steer davies gleave

South Western Franchise Ticketless Travel Survey

Final Report
April 2016

Department for Transport

Our ref: 22874302

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Prepared by:

Steer Davies Gleave
28-32 Upper Ground
London SE1 9PD

+44 20 7910 5000
www.steerdaviesgleave.com

Prepared for:

Department for Transport
Great Minster House
33 Horseferry Road
London SW1P 4DR

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Executive Summary

Steer Davies Gleave, as technical advisor to the Department for Transport in the re-letting of the South Western Franchise, carried out a ticketless travel survey on the South West Trains network in October-November 2015, with the aim of estimating the level of travel without valid tickets (the irregularity rate) across the network, and the resulting revenue lost to the franchise (revenue at risk).

Full cooperation was provided by the operator (Stagecoach South West Trains) and a sample of 23,834 observations was collected over fifteen days of surveying. We then cleaned and validated the data, segmented by ten geographic service segments and six time periods, applied weightings so that the overall results reflect actual travel patterns as far as possible, and applied assumptions where necessary, in order to derive estimates of the irregularity rate and annual revenue at risk across the franchise as a whole, in each time period and on each service segment.

The approach taken and assumptions made are documented in this report, along with the results in three cases (Low, Central and High) where alternative assumptions are used for passengers whose ticket validity is unknown.

The key findings of the survey are as follows:

- The overall weighted irregularity rate is estimated at 3.2%.
- Low and High Case estimates of the overall irregularity rate are 2.7% and 5.5% respectively.
- Using a 2014/15 revenue base, an estimated £24.6m of revenue is “at risk” due to ticketless travel, which represents 2.6% of in-scope franchise revenue in that year.
- Ticketless travel is most prevalent in the post-peak evening period (after 7pm) on weekdays, with an irregularity rate of 5.1%. However, revenue at risk in absolute terms is relatively low in that period due to peak periods having higher underlying revenue. The highest revenue at risk is in the evening peak with an estimated £7.7m of revenue lost annually (2014/15 prices) driven by high revenue and a ticketless travel rate of 3.5%. Despite a low irregularity rate (2.6%), morning peak revenue at risk is also relatively high at £5.6m per year.
- Ticketless travel rates by geographic service segment vary significantly, between 1.5% (London Waterloo to Bournemouth/Weymouth) and 4.6% (London Waterloo to Shepperton/Kingston). Revenue at risk is highest on the London Waterloo to Reading and Windsor services (Windsor Outers) at £5.3m per year (2014/15 prices) due to a combination of high underlying revenue and a ticketless travel rate of 4.5%.
- In general, longer-distance and non-London service segments show lower irregularity rates than those dominated by short-distance flows to and from London, with the exception of London Waterloo to Portsmouth, which has the third-highest irregularity rate.

The weighted Central Case irregularity rate and annual revenue at risk by time period and by service segment are illustrated in the Figure 1 and Figure 2 respectively, with the former also showing the network-wide results.

Figure 1: Weighted irregularity rate and revenue at risk by time period and overall

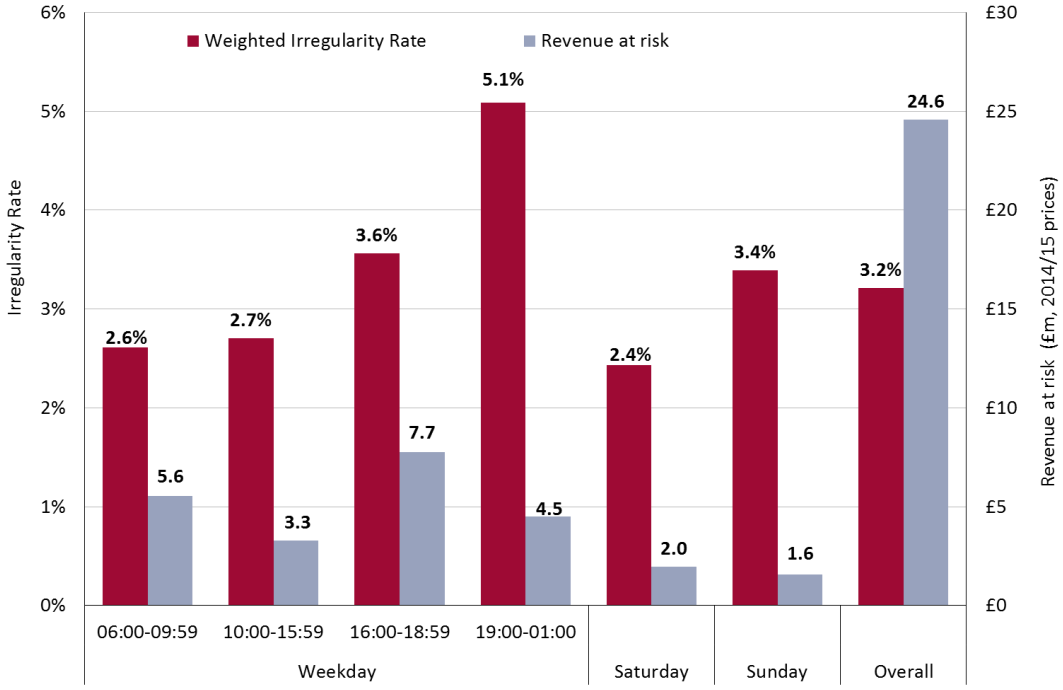
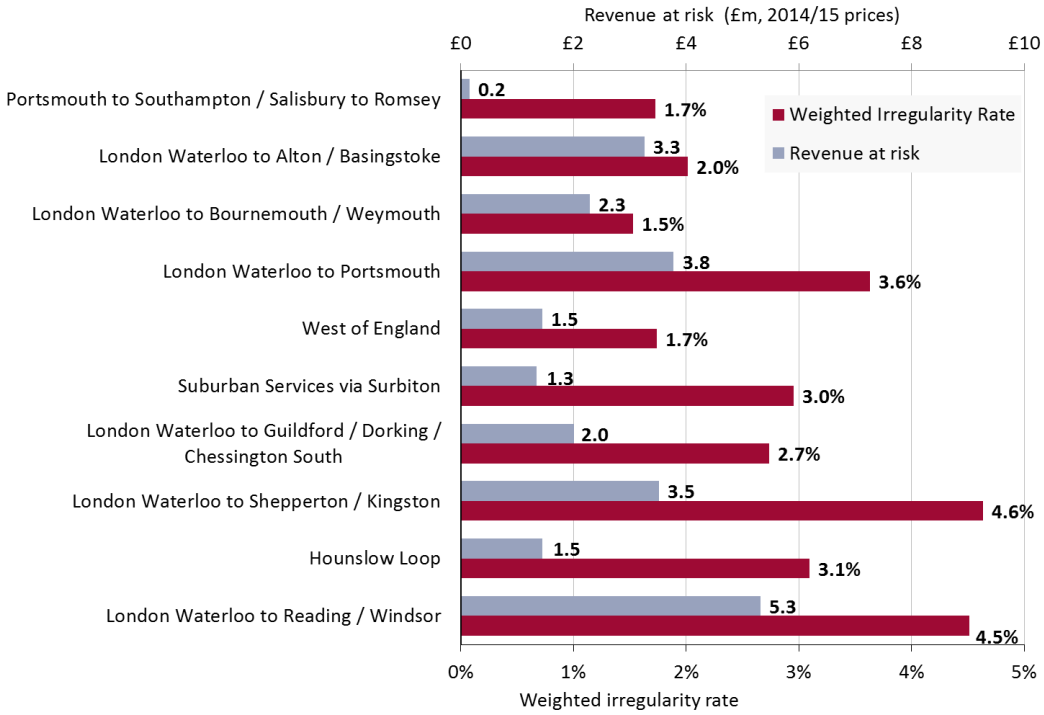


Figure 2: Weighted irregularity rate and revenue at risk by service segment



A sensitivity test was carried out using more recent LENNON data (2014/15 P08 to 2015/16 P07) in the weighting process. This makes only a marginal difference to the irregularity rate results from those presented here. The revenue at risk in this sensitivity scenario rises to £25.9m (nominal), but this is driven almost entirely by an increase in franchise revenue; the proportion of revenue at risk remains at 2.6%.

