe a secured or unsecured partial loan by the individual, which means they're more invested in the scheme." (Airline)*
>
> *"Access to student loans for pilot vocational training would reduce the cost and therefore improve accessibility for all prospective candidates, not simply those able to access the "Bank of Mum and Dad" to fund a career path." (Airline)*

4.3.16   Stakeholders noted multiple other countries that offer low interest, Government-funded loans to cover pilot training and licensing costs, some of which were assessed in the literature review and including:

- **Australia**, where the Government offers a vocational education and training (VET) student loan which can be put towards the costs of pilot training and licensing from an approved training provider. The loan includes a fixed and variable interest rate and has a 20% loading on the loan;
- **Norway** and other Scandinavian countries, where the Government provides a c.£100,000 interest-free loan toward training of your choice, with an extended repayment period;
- **Canada**, where the Government provides student loan financing to students undertaking commercial pilot training at flight schools that have been assessed as approved training institutes; and
- **Ethiopia and Kuwait** which give Government funding to Ethiopian Airlines and Kuwait Airways, respectively, for pilot training that is paid back by the pilot over time through a reduced salary.

> *"Other countries provide Government backed loans to become airline pilots. It's embarrassing seeing how well other countries do it compared to us." (Airline)*

Zero Rating VAT on Training

4.3.17   When asked what activities would be important for addressing the UK's need for pilots in the next 5-10 years, those responding to the survey rated the 0% VAT on pilot training as most important, with the majority noting that it would be an effective solution to the pilot shortage in the short, medium and long-term.

4.3.18   Stakeholders taking part in interviews noted that 0% VAT on pilot training courses would help to bring down the costs of pilot training, which would be beneficial to those self-funding their learning.

4.3.19   Stakeholders had an awareness of training courses in countries with fewer VAT regulations, such as Poland and Spain, noting that such training courses are often very popular. These courses were also seen to attract large numbers of UK learners, due to the cost savings on offer, and this caused concern due to changes in licensing post-EU Exit (as described in Section 3.3).

> *"[Zero-rating VAT] is one of the things that the Government could do most easily most quickly and would have the most immediate impact on the overall cost of students."* *(Training provider)*
>
> *"We believe that the removal of VAT from pilot training is essential, and made even more so by the post-Brexit limitations on pilot licensing.   UK pilots often undertook training overseas (e.g. Spain) but as the European Union Aviation Safety Agency (EASA) licence now obtained in doing so cannot be used in the UK, even this route is now closed. It will further exacerbate pilot shortages."* *(Airline)*

4.3.20   Despite support from many stakeholders, a few concerns were raised regarding the removal of VAT, which might mean such an approach does not meet its policy aims, including:

- Training providers not being able to remove VAT under current Treasury regulations, due to being private businesses; and
- A concern that training providers may inflate training fees to cover previous VAT charges.

Government Grants

4.3.21   The majority of those responding to the survey felt that Government funded grants would be an effective solution to the pilot shortage in the short, medium and long-term.

4.3.22   Government grant funding was also strongly supported by stakeholders taking part in interviews and was thought to mimic the approach undertaken in other sectors and countries, for example:

- The Ministry of Defence pays for Royal Air Force Training;
- In China, the Government pays for pilot training, in full; and
- In Poland and Canada, the Government provides grant funding to cover 50% of pilot training fees.

Full airline funding or incentives

4.3.23   There was a suggestion from some airlines that they would be happy to fully sponsor all pilot training, including full ATPL training, additional cadet schemes and type rating, but that they required guidance on how this could be achieved in a way that minimises risk to all invested parties.

> *"We are quite happy to expand our funding and our pipeline for training, but it's got to be done in a way that is a balance of risk for the airline, the individual and the Government." (Airline)*
>
> *"I think airlines are open to the idea that a lot of the money will need to come from themselves, it's just the mechanism for which that happens… We don't expect the Government to pay to provide fully qualified employees, but we don't want obstacles from the Government – like the rules around the apprentice not paying any of their own training." (Airline)*

4.3.24   Alternatively, there was an awareness from stakeholders that airlines in the US are offering very high sign-on bonuses and salaries, to alleviate the financial pressures of self-funding training and to encourage retention.

4.4   Alternative approaches to addressing shortages

Non-financial measures to address the pilot shortage

4.4.1   As well as the current and alternative financial approaches to addressing shortages in pilots, outlined above, those responding to the survey were prompted on the effectiveness of a number of other, non-financial measures.

4.4.2   When asked which of these activities would be important for addressing the UK's need for pilots in the next 5-10 years, the measures below received the highest levels of support:

- Enabling UK licence holders to also fly for EU airlines (European Union Aviation Safety Agency (EASA) Certificated); and
- Enabling overseas pilots easier access to UK employment.

4.4.3   The majority of those responding to the survey also noted that these measures would be effective solutions to the pilot shortage in the short, medium and long-term.

4.4.4   The following activities were also perceived to be effective solutions in the short, medium and long-term, however, each was rated as less important than the two measures outlined above:

- Salary-sacrifice scheme;
- More flight schools or places at flight schools;
- Better pay for flight instructors;
- Extending the age existing pilots can fly until (e.g. from 65 to 67 years), which was thought to be the most effective measure in the short-term;

- More recruitment of other nationalities sponsored by their Governments or other national sources, which was also thought to be the most effective measure in the short-term;
- Novel training course structures;
- Reduction in flying hours to become fully qualified to fly commercial airlines;
- Introduction of automation or aircraft flow autonomously; and
- New recruitment methods, which was thought to be required more over time.