1 Introduction

Overview

1.1 Steer Davies Gleave is technical advisor to the Department for Transport (DfT) in the re-letting of the South Western Franchise (SWF). As part of this role, we were commissioned to carry out and analyse the results of a ticketless travel survey across the network which is currently operated by Stagecoach South West Trains (SSWT). The survey took place in October and November 2015, with fieldwork carried out by Sky High (a subsidiary of Tracsis), subcontracting to Steer Davies Gleave.

1.2 This report documents the methodology used for the fieldwork and analysis, summarises the sample collected and presents the results.

1.3 The report is written for DfT information, and for provision to bidders for the SWF alongside the Invitation to Tender or in the data site.

Purpose of the Survey

1.4 The ticketless travel survey is intended to provide an estimate of the current level of fraudulent travel across the SSWT network (the irregularity rate) and the resulting revenue loss to the franchise (revenue at risk). This will allow both DfT, in the specification process, and bidders to prioritise potential initiatives to improve revenue protection in the new franchise and to estimate their impact on franchise revenue.

Structure of this Report

1.5 The remainder of this document is structured as follows:

- Chapter 2 details the approach taken and methodology used for the fieldwork.
- Chapter 3 provides a summary of the sample collected and how it was cleaned and validated.
- Chapter 4 sets out our analysis methodology, including the key assumptions made.
- Chapter 5 presents the results, in terms of both irregularity rates and revenue at risk. The results are presented by geographic service segment and time period, and are weighted in order to reflect the estimated breakdown of revenue and journeys across the network.

1.6 We also include four appendices to provide additional detail:

- Appendix A shows a summary of the survey schedule.
- Appendix B illustrates the mappings between our geographic service segments and service codes/groups in LENNON and MOIRA.
- Appendices C and D relate to a sensitivity test carried out using an alternative 13 periods of LENNON ticket sales data in the weighting process and revenue at risk calculation.

2 Fieldwork Methodology

2.1 This chapter sets out the methodology that was undertaken for the survey fieldwork. Specifically, we outline how the network was segmented, the principles behind the scheduling and the on-train questionnaire methodology.

Scope and Segmentation

2.2 The South Western Franchise covers a number of mainline routes from London Waterloo to Portsmouth, Weymouth and the West of England, and suburban routes from Waterloo to stations in South West London, Surrey, Berkshire and Hampshire. For the purposes of the ticketless travel survey, these routes were combined to form a set of ten service segments, based on the level of overlap between services, similarity of services offered and the franchise's service groups. Our service segments were as follows:

- London Waterloo to Reading/Windsor
- Hounslow Loop;
- London Waterloo to Guildford/Dorking via Epsom and Chessington South;
- London Waterloo to Shepperton/Kingston loop;
- Suburban services from London Waterloo via Surbiton (to Hampton Court, Guildford via Cobham and Woking);
- London Waterloo to Portsmouth via Guildford;
- London Waterloo to Bournemouth/Weymouth;
- London Waterloo to Salisbury/Exeter/Bristol (West of England);
- London Waterloo to Basingstoke/Alton; and
- Portsmouth to Southampton and Salisbury to Romsey.

2.3 We did not include the Island Line, in light of it accounting for a very small proportion (c. 0.1%) of total franchise revenue. We also carried out no surveys on the services between Guildford and Woking, but assumed in the analysis these services have the same rate of ticketless travel as the London Waterloo to Portsmouth (via Guildford and Woking) service segment.

Scheduling

2.4 The survey took place over a two week period from Thursday 8 October to Wednesday 21 October. There was an additional day of surveying on Saturday 14 November due to clashes with the Rugby World Cup during the main survey period in October. Each service segment was surveyed a total of six times: on four weekdays, one Saturday and one Sunday. Although revenue and journey numbers differ between the ten service segments, we carried out an even distribution of survey shifts between them in order to ensure a sufficient sample size on each from which robust conclusions could be drawn. We accounted for differential

revenue/journeys in the weighting process used to derive the overall ticketless travel and revenue at risk rates for the franchise (see Chapter 4).

2.5 We prepared a train by train schedule for each survey team to follow. This provided information on the stations at which the surveyors would board and alight each train, as well as an indication of the time they would be on each train and waiting at each station between trains. During every shift a break of at least 30 minutes was scheduled, and we ensured that these breaks were not taken during high peak periods.

2.6 SSWT cooperated fully with the survey, scheduling its revenue protection activity each day away from the routes we were surveying and also informing staff to expect us on the trains. They also provided letters of authority and permits to travel for the fieldwork team.

2.7 One contingency shift was completed on the London Waterloo to Reading/Windsor and London Waterloo to Alton/Basingstoke service segments on a weekday afternoon. This was required due to a lower than expected sample size of the London Waterloo to Reading/Windsor lines and because the evening part of a London Waterloo to Alton/Basingstoke shift had to be cancelled due to delays and cancellations on the network.

2.8 Table 2.1 shows the shifts that were completed on each service segment. Appendix A contains the summary schedule and shows when shifts were undertaken on each route. AM shifts were between 06:00 and 15:00, PM shifts took place between 15:00 and 23:00, and the weekend shifts were between 09:00 and 18:00.

Table 2.1: Summary of survey shifts completed

Route	Weekday AM	Weekday PM	Saturday	Sunday	Total
London Waterloo to Reading/Windsor	2	2 ½	1	1	**6 ½**
Hounslow Loop	2	2	1	1	**6**
London Waterloo to Shepperton/Kingston	2	2	1	1	**6**
London Waterloo to Guildford/Dorking/Chessington South	2	2	1	1	**6**
Suburban Services via Surbiton	2	2	1	1	**6**
West of England	2	2	1	1	**6**
London Waterloo to Portsmouth	2	2	1	1	**6**
London Waterloo to Bournemouth/Weymouth	2	2	1	1	**6**
London Waterloo to Alton/Basingstoke	2	2 ½	1	1	**6 ½**
Portsmouth to Southampton / Salisbury to Romsey	2	2	1	1	**6**
Total	**20**	**21**	**10**	**10**	**61**

Survey Methodology and Questionnaire

2.9 The ticketless travel survey was an electronic survey, which utilised handheld computers and dedicated survey software with a customised questionnaire. Surveyors were also provided with a MOVie Oyster card reader so that the validity of Oyster products could be verified and credit/debit cards checked for whether they can be used for contactless payment[1].

2.10 The key elements of the survey methodology were as follows:

- A detailed shift schedule was provided to all surveyors, indicating the exact trains, service segments to survey, and where to board the train (front, middle or back);
- Prior to surveying, each surveyor made an announcement to all passengers on entering each carriage, stating they were performing a survey "looking at ticket usage on behalf of the Department for Transport and South West Trains".
- After boarding, the surveyor team first met with the guard or commercial guard to check whether revenue protection staff were on-board and, in the case of trains with commercial guards, which carriages had already been checked.
- On trains with commercial guards (whose duties include revenue protection and ticket sales), where possible the survey team surveyed passengers before the commercial guard checked their tickets. Where this was not possible (due to surveyors not boarding at the journey origin), tickets were still checked but those who had bought tickets on the train were recorded separately from those who had valid tickets which had been bought before the start of the journey.
- Passengers who had already had their tickets checked by SSWT revenue protection staff were not surveyed (this was extremely rare).
- Information was recorded for every passenger in a train carriage who was present when the survey team entered the carriage, including those who alighted before they could be surveyed and those refusing to show their ticket.
- Surveyors did not have authority to force any passengers to show their tickets and passengers refusing to take part in the survey were recorded as such.

2.11 SSWT informed us of ticketing issues on the network throughout the survey period, for example where ticket machines were not working or ticket offices were closed. We made the surveyors aware of any major issues, and ticket purchase issues were considered as part of our analysis (discussed further in paragraph 3.4).

2.12 In addition to counting those with valid tickets, the surveyors recorded:

- 15 different types of ticket irregularity (three for passengers without tickets and 12 for passengers with invalid tickets);
- four categories of "uncertain ticket types" for which the validity could not be determined;
- those who alighted the train before being surveyed; and
- those who refused to participate in the survey.

2.13 The passenger classes used are described in Table 2.2.

[1] Note that MOVie readers cannot be used to verify whether contactless payment cards have been validated, only to determine whether or not a card is equipped for contactless payment.

Table 2.2: Passenger classes

Passenger class	Description
Valid	The passenger presents a valid ticket
Non-payment	The passenger cannot produce a ticket of any kind.
Unable to pay at penalty fares station	The passenger states that he/she has been unable to buy a ticket before getting on a train at a penalty fares station.
Unable to pay at non-penalty station	The passenger states that he/she has been unable to buy a ticket before getting on a train at a non-penalty fares station.
Journey taken after valid date	The ticket or pass held by the passenger has expired.
Journey taken before valid date	The pass held by the passenger is not yet valid.
Forged/altered	The ticket, pass or photocard held by the passenger has been tampered with, forged, defaced or altered.
Overriding	The passenger has travelled further than the destination on his /her ticket (including using an Oyster card outside the Travelcard area).
Missing/stolen	The passenger states that his/her ticket or pass is missing or has been stolen.
Transferred use	The passenger is using someone else's pass (photo does not match the user).
Used at invalid time	The ticket or pass is being used at the wrong time of day.
Child impersonation	The passenger has a child ticket or pass, but is clearly an adult.
Invalid class	The passenger is using a standard class ticket in a first class carriage.
Misuse of railcard	The passenger has a ticket or pass that requires a railcard, but cannot present the appropriate card.
No photocard	The passenger has a pass but no valid photocard to accompany it.
Non-validation of an Oyster card	The passenger presents an Oyster card when surveyed but it has not been validated.
Pay on train	The passenger states that he/she wishes to buy a ticket on board the train, or presents a ticket that has been bought on board.
Contactless payment	The passenger presents a contactless payment card.
Passenger smartcard	The passenger presents a passenger smartcard.
Staff smartcard	The passenger presents a staff smartcard.
Alighter	The passenger alights the train before the surveyors can interview him/her.
Refusal	The passenger refuses to take part in the survey.

2.59 Contactless payment cards, passenger smartcards and staff smartcards required their own passenger classes as the technology we have to read them does not provide enough information to confidently classify them as valid or otherwise. We also included a separate irregularity class for passengers who had bought a ticket on the train or stated that they intended to do so, in order that an assumption could be applied about the proportion who would have bought a ticket in the absence of a commercial guard on board.

Limitations of Methodology

2.60 For the vast majority of passengers on board the surveyed trains, the survey team had sufficient information with which to determine whether or not they were travelling with a valid ticket. However, this was not possible for all passengers, for the following reasons:

- Neither DfT nor SSWT was able to provide us with readers which can be used to verify the validity of contactless payment cards or smartcards (other than Oyster).
- There were instances where passengers refused to take part in the survey.
- Some passengers alighted the train before they could be surveyed; some may have alighted deliberately in order to avoid the ticket check.

2.61 Hence, we were required to make assumptions about the level of ticketless travel amongst these passengers; these assumptions are discussed in Chapter 4.

2.62 Most longer-distance SSWT services have a commercial guard on board, whose duties include revenue protection and ticket sales. SSWT's policy is that all passengers must buy a ticket before boarding, unless their origin station does not possess ticket sales facilities (there are four such stations); however, in practice, some passengers do purchase tickets from the commercial guard without penalty. Passengers who had already had their tickets checked by or purchased a ticket from the guard are included in this survey. Passengers who had bought a ticket on the train or stated that they intended to do were classified as "Pay on train".

3 Sample Collected and Data Cleaning

3.1 This chapter summarises the data that was collected during the surveys. It also details the steps taken to ensure any input errors or failure of surveyors to identify valid and/or invalid tickets is mitigated through a process of data cleaning and validation.

Summary of Sample

3.2 During the survey period (8-21 October and 14 November 2015), a total of 23,834 observations was collected (21,773 plus 2,061 alighters). This sample ensures a robust estimate of the ticketless travel rate can be made for each service segment and for each time of day segment used in the analysis, as well as the overall level. Table 3.1 shows the number of observations by service segment and time period.

Table 3.1: Sample size by service segment and time period

Service Segments	Weekday 06:00-09:59	Weekday 10:00-15:49	Weekday 16:00-18:59	Weekday 19:00-01:00	Saturday	Sunday	Total	% of Total
London Waterloo to Reading/Windsor	481	912	359	553	492	524	**3,321**	13.9%
Hounslow Loop	513	949	344	249	577	678	**3,310**	13.9%
London Waterloo to Shepperton/Kingston	420	689	262	565	616	493	**3,045**	12.8%
London Waterloo to Guildford/Dorking/ Chessington South	438	650	234	391	392	448	**2,553**	10.7%
Suburban Services via Surbiton	462	743	397	460	468	452	**2,982**	12.5%
West of England	145	504	223	273	259	367	**1,771**	7.4%
London Waterloo to Portsmouth	344	526	189	114	506	146	**1,825**	7.7%
London Waterloo to Bournemouth/ Weymouth	314	396	239	196	409	404	**1,958**	8.2%
London Waterloo to Alton/Basingstoke	136	330	318	265	265	265	**1,579**	6.6%
Portsmouth to Southampton / Salisbury to Romsey	268	284	225	120	449	144	**1,490**	6.3%
Total	**3,521**	**5,983**	**2,790**	**3,186**	**4,433**	**3,921**	**23,834**	100.0%
% of Total	14.8%	25.1%	11.7%	13.4%	18.6%	16.5%	100.0%	

Data Cleaning

3.3 The quality of data collected from the on-train surveys is subject to potential input errors or failure of surveyors to recognise and validate all types of tickets and irregularities they encounter. Although all surveyors are provided with thorough training, it is still possible that there are some incorrectly coded tickets that could subsequently affect the overall reported rate of ticketless travel. To mitigate against this, we cleaned and validated the data before carrying out any analysis.

3.4 Our data cleaning and validation process involves cross-checking the variables in the data to spot incorrectly coded entries and also take account of any service information received from SSWT, for example:

- passengers with railcards that lack photocards (misuse of railcard) wrongly coded as no photocard;
- passengers travelling on off-peak/super off-peak tickets during time periods for which these tickets are valid, but wrongly coded as travelling at an invalid time;
- passengers unable to pay but having boarded at a non-penalty-fares station and therefore having a valid reason for not having a ticket;
- passengers unable to pay but having boarded at a station where all ticket selling facilities are out of order (verified by SSWT) and therefore having a valid reason for not having a ticket; and
- passengers using freedom passes in the peak wrongly coded as invalid time rather than non-payment.

3.5 In total 129 observations (c. 0.6% of the total sample) were recoded for reasons such as these, as can be seen in Table 3.2.

3.6 No observations had to be excluded. Exclusions are often required for two reasons:

- When several passengers in one carriage refuse to be surveyed due to a group effect (one person refusing and several others subsequently doing the same).
- When a ticket type or validity class is not recognised by the survey team, and cannot be interpreted by the Steer Davies Gleave project team based on the information provided by the surveyor.