4.4.5   Stakeholders taking part in interviews also suggested a number of non-financial measures which could be effective in mitigating any pilot shortage. These suggestions included some of the measures that were prompted during the survey and can be summarised as:

- Extending the mandatory **retirement** age to retain pilots in the short-term;
- Changing **'right to work' requirements** following EU Exit, with stakeholders noting that Australia and the US are currently offering visas for pilots; and
- Changing restrictions on **student visa** providers so smaller aviation training providers can recruit overseas students.

4.4.6   Looking to Oliver Wyman's "Pilot Dilemma" report, reviewed as part of the literature review[39], pay, working standard and quality of life factors were also thought to be important for addressing pilot shortages, especially in light of COVID-19.

Addressing the demographic of the pilot profession

4.4.7   A review of the available evidence also points to a number of other activities that could be important to address the demographic make-up of the pilot profession and, in parallel, address pilot shortages.

4.4.8   From their survey and one-to-one interviews with female Flight Operations leaders, Oliver Wyman note that airlines could be doing more to address the current lack of women in the pilot pipeline by engaging women much earlier and increasing mentorship.

4.4.9   Similar to other male-dominated industries, such as technology, this engagement must begin early, before stereotypes are fully formed. Evidence shows:

- JetBlue and United Airlines conduct school visits and events aimed at getting girls interested in aviation;
- In 2015, EasyJet launched its Amy Johnson Flying Initiative to increase the proportion of women entering easyJet's training scheme to 12% over two years (Careers.easyjet, 2018). This initiative included raising awareness in schools through visits and presentations by pilots and airline managers, working with training providers to attract more female entrants to their cadet program, and enhancing mentoring for female pilots (Paddock, 2018). In addition, EasyJet underwrote the training costs of approximately £100,000 for six female entrants (Paddock, 2018); and
- The Philippines' largest flight school, Alpha Aviation Group, uses on-campus university recruiting programs and talks by female aviators to encourage more women to apply.

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[39] Wyman - The Pilot Dilemma 2020

4.4.10   A review of airline policies also shows that they have set clear goals. For instance, this year, easyJet expects 20% of new entrant pilots to be women, while Qantas wants women to make up 40% of pilots by 2028. What will be important in meeting such goals and growing the supply of female aviators is that airlines commit to ongoing, targeted support and a multifaceted approach along the entire pilot career path. Commitment to addressing the gender-gap can be seen to bring results. For example, evidence shows that 10 of India's 12 airlines, as well as selected airlines in Canada, Australia, Iceland, and South Africa, now have double-digit shares of female pilots[40].

4.4.11   The British Women Pilots Association (BWPA) and Women in Aviation International (WAI) initiatives are other examples of inspiring and attracting women in all areas of aviation (BWPA, 2020; WAI, 2020). The BWPA aims to promote the training and employment of women in aviation and assist women in gaining air licences, through attending events for young people to raise awareness of careers in aviation, awarding scholarships to support flight training, and presenting awards to recognise the achievements of women in aviation (BWPA 2020).

4.4.12   As well as delivering and supporting outreach activities to encourage greater gender diversity in the pilot profession, DfT also support and deliver outreach with a wider demographic of underrepresented groups, in order to understand the root causes that prevent inclusivity in the profession, challenge misconceptions, and create opportunities which are inclusive and engaging for all. DfT's work includes:

- The Generation Aviation Campaign, which seeks to raise awareness of aviation careers and provide opportunities for potential employees;
- The Reach for the Sky programme, which encourages under-represented groups and young people to consider an aviation career through dedicated funding, including through:

  - The Air League – a charity providing scholarships and work opportunities in the aviation sector, with a focus on supporting those from disadvantaged backgrounds;
  - STEMettes – a social enterprise providing educational, Science, Technology, Engineering and Maths (STEM) workshops, events and learning experiences for young women and young non-binary people;
  - Aerobility – a charity providing access to flying and aviation careers for people with disabilities; and
  - The Civil Aviation Authority – providing STEM outreach and resources, including UK-wide competitions, provision of technological equipment to schools, virtual work experience, and funding for scholarships and training spaces, with a focus on underrepresented groups to target demographic diversity.

- Aviation Ambassador appointments, with Ambassadors aiming to promote the aviation sector by raising young people's awareness of aviation careers and supporting career transitions from established professionals; and
- Research into perceptions of aviation careers by young people.

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[40] ISWAP

4.4.13   Stakeholders taking part in interviews also noted the importance of working in partnership with education providers and other programmes, such as Fantasy Wings and Bee Future Aviators, to encourage young people from specific demographics to consider an aviation career, especially girls, those from ethnically diverse backgrounds and those from low-income families.

4.4.14   DfT's research on young people's perceptions of aviation and maritime careers[41], shows that awareness raising will be a vital step to improving engagement with aviation careers. Specifically, only one in ten respondents to a representative survey of young people stated that they know quite a lot about what people in the aviation sector do, and those who felt they knew more about the sector were more likely to consider an aviation career than those who felt they knew less.

4.4.15   Targeted outreach to under-represented groups is also likely to be important in encouraging the future pipeline of pilots, with two fifths of young people responding to the same survey stating that lack of diversity in the aviation sector negatively influences their choice on whether or not to pursue an aviation career.

4.4.16   The following types of young people were also less likely to consider an aviation career:

- Young people from an Asian or Asian British background;
- Young people with a disability or long-term health condition; and
- Young women.

Addressing the pilot shortage with innovation in training and flight operation

4.4.17   Traditional training curriculums are likely to be adapted to the modern learner in the near future, which could create efficiencies in training provided, both in relation to the structure of training (e.g. more flexible training programmes) and the format in which training is delivered (e.g. simulators, artificial intelligence).

4.4.18   CAE note[42] that data collected during training sessions will provide instructors with a wealth of information that helps them identify how training can be modernised and innovated.

4.4.19   By way of contrast, stakeholders taking part in interviews felt that automation of aircraft would not be an effective approach to mitigating a pilot shortage in the short-term, with the suggestion that automation was only likely to change the *type* of training required for pilots, rather than the *amount* of people required to undertake pilot training.

4.4.20   Additionally, research by DfT suggests that some young people feel increased automation or offshoring of roles would be a factor that would prevent them considering an aviation career[43].

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[41] https://www.gov.uk/government/publications/aviation-and-maritime-careers-young-peoples-perceptions
[42] CAE: Ibid (2020)

[43] https://www.gov.uk/government/publications/aviation-and-maritime-careers-young-peoples-perceptions

5. ASSESSMENT OF ALTERNATIVE FUNDING METHODS

5.1 Introduction

5.1.1 Chapter 4 describes the range of funding methods used in the UK and worldwide and is based on information derived from the literature review and stakeholder engagement.

5.1.2 In this chapter:

- Section 5.2 provides a range of funding methods that could be used in the UK, developed from the findings of the literature review and stakeholder engagement;
- Section 5.3 describes the evaluation framework against which these potential funding methods have been assessed, alongside consideration of information obtained through the literature review and stakeholder engagement; and
- Section 5.4 provides an overview of the outcomes of the assessment of each of the funding methods.

5.1.3 The conclusions outlined in Chapter 6 provide policy implications and recommendations, based primarily on the outcomes of this evaluation, but also taking into consideration the findings from the literature review and stakeholder engagement.

5.2 Funding methods to be evaluated

5.2.1 Following completion of the stakeholder engagement and the literature review, nine different potential methods for addressing the cost of pilot training were identified as potentially applicable to the UK, each falling within one of three broad approaches:

- Re-training existing resource;
- Providing financial support for pilot training; and
- Reducing the cost of pilot training overall.

5.2.2 The funding methods are outlined in Table 6.

Table 6. Funding Methods Assessed in the Evaluation

Re-training existing resource	Providing financial support for pilot training	Reducing the cost of pilot training overall
Military **transfer into the industry**	**Government funding** through scholarships or grants **Government funding** through loans, whether full or partial **Airline sponsorship** of trainees through **bonding** and/or a salary sacrifice scheme **Airline sponsorship** of trainees without bonding or salary sacrifice **Sign-on bonuses** from the airline as a financial incentive to contribute towards training costs Scholarships (full or partial) from **third parties such as charities or guilds** **First Officer Apprenticeship**	**Zero Rating** VAT on pilot training

5.2.3   In addition to these nine alternative approaches to addressing the cost of pilot training, a self-funding approach, either through family savings/loans, personal savings or private bank loans, has been assessed. This allows comparison of alternative methods against the current norm.

5.2.4   The remainder of this chapter outlines how the ten funding methods have been assessed against an evaluation framework, and the outcomes of the evaluation.

5.3   Evaluation Framework

5.3.1   An evaluation framework was developed to assess the impact of each of the nine potential funding methods to address the cost of pilot training, in addition to a self-funding approach.

5.3.2   The evaluation framework comprises twelve criteria, which were used to assess the impacts of each funding method on Government, industry and cadets in the UK, relative to the current approach. Criteria were developed through engagement with Government, industry and recent graduates of flight training schools, to best understand their priorities.

5.3.3   The criteria relating to the impact on **Government and Government objectives** are:

- Costs to Government;
- Encourages more participation overall, through more potential pilots entering the profession;
- Facilitates participation in commercial aviation from under-represented groups, specifically women, ethnic minorities and those from low socio-economic backgrounds which could facilitate the Government's Levelling Up Programme[44];
- Addresses the consequences of EU Exit policy on two licence system (CAA/EASA), making participation in either market easier; and
- Makes the UK a recognised centre of excellence for commercial pilot training by increasing UK participation and investment, and therefore global reputation and international reputation.

5.3.4   The criteria relating to the impact on **the UK airline industry** are:

- Stimulates industry investment in UK training;
- Impact on cost and risk to airlines; and
- Stimulates supply of pilots for both commercial and non-commercial airlines.

5.3.5   The criteria relating to the impact on **cadets in the UK** are:

- Reduces the financial cost of training for cadets;
- Facilitates part-time training programmes that allow working whilst training and increased flexibility (with full sponsorship likely to reduce flexibility);
- Increases available training opportunity, to allow for enough supply of training schools; and
- Ensures cadets have other qualifications to fall back on.

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[44] https://www.gov.uk/government/publications/levelling-up-the-united-kingdom

5.3.6   For each impact criteria, each potential method to address the cost of pilot training was assigned a score between 1 and 7:

○   1 indicates a very negative impact;
○   2 indicates a negative impact;
○   3 indicates some negative impact;
○   4 indicates no/very little impact;
○   5 indicates some positive impact;
○   6 indicates a positive impact; and
○   7 indicates a very positive impact.

5.3.7   Additionally, the framework identifies potential risks, and scores each potential funding method on a scale between 1 and 7:

○   1 indicates very low risk;
○   2 indicates low risk;
○   3 indicates quite low risk;
○   4 indicates neutral risk;
○   5 indicates some risk;
○   6 indicates high risk; and
○   7 indicates very high risk.