Table 3.2: Number of observations recorded and recoded by irregularity type (excluding alighters)

Passenger class	Cleaned observations	Recoded to class	% recoded	% of total cleaned sample excluding alighters
Valid	19,966	96	0.5%	91.9%
Non-payment	334	22	6.6%	1.5%
Used at invalid time	9	-	-	0.0%
Child impersonation	13	-	-	0.1%
Journey taken after valid date	14	-	-	0.1%
Journey taken before valid date	-	-	-	-
Invalid Class	21	-	-	0.1%
Overriding	46	-	-	0.2%
Forged/altered	5	-	-	0.0%
Misuse of railcard	21	4	19.0%	0.1%
No photocard	1	-	-	0.0%
Missing/stolen	18	-	-	0.1%
Unable to pay at non-penalty station	38	-	-	0.2%
Transferred use	1	-	-	0.0%
Non validation of Oyster card	1	1	100.0%	0.0%
Pay on train	160	6	3.8%	0.7%
Unable to pay at non-penalty station	-	-	-	-
Contactless payment	832	-	-	3.8%
Passenger smartcard	25	-	-	0.1%
Staff smartcard	63	-	-	0.3%
Refusal	205	-	-	0.9%
Total	**21,733**	**129**	**0.6%**	**100%**

4 Analysis Methodology

4.1 This chapter sets out the methodology undertaken to clean, analyse and weight the data to achieve the weighted results for irregularity rates and revenue at risk.

Summary of Analysis Methodology

4.2 After completing the data cleaning and validation process outlined in the previous chapter, we exported the final data set into Microsoft Excel, where we calculated an estimate of the level of ticketless travel and revenue at risk for each service segment and for each of six time periods – four on weekdays (06:00-10:00, 10:00-16:00, 16:00-19:00 and 19:00-01:00) and all-day on each of Saturdays and Sundays.

4.3 There are three key steps in the analysis process, each of which is described in further detail below:

1. Apply assumptions about the ticketless travel rate amongst passengers who alight before being surveyed, refuse to participate or present a contactless payment card or non-Oyster smartcard, since the true ticketless travel rate amongst these passengers is not known.
2. Apply journey weightings so that the overall ticketless travel rate is representative of the actual distribution of journeys by service group and time period rather than the sample distribution. The weightings used apply more importance to survey data collected during times where more journeys are made by passengers.
3. Apply revenue loss assumptions for each irregularity class, revenue weightings and total annual revenue to estimate the revenue at risk due to ticketless travel in percentage and monetary terms.

4.4 In order to reflect the uncertainty around the assumptions for refusals, alighters and uncertain ticket types, we have produced and presented results under three sets of assumptions, as Low, Central and High cases.

Assumptions for Uncertain Ticket Types and Yield Loss

4.5 Two different sets of assumptions were made in our analysis, as follows:

- Firstly, an assumption was made for alighters, refusals and ticket types for which we do not have enough information to make a judgement on each individual case (e.g. contactless payment) as to how many of them were not travelling with a valid ticket.
- Secondly, yield loss assumptions were applied to all passenger classes, in order to calculate the estimated revenue at risk.

4.6 Table 4.1 shows our assumptions for the irregularity rate amongst alighters, refusals and uncertain ticket types for each of the Low, Central and High cases. These were developed

based on our previous experience of ticketless travel surveys on similar rail networks and agreed in advance with DfT.

4.7 Where the assumption is stated as ”Average”, this means we applied the average irregularity rate for the route and time period for certain ticket types to that ticket type. For example if there were 20 contactless payment passengers travelling on the Hounslow loop in the AM peak and the irregularity rate for that service segment and time period was 5%, then one passenger would be recoded to non-payment and the remaining 19 passengers would be recoded to valid.

Table 4.1: Irregularity rate assumptions for uncertain ticket types, alighters and refusals

Ticket Type	Low Case	Central Case	High Case	Rationale
Alighter	Average	Average	25%	In the Low and Central cases, it is assumed that alighters are getting off the train as they have reached their destination. In the High Case, is it assumed that some alighters are getting off the train to avoid the surveyor team. On a heavy rail network with several minutes between (most) stations and services, we consider that few passengers would accept the inconvenience of early alighting in order to avoid the survey, hence these assumed irregularity rates are low.
Refusal	Average	50%	75%	In the Low Case it is assumed that most refusals have a valid ticket, which provides a lower bound. For the central and high cases, it is assumed that increased numbers of passengers are refusing because they do not have a valid ticket to present.
Contactless payment	Average	Average	Average	Passengers using contactless payment are assumed to have the average irregularity rate as we have no evidence to suggest otherwise.
Staff smartcard	0%	0%	Average	As staff smartcards are rarely used and are held by members of staff only, it is assumed in the Low and Central cases that no passengers would be travelling fraudulently with them. In the High Case, we propose the average irregularity rate to reflect the potential for transferred use.
Passenger smartcard	Average	Average	Average	The passenger smartcard is in a trial period and is not widely used. In the absence of any evidence to suggest otherwise, our proposed assumption in all cases is that the average irregularity rate applies.
Pay on train	Average	Average	25%	The “average” rate probably represents a lower bound (since these passengers are not in possession of a ticket they are at least as likely to be travelling invalidly as an ”average” passenger) but we do not expect that many passengers would lie given that this a survey with no penalty, hence a relatively low rate is proposed even in the high case.

4.8 Table 4.2 shows the yield loss assumptions applied for each passenger class, and the rationale for each.

Table 4.2: Yield loss assumptions by irregularity type

Irregularity Type	Assumed Yield Loss	Rationale
Non-payment	100%	Passenger does not have a ticket of any kind.
Used in invalid time	50%	It is assumed that an off- peak ticket is half the price of a peak ticket.
Child impersonation	50%	Child tickets are half the price of an adult ticket.
Journey taken after valid date	100%	Passenger has reused a ticket or not bought a correct ticket for the journey being made.
Journey taken before valid date	100%	Passenger has used a ticket before it is valid and not bought a correct ticket for his/her journey.
Invalid class	50%	It is assumed that first class tickets are approximately 50% more expensive than standard class tickets.
Overriding	90%	It is assumed that passengers will "short-ticket", purchasing the cheapest fare ticket to get through the ticket gates, therefore a high proportion of the yield is lost.
Forged/altered	100%	Ticket has been edited and thus it is likely no fare has been paid.
Misuse of railcard	33%	Most railcards entitle holders to a third off rail travel.
No photocard	100%	Passenger cannot produce the valid photocard to accompany a season ticket, making the journey invalid. The whole yield is lost because in this instance the passenger should purchase another ticket.
Missing/stolen	100%	Passenger has claimed that his/her ticket has gone missing or been stolen but, as he/she cannot produced a valid ticket and should have purchased a replacement, the whole yield is lost.
Unable to pay	100%	Passenger was unable to purchase a ticket so has no ticket of any kind.
Transferred used	100%	Passenger has been passed the ticket by someone else and so has not paid a fare.
Non-validation Oyster card	100%	Passenger has not touched in so no payment will be deducted from his/her Oyster card.
Non-penalty unable to pay	100%	Passenger was unable to purchase a ticket so has no ticket of any kind, despite having a valid reason.

Weighting and Calculation of Revenue at Risk

4.9 We obtained revenue and journeys data by date and service code from LENNON for periods 2015 P01 to 2015/16 P07 inclusive. This allowed us to present two sets of annual results:

- Using 2014/15 full year data.
- Using the most recent 13 periods (2014/15 P08 to 2015/16 P07).

4.10 The LENNON data was aggregated by service code and day of the week, and this breakdown was used to derive weightings for weekday, Saturday and Sunday revenue and journeys. MOIRA data was used to split data by service code into more disaggregate component groups ("MOIRA service groups") where required, and to split the weekday revenue and journeys by ticket type (full/reduced/seasons). We then used MOIRA time of day profiles for a representative flow in each service group to apportion weekday revenue and journeys into the four times of day used in our analysis.

4.11 Where our service segments did not correspond directly with the LENNON service codes and MOIRA service groups, we developed a mapping based on analysis of the routes covered by each LENNON service code and MOIRA service group. These mappings are shown in Appendix A.

4.12 For the purposes of this analysis, we excluded the Island Line, included services between Guildford and Woking in the London Waterloo to Portsmouth service segment, and included residual Windsor Inner and Windsor Outer revenue and journeys in the Hounslow Loop and London Waterloo to Reading/Windsor service segments respectively. LENNON revenue on non-geographic service groups was considered out of scope.

4.13 The resulting weightings using 2014/15 data are shown in Table 4.3 and Table 4.4 respectively. The weightings derived for the most recent 13 periods are shown in Appendix C.

Table 4.3: 2014/15 journey weightings

Route	Weekday 06:00-10:00	Weekday 10:00-16:00	Weekday 16:00-19:00	Weekday 19:00-01:00	Saturday	Sunday	Total
London Waterloo to Reading/Windsor	5.5%	2.7%	4.5%	1.8%	1.6%	0.8%	**17.0%**
Hounslow Loop	3.9%	1.3%	3.2%	1.5%	0.8%	0.4%	**11.1%**
London Waterloo to Shepperton/Kingston	5.3%	1.9%	4.4%	2.1%	1.1%	0.6%	**15.5%**
London Waterloo to Guildford/ Dorking /Chessington South	4.5%	1.5%	3.7%	1.8%	0.9%	0.6%	**12.9%**
Suburban Services via Surbiton	2.7%	1.0%	2.3%	1.1%	0.5%	0.4%	**8.1%**
West of England	1.0%	0.7%	0.9%	0.3%	0.4%	0.2%	**3.5%**
London Waterloo to Portsmouth	1.8%	1.5%	2.3%	0.9%	0.8%	0.5%	**7.8%**
London Waterloo to Bournemouth/Weymouth	1.9%	1.3%	1.6%	0.6%	0.8%	0.4%	**6.5%**
London Waterloo to Alton/Basingstoke	5.5%	2.2%	4.5%	2.1%	1.3%	0.8%	**16.4%**
Portsmouth to Southampton / Salisbury to Romsey	0.4%	0.2%	0.4%	0.1%	0.1%	0.1%	**1.3%**
Total	**32.4%**	**14.5%**	**27.9%**	**12.2%**	**8.3%**	**4.8%**	**100.0%**

Table 4.4: 2014/15 revenue weightings

Route	Weekday 06:00-10:00	Weekday 10:00-16:00	Weekday 16:00-19:00	Weekday 19:00-01:00	Saturday	Sunday	Total
London Waterloo to Reading/Windsor	4.4%	2.4%	3.5%	1.4%	1.4%	0.8%	**13.8%**
Hounslow Loop	1.7%	0.6%	1.4%	0.6%	0.4%	0.2%	**4.9%**
London Waterloo to Shepperton/Kingston	2.6%	1.0%	2.2%	1.1%	0.6%	0.4%	**7.9%**
London Waterloo to Guildford/ Dorking /Chessington South	2.6%	0.9%	2.1%	1.0%	0.5%	0.4%	**7.5%**
Suburban Services via Surbiton	1.6%	0.6%	1.4%	0.7%	0.4%	0.2%	**4.9%**
West of England	2.7%	2.2%	2.2%	0.9%	1.0%	0.6%	**9.7%**
London Waterloo to Portsmouth	3.5%	2.9%	4.2%	1.6%	1.4%	0.9%	**14.4%**
London Waterloo to Bournemouth/Weymouth	5.0%	4.1%	4.2%	1.5%	1.8%	1.2%	**17.7%**
London Waterloo to Alton/Basingstoke	6.2%	2.4%	5.1%	2.2%	1.4%	0.9%	**18.2%**
Portsmouth to Southampton / Salisbury to Romsey	0.2%	0.2%	0.3%	0.1%	0.1%	0.1%	**0.9%**
Total	**30.5%**	**17.3%**	**26.6%**	**11.0%**	**9.0%**	**5.6%**	**100.0%**

5 Results

5.1 This chapter summarises the results of the ticketless travel survey, presenting the irregularity rates and revenue at risk by time period and service segment, as well as the results for the network as a whole.

5.2 The weighted results presented here are based on LENNON revenue and journeys data for the 2014/15 full year. In Appendix D we display results based on the most recent 13 periods of LENNON data available at the time of carrying out the analysis (2014/15 P08 – 2015/16 P07).

5.3 As noted in paragraph 4.12, we have excluded the Island Line from our analysis, included services between Guildford and Woking in the London Waterloo to Portsmouth service segment, and included residual Windsor Inner and Windsor Outer revenue and journeys in the Hounslow Loop and London Waterloo to Reading/Windsor service segments respectively.

Irregularity Rates

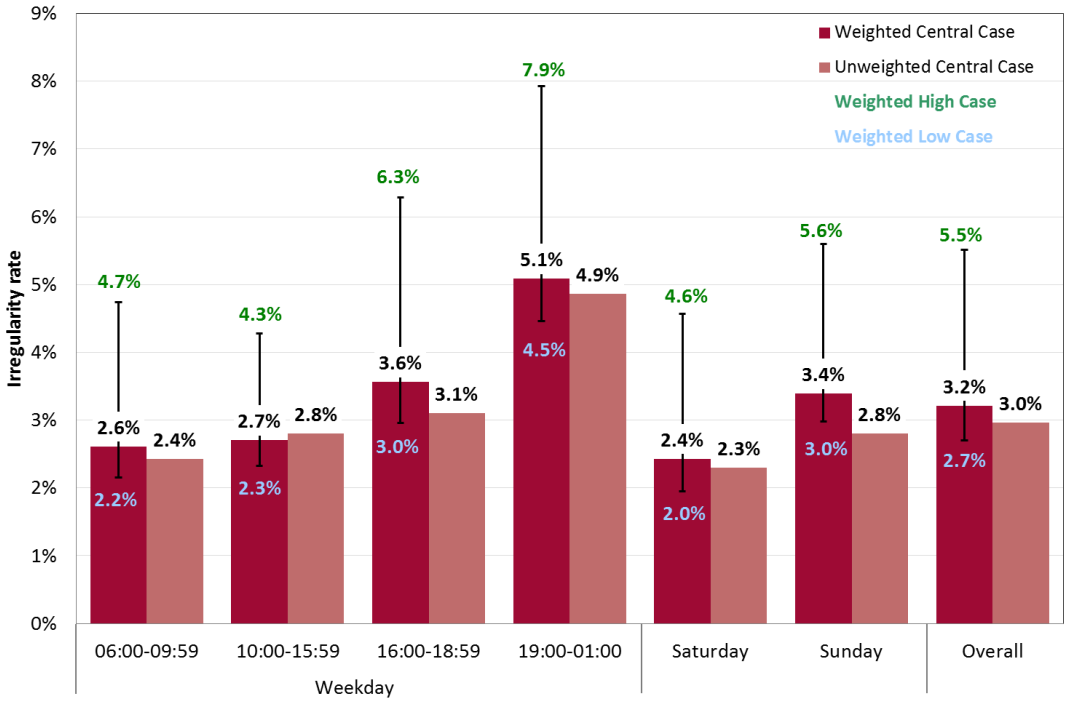
Irregularity Rate by Time Period

5.4 The irregularity rate is the proportion of passengers who are travelling without a valid ticket, whether they have an invalid ticket or no ticket whatsoever.