5.3.8   The potential risks identified are:

○   Lack of industry buy-in to the funding model concerned[45];
○   Lack of cadet buy-in to the proposed model[46];
○   Risk to cadet supply due to industry downturn (e.g. a global financial crisis or pandemic; a major war or upsurge in terrorism; a sharp up-lift in fuel prices or a societal shift in attitudes to flying – perhaps for environmental reasons);
○   Risk to cadet supply due to compatibility with long-term industry technological advances; and
○   Negatively impact the calibre of trainees by lowering selection criteria or reducing the pool of candidates.

5.4   Outcomes of the assessment of different funding methods

5.4.1   This section provides the outcomes of the assessment of self-funding for addressing the cost of pilot training, followed by the outcomes of the assessment of each of the funding approaches described in section 5.2.

5.4.2   This includes providing the overall impact score and risk score for each method (using the scales provided in the previous section. The full evaluation matrix, with scores each criteria against each potential funding method, is provided in **Appendix D**.

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[45] Without airline/training provider support/participation it will be difficult to materially change industry fundamentals

[46] If the funding approach does not address the core issue of affordability, access to resources and perceived risk, it will be unlikely to add to the scale of the pipeline of trainees seeking careers as commercial pilots

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Self-funding, either through family savings/loans, personal savings or private bank loans

IMPACT SCORE	2.2 (Negative impact)	RISK SCORE	5.6 (Some risk)

5.4.3   At present, the most common funding method for pilot training leaves the burden for funding and all risk on the individual trainee and/or their families.

5.4.4   With this funding method, prospective pilots must be able to either pay for their training out of their own pocket or be willing to take on upwards of £100,000 of debt, usually mortgaged against family assets or savings, to cover the cost of training.

5.4.5   Although, in principle, self-funding alleviates financial risk from airlines and from Government, over the course of the last 20-25 years in which this has been the most common method of funding, it has been a barrier to some of the most capable and passionate people pursuing a pilot career, and therefore reduces the number and variety of candidates wishing to enter the profession, with the pool of candidates able to pay for their own training diminishing. The financial barrier is also exacerbated for people from low socio-economic backgrounds, minority ethnic individuals, and women.

5.4.6   Therefore, whilst self-funding alleviates financial risk from airlines and from Government, in principle, both Government and the airline industry experience a greater risk from this approach, namely low participation from cadets. This poses risks to the operation of the industry and requires their financial investment to improve cadet supply.

5.4.7   In addition, there is minimal criteria for self-funding pilot training, and therefore there is no guarantee on the calibre of cadets obtaining a pilot's licence. Moreover, the financial outlay from self-funding pilot training, prevents cadets financing other qualifications to fall back on, opening the industry to the risk of consistently lower quality pilots in the future.

5.4.8   Furthermore, the reliance on self-funding pilot training means there are currently consequences on pilot supply in light of the EU Exit policy that requires a two-licence system. This is because cadets can now choose which licence they spend their savings and/or loans on, and there is perception by some that cadets will opt for the EASA licence due to the access it offers to the much larger pan-European market, or due to the cost of obtaining a dual licence from both the EASA and the CAA. However, it should be noted that the UK has autonomy to address this concern, developing guidance that works best for the UK industry, learning from best practise.

5.4.9   Overall, although this method has worked over the past 20-25 years since it became the industry standard, the method of pilot trainees self-funding their training presents a large risk to the industry and the economy by limiting the pool of potential pilots and creating barriers for low income, minority ethnic and women who want to enter the industry. This method will also continue to produce fewer UK pilots as the number of people who can self-fund diminishes.

Re-training existing resource

Military transfer into the industry

IMPACT SCORE	4.1 (No/negligible impact)	RISK SCORE	3.0 (Quite low risk)

5.4.10   The overall number of military pilots in the UK has reduced overtime, therefore reducing the pipeline of military to commercial pilots. Former military pilots who do want to train to be a commercial pilot are able to receive a small stipend, but it does not cover the full cost of training[47].

5.4.11   There is potential for airlines to solidify this pipeline by covering the full cost of additional training courses former military pilots require to fly commercial. The cost to Government is therefore negligible.

5.4.12   It should be noted that whilst this approach could go some way to address a pilot shortage, the military profession also lacks diversity in its workforce, especially in relation to ethnicity, and therefore this method should not be seen to address aims around improving diversity in the pilot profession, unless targeted efforts were made to encourage military transfer from under-represented groups[48].

Providing financial support for pilot training

Government funding through scholarships or grants

IMPACT SCORE	5.4 (Somewhat positive impact)	RISK SCORE	2.2 (Low risk)

5.4.13   Government-funded scholarships or grants will insulate the industry from potential shortages by providing some UK cadets with financial support for achieving pilot licences. Not only will this method attract more UK candidates, it will also help to make the UK a recognised centre of excellence for pilot training by encouraging further investment in training by industry, and thus have a knock on effect of attracting further international talent.

5.4.14   The primary disadvantage with this method is the cost to Government. However, with Government funding for grants/scholarships, the Government could exert some power in deciding which candidates will be selected, or make applications means-tested, thus reducing the barrier for under-represented groups by not perpetuating the financial privilege gap that currently exists, and therefore increasing diversity in the profession.

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[47]   https://www.forcesemployment.org.uk/news/everything-you-need-to-know-about-employment-support-grants/; https://www.ctp.org.uk/allowances-grants; and https://www.britishlegion.org.uk/get-support/financial-and-employment-support/employment/employment-grants
[48]   https://www.gov.uk/government/statistics/mod-diversity-dashboard-april-2022/civilian-personnel-biannual-diversity-dashboard-report-april-2022

5.4.15   As well as Government decisions on the type of successful candidates, Government could also include a directive on the type of pilots licence the scholarship or grant applies to, potentially addressing some of the consequences of the EU Exit policy on a two-licence system. It is likely that this will face political challenges.

Government funding through loans, whether full or partial

IMPACT SCORE	5.2 (Somewhat positive impact)	RISK SCORE	2.6 (Low risk)

5.4.16   Similar to Government scholarships or grants, full funding of pilot training via Government-backed loans may also help increase participation overall, as well as improve the diversity of the pilot profession. Low-interest, or no-interest loans would further help to achieve this objective. However, evidence does suggest that those from low-income or disadvantaged backgrounds have high levels of concern about debt in the context of higher education and this will need to be considered in relation to cadet buy-in[49].

5.4.17   Government could also include some selection criteria incorporated into the offer of the loans, either targeting the loan to a specific type of cadet, or to all, whilst ensuring a high calibre of trainees.

5.4.18   As well as Government decisions on the type of successful loan candidates, Government could also include a directive on the type of pilots licence the loan applies to, potentially addressing some of the consequences of the EU Exit policy on a two-licence system. It is likely that this will face political challenges.

5.4.19   Like Government-funded scholarships or grants, a Government-funded loan would reduce the risk and cost for airlines, but pose a greater financial risk for Government. However, a Government loan would also determine a partnership agreement between the cadet and the Government, as is currently the case for higher education, with loan repayments, plus interest, recouping the initial outlay of cost by Government.

5.4.20   To enable cadets to access loans for pilot training, Government will need to consider broadening the criteria on which courses student loans can be used, or reclassifying flight schools as education providers.

5.4.21   According to one UK-based education lending institution, partial Government loans will also provide for more safety for lending institutions to offer unsecured loans, thus allowing prospective pilots without money to self-fund to acquire the remainder of the cost of their training.

Airline sponsorship of trainees through bonding and/or a salary sacrifice scheme

IMPACT SCORE	5.2 (Somewhat positive impact)	RISK SCORE	3.6 (Quite low risk)

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https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/909623/Impact_of_the_student_finance_system_on_disadvantaged_young_people.pdf

5.4.22   This method, in which airlines pay for the cost of training and recoup their investment over time through salary sacrifice, was very common between the 1970s and 1990s.

5.4.23   This method encourages more participation overall and gives airlines more input into selection criteria from the onset, as opposed to hiring from a limited pool of cadets who have already self-funded their flight training.

5.4.24   This method therefore has positive impacts on participation from under-represented groups and on industry investment in UK training capacity. For scholarships provided by UK airlines in particular, this method could also go some way to address some of the consequences of the EU Exit policy on a two-licence system, with UK airlines likely to mandate a UK licence rather than an EASA licence, or even support dual-licencing. It is likely that this will face political challenges.

5.4.25   Furthermore, this method could go some way to addressing regional airline's concerns that any pilots trained will move to larger airlines, by forming partnership agreements between regional and larger airlines, to work together to train pilots and share the related expenditure.

5.4.26   Whilst this method puts the financial risk on airlines to deliver successful cadet training, the inclusion of bonding or salary sacrifice mitigates this to a large extent. It would be important for there to be alternative employment options within the bonded airline for cadets who do not pass final exams or who decide they do not want to be pilots following sponsorship.

Airline sponsorship of trainees to cover the cost without bonding or salary sacrifice

IMPACT SCORE	5.6 (Somewhat positive impact)	RISK SCORE	3.4 (Quite low risk)

5.4.27   As with the method above, this method would be likely to create a large pool of candidates, from national and international locations, and will allow airlines to employ the best qualified pilots, increase diversity in the profession and go some way to address the consequences of the EU Exit policy on a two-licence system.

5.4.28   However, given conversations with stakeholders in the aviation industry, without Government incentive, this method is very unlikely to be utilised in the UK, due to the financial risk it poses for airlines.

Sign-on bonuses from the airline as a financial incentive to contribute towards training costs

IMPACT SCORE	4.3 (No/negligible impact)	RISK SCORE	3.8 (Quite low risk)

5.4.29   According to some stakeholders, because the shortage of pilots in the United States is more prominent than in the UK, airlines have started offering large bonuses for pilots as an incentive.

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5.4.30 There is no cost to the Government for this method, with airlines taking the financial risk which is likely to have low levels of industry buy-in, especially in light of the industry downturn resulting from the COVID-19 pandemic. However, financial risk to airlines is likely to be lower than in an airline sponsorship approach and could be mitigated by bonding pilots who accept sign-on bonuses.

5.4.31 This method is not a solution to the cost of training, as prospective pilots would have to take a risk that the bonuses will still be available after their training concludes. This method therefore does not address participation from under-represented groups and is likely to only have low levels of incentives to cadets to train prior to starting their training.

5.4.32 Airlines in other countries offering large sign-on bonuses could cause the potential pilot shortage in the UK to worsen, as UK pilots and cadets leave for better pay abroad. This may create pressure for UK airlines to offer bonuses or increase pilot pay.

Scholarships (full or partial) from third parties such as charities or guilds

IMPACT SCORE	4.5 (No/negligible impact)	RISK SCORE	3.4 (Quite low risk)

5.4.33 Third party-funded scholarships directly benefit trainees with reduced financial risk to the airlines and to Government.