5.5 Figure 5.1 illustrates the irregularity rates by time period and across the franchise as a whole, showing a comparison between unweighted and weighted Central Case estimates. Both are based on the same assumptions of ticketless travel rates amongst uncertain passenger classes (shown in Table 4.1), but the weighted results account for the actual distribution of LENNON journeys by segment. We also show the Low and High Case estimates of the weighted irregularity rates.

5.6 The overall estimated weighted irregularity rate is 3.2% in the Central Case with a High Case result of 5.5% and a Low Case result of 2.7%. The time period with the highest irregularity rate is the post-peak PM period on weekdays with a weighted Central Case result of 5.1%, considerably higher than all other time periods. The lowest rates are observed on Saturdays (2.4% in the weighted Central Case) and in the AM peak and inter-peak periods (2.6% and 2.7% respectively).

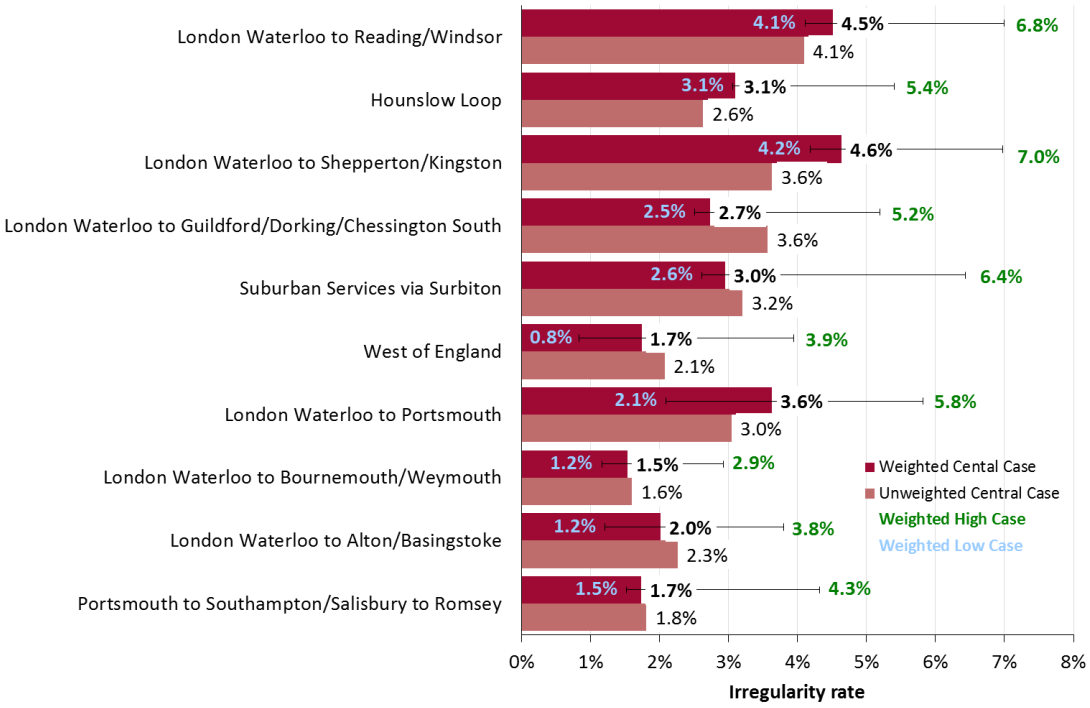
Figure 5.1: Irregularity rate by time period



Irregularity Rate by Service Segment

5.7 Figure 5.2 illustrates the irregularity rates by service segment, showing a comparison between weighted and unweighted estimates in the Central Case, and between Low, Central and High weighted results.

Figure 5.2: Irregularity rate by service segment



5.8 The service segments with the highest irregularity rates are London Waterloo to Shepperton/Kingston with a weighted Central Case result of 4.6%, and London Waterloo to Reading/Windsor at 4.5%. The lowest rates are observed on the London Waterloo to Bournemouth/Weymouth (1.5% in the weighted Central case), West of England (1.7%) and Portsmouth to Southampton / Salisbury to Romsey (1.7%) service segments.

5.9 In general, longer-distance and non-London service segments show lower irregularity rates than those dominated by short-distance flows to and from London, with the exception of London Waterloo to Portsmouth, which has the third-highest weighted irregularity rate (3.6%).

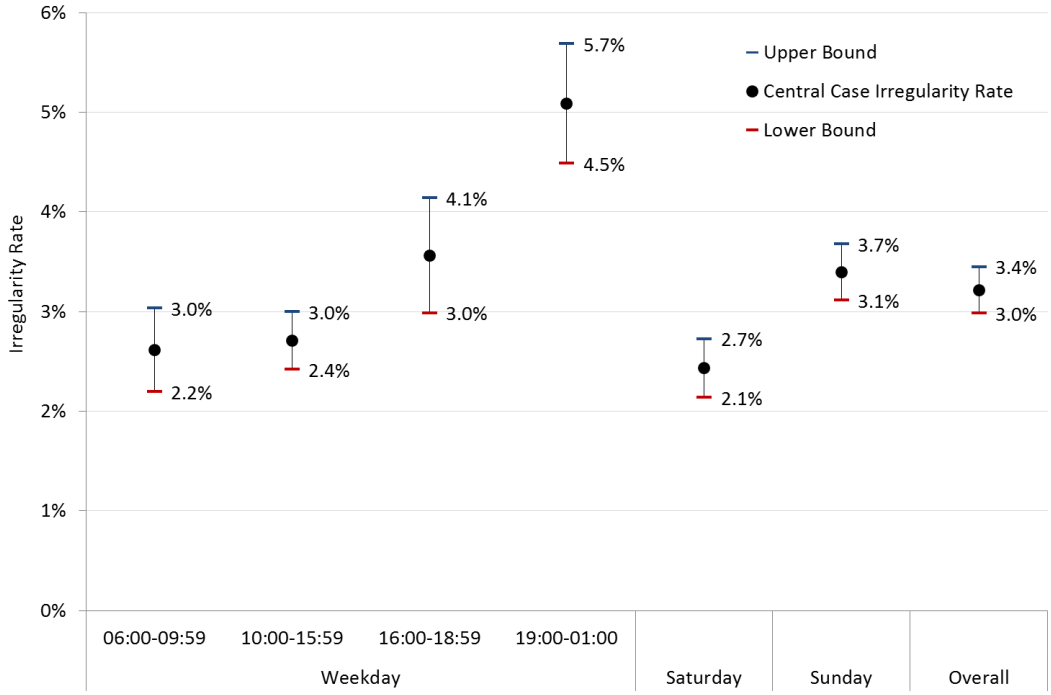
Margins of Error

5.10 The margin of error around our estimate of the ticketless travel rate in each time period is affected by the irregularity rate, sample size and distribution of sample by service segment within the time period.

5.11 Figure 5.3 illustrates the 90% confidence interval (interval within which there is 90% probability that the true estimate lies) around the weighted Central Case irregularity rate for each time period, based on the sample sizes in each segment. The maximum margin of error for any time period is ±0.6% (in the weekday PM post peak period) and the minimum margin of error is ±0.3% on Saturdays and in the inter-peak. The margin of error around the franchise-wide rate is ±0.2%, smaller than those for each individual time period due to the larger sample.

5.12 Note that these margin of error estimates do not account for potential data input errors, accuracy of the weightings data or other survey limitations outlined in paragraphs 2.60-2.62.