5.4.34 Currently, third party scholarships are limited and therefore cannot be relied upon to stimulate pilot supply and encourage participation in pilot training overall. However, if more are available, third party scholarships or grants could be a successful method for stimulating supply and diversifying the industry.

5.4.35 Third parties could exert some power in deciding which candidates will be selected, thus reducing the barrier for under-represented groups by not perpetuating the financial privilege gap that currently exists.

5.4.36 Charities will need to work closely with Government and industry to ensure scholarships and grants can be offered for training that matches airline and cadet expectations and requirements.

Current design of First Officer Apprenticeship

IMPACT SCORE	3.8 (Somewhat negative impact)	RISK SCORE	5.0 (Some risk)

5.4.37 Evidence suggests that the existing First Officer Apprenticeship (FOA), developed in coordination with the Government and industry, is not currently utilised by airlines because of the limitations on funding through the apprenticeship levy, the inability of airlines to bond apprentices after the training, and a lack of training providers being enrolled to deliver the FOA.

5.4.38 The FOA therefore has no impact on cadet participation in its current form.

IMPACT SCORE	4.9 (No/negligible impact)	RISK SCORE	2.6 (Low risk)

5.4.39   If the improvements to FOA outlined in Section 4.2 are delivered, FOA has potential to have a positive impact on cadet participation, including from under-represented groups.

5.4.40   In the re-design of the FOA, Government could ensure specific selection criteria to encourage high calibre candidates from under-represented backgrounds, as well as criteria for training to ensure:

- Flexibility in training format for cadets, including the option for part-time training alongside part-time work;
- Cadets gain other qualifications to fall back on; and
- Consideration of the consequences of the EU Exit policy on a two-licence system.

5.4.41   Whilst revisions to the FOA are likely to have cost implications for Government, as well as increases to the levy for airlines, consideration should also be given to the option of pairing FOA with airline funded scholarships or grants. This would not only provide the opportunity for cadets to train without self-funding, but it also reduces the requirement for Government to provide a larger pot of funding for FOA.

5.4.42   Whilst this combined approach of FOA and airline funded scholarships or grants would be likely to have lower-levels of industry buy-in, in theory, industry concerns are likely to be outweighed by the benefits that the FOA will bring to pilot supply for the industry. Furthermore, some of the following approaches could be considered to reduce industry risk:

- Bonding following completion of the FOA;
- Lengthening the duration of the FOA, encouraging cadet buy-in within the airline providing the training and improving their wider business knowledge; and
- Offering the FOA after some training has already taken place, ensuring cadet buy-in within the profession.

5.4.43   Difficulties for ATOs in gaining a place on the register of apprenticeship training providers (RoTap), due to the impacts of COVID-19 on financial standing and the requirement to show a gap in current training provision, will likely solve themselves once training providers have had more time to recover from the pandemic, and they can produce the financial records needed to become an approved apprenticeship provider.

5.4.44   There is also potential for airlines to become the apprenticeship provider because most airlines offer apprenticeships in other areas of the business and are already on the RoTap.

Reducing the cost of pilot training overall

Zero Rating VAT on pilot training

IMPACT SCORE	4.7 (No/negligible impact)	RISK SCORE	3.4 (Quite low risk)

5.4.45   Zero rating VAT on pilot training in the UK will help make domestic prices more competitive with the largest competitors in mainland Europe such as Spain and Poland, and would therefore encourage more UK and overseas cadets to attend flight schools in the UK, potentially stimulating the supply of pilots available to UK airlines and investment in UK-based training, whilst also potentially addressing some of the consequences of the EU Exit policy on a two-licence system.

5.4.46   However, zero rating VAT from pilot training courses means that the Government would lose between £15-30m in VAT given the estimated number of cadets attending flight training school per year. In addition, current legislation does not allow for VAT to be zero rated on pilot training, causing a barrier in the delivery of this measure.

5.4.47   Zero rating VAT also poses a risk that trainees would never see a price reduction/the full price reduction if training providers continue to charge the same amount. Additionally, whilst a 20% reduction in training fees would not be insubstantial, the value of pilot training will still remain high, meaning the financial barrier to completing training still exists. This means that a zero rate VAT on pilot training could not target Government objectives around improving participation from under-represented groups.

5.4.48   If legislative barriers can be addressed, VAT could be zero rated alongside an ease of student visa requirements that would allow more international students to train and/or work in the UK.

5.4.49   Some stakeholders noted that removing VAT and fuel duty from fuel used to train pilots would also be a useful way to lower the cost for flight training providers in the UK, therefore potentially reducing the overall cost for trainees. Training providers and airlines that fund training in the UK are already able to claim back VAT on fuel costs, in addition to other costs related to the delivery of training, and so this measure is already partly in place at present.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 This study

6.1.1 The total cost for attainment of an Air Transport Pilot Licence (ATPL) or a Multi-pilot licence (MPL) in the United Kingdom (UK) ranges between £60,000 and £150,000.

6.1.2 The Department for Transport (DfT) sought to understand the extent of the problems associated, currently or prospectively, with the high cost of pilot training in order to address finance as a barrier to entering the pilot profession, and in so doing:

- Increase the pool of talent entering the pilot profession;
- Increase accessibility and diversity within the pilot profession, by enabling those from less affluent backgrounds to access training; and
- Enable the UK pilot profession and UK flight schools to compete on the global stage.

6.1.3 With these goals in mind, the DfT commissioned specialist researchers from transport consultancy SYSTRA Ltd, and aviation expertise from Northpoint Aviation, to undertake a study to help industry and Government understand what options there might be for addressing the high cost of pilot training in the UK. The specific objectives of this study were to:

- Assess the level of demand for commercial airline pilots that is likely to exist over the coming several years in the UK, and the level of risk of a shortage of qualified pilots relative to this demand;
- Identify a range of potential alternative methods for funding cadets' pilot training, including the First Officer Apprenticeship (FOA); and
- Evaluate these methods for addressing the high cost of pilot training to determine their viability for use in the UK.

6.1.4 The study comprised four different approaches, specifically:

- A thorough **literature review of existing data and reports** to understand whether there is any existing information providing evidence on pilot demand and supply, barriers to entering the pilot profession and examples of pilot training funding models used in the UK and overseas;
- A **stakeholder engagement exercise** to capture industry perspective, comprising an online survey and in-depth interviews;
- Quantitative analysis of secondary data in order to develop a **quantified estimate of the potential scale of pilot shortages** in the UK; and
- An evaluation of a range of potential **funding methods**.

6.2 Main findings

Demand and supply of UK Pilots

6.2.1 This study demonstrates that stakeholders, as well as the available literature and data, all point to the likelihood of pilot shortages emerging over the next 20 years. A number of factors capable of materially influencing pilot supply and demand are identified that elucidate this conclusion, including:

- The cost of pilot training;
- The growing age of the pilot profession;
- Industry growth or downturn, including in light of the COVID-19 pandemic;
- Flight school capacity and efficiency in training;
- The UK's EU Exit; and
- Quality of life factors for pilots.

6.2.2 An estimated quantification of the pilot shortage was provided in using established industry reports, for both fixed-wing and rotary pilots. Specifically, for fixed-wing pilots it is possible that by 2026, up to ~7,500 unfilled pilot positions may emerge, growing to ~20,000 by 2041. For context, 2021's estimated supply of pilots is believed to be between ~13,500 and ~18,500, which means that by 2026, the 2021 supply would need to grow by up to 64% to meet the estimated demand.

6.2.3 The resultant output from modelling based on DfT data generates a more conservative set of pilot forecasts than the modelling based on industry sources. This is primarily a function of the fact that the DfT Jet Zero ATM input data projects a flatter (i.e. lower) rate of traffic growth for 10 years post pandemic than the industry forecasts imply; in addition the assumed fleet mix moving forward between the two sources of input data are somewhat different.

6.2.4 The estimations for rotary pilots are less clear; however, it is unlikely that a shortage will be experienced, unless supply levels fall to 1,000 or fewer pilots.

6.2.5 Stakeholders felt that addressing the cost of pilot training and licensing was a key solution to addressing any commercial pilot shortage.

Approaches to addressing pilot shortages

6.2.6 The predominant method for funding the costs of pilot training currently is self-funding, either by new cadets using personal savings or loans, or by re-mortgaging family assets. Other current funding methods include:

- Military re-training, with those who are already trained as pilots in the military able to access grant funding to re-train;
- The First Officer Apprenticeship (FOA), although evidence suggest that the FOA is not currently utilised by airlines or training providers; and
- Training through Universities.

6.2.7 A number of alternative methods or policies for funding the costs of pilot training were identified via the literature review and stakeholder engagement, including:

- Government-funded grants and loans;
- Government zero rating VAT for pilot training fees;
- Airline-funded scholarships and incentives; and
- Third-party-funded scholarships.

6.2.8 It was considered that the following measures could also be important in helping to address any potential UK shortage in pilots, although they would not necessarily support the cost of pilot training:

○ Addressing the consequences of the UK's EU Exit, predominantly the two-licence system, including enabling UK licence holders to also fly for EU airlines and enabling overseas pilots easier access to UK employment;

○ Greater capacity in UK flight schools;

○ Extending the age existing pilots can fly until;

○ New recruitment methods and engagement with cadets, including to address the demographic of the pilot population; and

○ Novel training course structures and content, including adapting courses to the modern learner and to modern automation technology.

Assessment of alternative funding methods

6.2.9 This report assesses the impacts of each alternative method for funding the costs of pilot training, including the impacts on Government, industry and cadets in the UK. It also identifies the risks for delivery of each method, relative to the current funding approach. The impacts were identified following an assessment of each funding method against twelve criteria; this evaluation matrix was designed and agreed with the DfT and can be found in Appendix D.

6.2.10 Table 7 summarises the outcomes of the assessment, using the following key:

IMPACTS		RISKS	
1	Very negative impact	Very high risk	7
2	Negative impact	High risk	6
3	Somewhat negative impact	Some risk	5
4	No/negligible impact	Neutral risk	4
5	Somewhat positive impact	Quite low risk	3
6	Positive impact	Low risk	2
7	Very positive impact	Very low risk	1

6.2.11 Self-funding and the current design of the First Officer Apprenticeship scored least favourably. Government-funded loans, airline sponsorship with bonding, Government-funded scholarships or grants, and airline sponsorship without bonding, scored the most favourably.