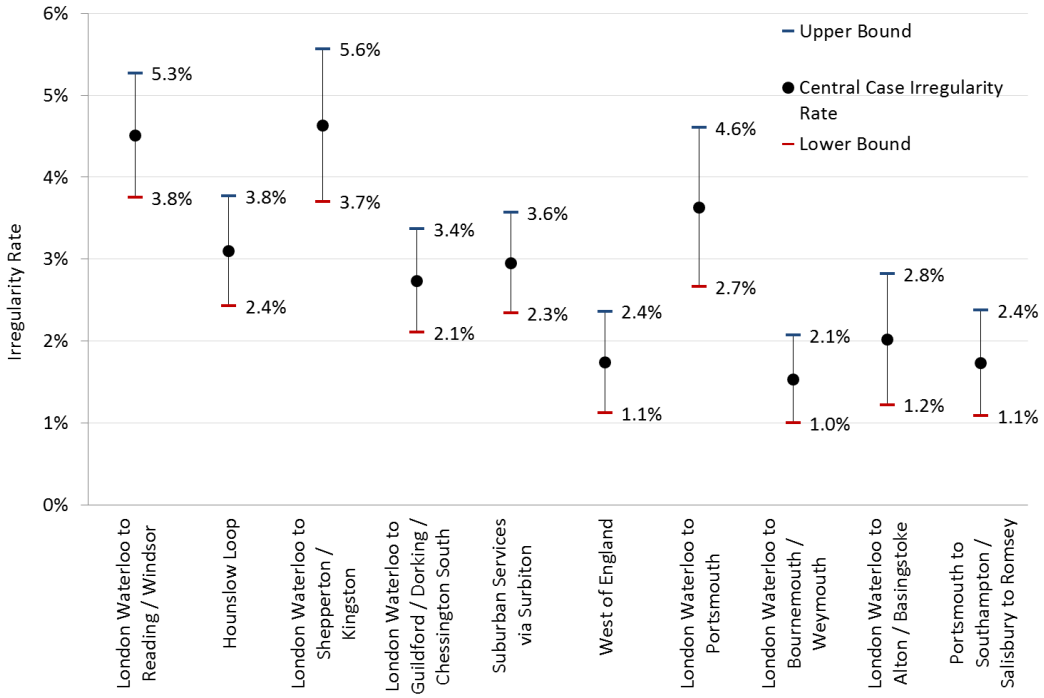
Figure 5.3: Margin of error by time period (Central Case, 90% confidence)



5.13 Figure 5.4 illustrates the 90% confidence interval around the weighted Central Case irregularity rate for each service segment. The maximum margin of error for any service segment is ±1.0% (London Waterloo to Portsmouth). The lowest margin of error is ±0.5%

(London Waterloo to Bournemouth/Weymouth). The margins of error are generally larger around the service segment estimates than around those by time period, due to the total sample being divided between more segments (10 service segments vs 6 time periods) so sample sizes on each segment are smaller.

Figure 5.4: Margin of error by service segment (Central Case, 90% confidence)



Irregularity Rate by Irregularity Type

5.14 Table 5.1 provides a breakdown of the weighted Central Case irregularity rate for each time period into the type of irregularity. A total of 96.8% of passengers is estimated as having a valid ticket, 2.0% no ticket whatsoever, 0.4% overriding, and 0.8% another irregularity type.

Table 5.1: Breakdown of weighted irregular journeys (Central Case) in each time period by irregularity type

Irregularity type	Overall	Weekday 06:00-09:59	Weekday 10:00-15:49	Weekday 16:00-18:59	Weekday 19:00-01:00	Saturday	Sunday
Non payment	**2.0%**	1.5%	1.6%	2.2%	3.7%	1.7%	1.3%
Used in invalid time	**0.1%**	0.2%	0.1%	-	-	-	-
Child impersonation	**0.1%**	0.1%	0.0%	0.1%	0.1%	0.1%	0.1%
Journey taken after valid date	**0.1%**	0.0%	0.0%	0.1%	0.3%	0.1%	0.1%
Invalid Class	**0.2%**	0.1%	0.1%	0.3%	-	-	0.8%
Overriding	**0.4%**	0.5%	0.5%	0.4%	0.2%	0.1%	0.3%
Forged/Altered	**0.0%**	-	0.1%	-	0.1%	-	0.0%
Misuse of railcard	**0.1%**	0.0%	0.1%	0.1%	0.1%	0.1%	0.3%
Missing/stolen	**0.1%**	0.1%	0.1%	0.0%	0.3%	0.0%	0.5%
Unable to pay	**0.2%**	0.0%	0.2%	0.4%	0.3%	0.4%	0.1%
Total irregularities	**3.2%**	**2.6%**	**2.7%**	**3.6%**	**5.1%**	**2.4%**	**3.4%**

Revenue at Risk

5.15 The revenue at risk is the revenue estimated as being lost as a result of ticketless travel. The results are weighted so the overall revenue at risk is representative of the actual revenue by time period and service segment, using the methodology detailed in Chapter 4.

5.16 Table 5.2 presents the weighted Central Case revenue at risk estimates by time period and service segment, based on 2014/15 full year LENNON data. The overall estimated annual revenue at risk is £24.6m (2014/15 prices), of which £7.8m (31.5%) is in the weekday PM peak period. This is the highest time period, driven by both a high proportion of overall revenue and the second-highest ticketless travel rate. The service segment with the highest revenue at risk is London Waterloo to Reading/Windsor with an estimated £5.3m lost annually (21.7% of the total revenue at risk).

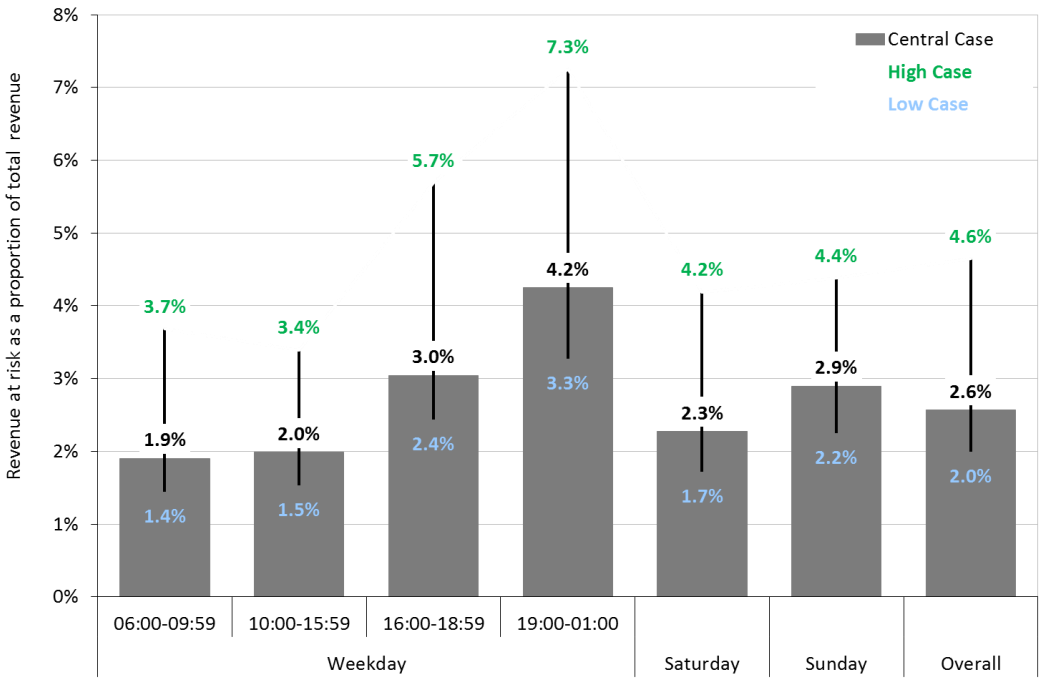
Table 5.2: Revenue at risk (Central Case) by service segment and time period (£m, 2014/15 prices)