Table 7. Summary of impact and risk scores for pilot training funding approaches

METHOD	IMPACT SCORE	RISK SCORE
Self-funding	2.2 (Negative impact)	5.6 (Some risk)
First Officer Apprenticeship (current design)	3.8 (Somewhat negative impact)	5.0 (Some risk)
Military transfer	4.1 (No/negligible impact)	3.0 (Quite low risk)
Airline sign-on bonuses	4.3 (No/negligible impact)	3.8 (Quite low risk)
Third-party scholarships	4.5 (No/negligible impact)	3.4 (Quite low risk)
Government removal of VAT on pilot training	4.7 (No/negligible impact)	3.4 (Quite low risk)
First Officer Apprenticeship (improved design)	4.9 (No/negligible impact)	2.6 (Low risk)
Government-funded loans	5.2 (Somewhat positive impact)	2.6 (Low risk)
Airline sponsorship with bonding or salary sacrifice	5.2 (Somewhat positive impact)	3.6 (Quite low risk)
Government-funded scholarships or grants	5.4 (Somewhat positive impact)	2.2 (Low risk)
Airline sponsorship without bonding or salary sacrifice	5.6 (Somewhat positive impact)	3.4 (Quite low risk)

Consideration of the study context

6.2.12   A number of factors are likely to have influenced demand and supply for commercial airline pilots in the UK, as well as worldwide, at the time this study was undertaken, and the findings should be considered in light of this wider context. These factors include:

- The global COVID-19 pandemic;
- War in Ukraine;
- High energy costs;
- The UK cost of living crisis;
- Post EU Exit issues relating to CAA/EASA certification; and
- The potential implications of climate change policy.

6.2.13   Each of these factors are volatile and change the state of play as they become evident, therefore further data on pilot supply and demand should be considered as it becomes available.

6.3 Recommendations for addressing the costs of pilot training

6.3.1 This report has found that addressing the cost of pilot training, and consideration of dual licensing, will be key to addressing a future commercial pilot shortage. Based on evidence from the literature review and stakeholder engagement, and our evaluation of potential funding methods, we have developed the following set of recommendations to be considered. These recommendations are broadly split into:

- Recommended alternative funding approaches; and
- Recommendations for addressing other costs for new pilots.

Recommended funding approaches

6.3.2 The following are recommended as workable and impactful alternative funding approaches that reduce cadet's financial risk:

- Developing a **Government-funded scholarship or grant** to pay for pilot training in part or full;

- Developing a **Government-funded loan system** to pay for pilot training in full, working in much the same way as higher education loans provided by the Student Loans Company. It should be noted that the criteria regarding which courses student loans can be used for may require broadening for this approach, or flight schools may need to be reclassified as education providers;

- Facilitating **airline full sponsorship**, with or without bonding or salary sacrifice, including enabling the pairing of this with an improved First Officer Apprenticeship;

- Addressing the issues associated with the **First Officer Apprenticeship** (FOA) which are currently restricting its take-up and support within the industry. These issues include:

  - Increasing awareness that the FOA can be delivered after the cadet has undertaken some initial training which may have been self-funded, or funded via new, alternative approaches;
  - Ensuring that apprenticeship rules enable training to be further funded by employers (i.e. the airlines), bridging the current funding gap of around £70,000. This could include combining airline scholarships or grants with the FOA, which could be incentivised through airline bonding and lengthening the duration of the FOA;
  - Changing the content and structure of the FOA, to support flexibility in training and the cadet's achievement of other qualifications whilst learning.

- Considering legislative changes that could enable the **zero rating of VAT on pilot training**, or alternatively removing fuel duty from fuel used to train pilots;

- Facilitating greater availability of **scholarships from Third-Sector sources**; and

- Making the transfer between **military** and commercial flying easier once military obligations have been met, by developing specially designed transition courses.

6.3.3   For the scholarship, grant, loan and apprenticeship funding approaches, specific selection criteria should be in place to encourage high calibre candidates from **under-represented backgrounds**.

Recommendations for addressing other costs for new pilots

6.3.4   Cadets are also subject to other costs when joining the pilot profession and we therefore recommend the following for Type Rating:

⭕ Type Rating Training is specialised training to ensure new First Officers can fly the requisite aircraft in the fleet of their employer, and the typical cost for a newly qualified commercial pilot is £27,000. Since this training is essential for a new pilot to become commercially useful to airlines, in essence it is no different to the training that nearly all businesses have to provide to employees to enable them to fulfil their role. As such, in our view, **Type Rating Training should no longer be borne by newly qualified pilots, but by their employing airline**. This could be done in three principal ways:

- Under a *bond* payable if the pilot leaves within an agreed timeframe;
- Through a *salary sacrifice* scheme in which the airline recoups some or all of the type training costs; and
- As an *investment* in the pilot, which the airline recognises as its obligations to ensure it has a well restored and trained workforce.

Of course, should a pilot wish to undertake Type Rating Training on other aircraft not flown by their employer, for example to improve their chances of securing employment from another airline, then the cost would need to be borne by the pilot themselves on the basis it could then be factored into any remuneration offered by the new employer.

6.4   Other recommendations to attract more pilots to the profession

6.4.1   In addition to the recommendations regarding the cost of pilot training, we have developed the following set of recommendations to be considered to help attract more pilots, particularly those from more diverse or under-represented backgrounds, into the industry, and to maintain the UK's position as a world leader in aviation and flight training:

⭕ In light of the impacts of the UK's **EU Exit** on licencing, it is recommended that any training financed through the above approaches should support cadets to complete dual-licensing, if the need for this cannot be eliminated through negotiation with the EU.

⭕ A **strong programme of awareness raising should be developed for schools,** including through opportunities to visit flying schools, Original Equipment Manufacturer (OEMs) and airlines for taster days. DfT and the industry are making investments of this kind already, and this work could be increased exponentially through a co-ordinated partnership over a 3-5 year period. A core aim of any ongoing investments and support should be to attract more interest in the profession from **women and ethnic minority groups at school**, both of which are under-represented, not only amongst the current cadre of commercial pilots, but also in those applying to become trainee pilots at University or Flying Schools.

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