Service segment	Weekday 06:00-09:59	Weekday 10:00-15:49	Weekday 16:00-18:59	Weekday 19:00-01:00	Saturday	Sunday	Total	% of Total
London Waterloo to Reading/ Windsor	0.72	0.78	2.46	1.00	0.22	0.14	**5.32**	21.7%
Hounslow Loop	0.35	0.19	0.30	0.56	0.03	0.03	**1.45**	5.9%
London Waterloo to Shepperton/ Kingston	1.32	0.27	1.13	0.63	0.05	0.12	**3.52**	14.3%
London Waterloo to Guildford/ Dorking/ Chessington South	0.35	0.35	0.46	0.47	0.29	0.10	**2.01**	8.2%
Suburban Services via Surbiton	0.52	0.17	0.21	0.23	0.13	0.08	**1.35**	5.5%
West of England	0.14	0.45	0.40	0.28	0.08	0.09	**1.45**	5.9%
London Waterloo to Portsmouth	0.46	0.27	1.38	0.70	0.32	0.65	**3.78**	15.4%
London Waterloo to Bournemouth/ Weymouth	0.46	0.34	0.95	0.04	0.29	0.21	**2.29**	9.3%
London Waterloo to Alton/ Basingstoke	1.18	0.41	0.41	0.57	0.53	0.15	**3.26**	13.3%
Portsmouth to Southampton/ Salisbury to Romsey	0.05	0.03	0.04	0.01	0.03	0.00	**0.16**	0.6%
Total	**5.55**	**3.28**	**7.75**	**4.49**	**1.96**	**1.55**	**24.59**	100.0%
% of Total	22.6%	13.3%	31.5%	18.3%	7.9%	6.3%	100%	

5.17 Figure 5.5 illustrates the revenue at risk as a proportion of total revenue, by time period and across the franchise as a whole, comparing the Low, Central and High Cases. Overall, 2.6% of franchise revenue is estimated as being "at risk"; this is lower than the irregularity rate of 3.2% due to some of the highest irregularity rates being on segments with relatively low revenue weightings (e.g. weekday evenings and Sundays) and some irregularities being associated with less than 100% yield loss.

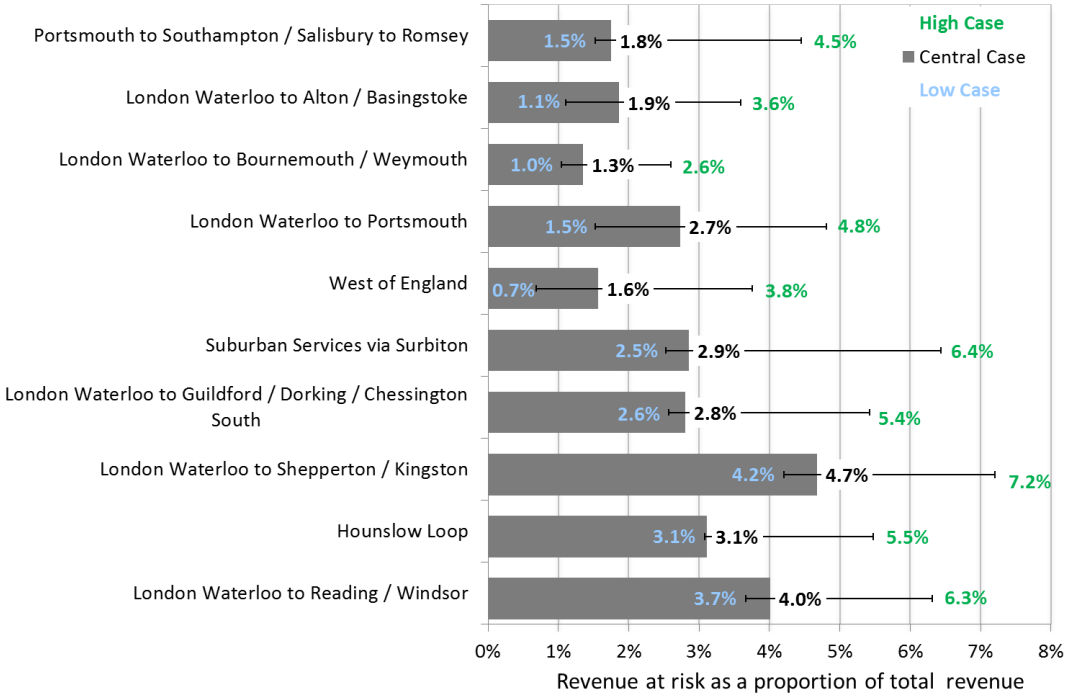
5.18 The time period with the greatest proportion of revenue at risk is the weekday PM post-peak evening period at 4.2% in the Central Case while the lowest proportion revenue at risk is 1.9% in the weekday AM peak period.

Figure 5.5: Proportion of revenue at risk by time period



5.19 Figure 5.6 illustrates the proportion of revenue at risk by service segment. The service segment with the greatest proportion of revenue at risk is the London Waterloo to Shepperton/Kingston service at 4.7% in the Central Case, and the lowest result of 1.3% is observed on the London Waterloo to Bournemouth/Weymouth service segment.

Figure 5.6: Proportion of revenue at risk by service segment



Appendices

A Summary Schedule

A.1 Table A.1 displays the summary survey schedule used between 8-21 October and on 14 November. The AM shifts occurred between 06:00-15:00, the PM shifts took place between 15:00-23:00, and the weekend shifts were between 09:00-18:00. The summary schedule does not include the contingency PM shift that took place on the London Waterloo to Reading/Windsor and London Waterloo to Alton/Basingstoke service segments on 21 October.

Table A.1: Summary Schedule

Route	08/10 Thu	09/10 Fri	10/10 Sat	11/10 Sun	12/10 Mon	13/10 Tue	14/10 Wed	15/10 Thu	16/10 Fri	17/10 Sat	18/10 Sun	19/10 Mon	20/10 Tue	21/10 Wed	14/11 Sat
London Waterloo to Windsor/Reading	AM			SUN		PM			AM					PM	SAT
Hounslow Loop		PM		SUN	AM		PM						AM		SAT
London Waterloo to Guildford/Dorking/Chessington South		AM	SAT			PM		PM			SUN			AM	
London Waterloo to Shepperton/Kingston Loop	PM			SUN	AM			PM				AM			SAT
Suburban Services via Surbiton		AM	SAT		PM		AM				SUN		PM		
London Waterloo to Portsmouth				SUN		AM			PM	SAT		PM		AM	
London Waterloo to Bournemouth/Weymouth	AM		SAT	SUN	PM			AM						PM	
West of England		PM					AM			SAT	SUN	AM	PM		
London Waterloo to Alton/Basingstoke	PM		SAT			AM	PM		AM		SUN				
Portsmouth to Southampton / Salisbury to Romsey								AM	PM	SAT	SUN	PM	AM		

B LENNON and MOIRA Mappings

B.1 Table B.1 displays the mapping used between LENNON service codes and their component groups, and the service segments used for our analysis and documented in this report. These were used in the derivation of the weightings shown in Tables Table 4.3, Table 4.4 and Appendix C.

Table B.1: Mapping of LENNON service codes to service segments

LENNON service code	Component group(s)	Ticketless travel service segment
6200	Mainline - Bournemouth/Weymouth	London Waterloo to Bournemouth/Weymouth
6210	Mainline-Portsmouth	London Waterloo to Portsmouth
6230	West of England	West of England
6290	Waterloo-Basingstoke	London Waterloo to Alton/Basingstoke
6310	South Coast	Portsmouth to Southampton/Salisbury to Romsey
6320	Waterloo-Alton	London Waterloo to Alton/Basingstoke
6710	Waterloo-Waterloo via Kingston	London Waterloo to Shepperton/Kingston
	Waterloo-Windsor	London Waterloo to Reading/Windsor
	Services via Hounslow	Hounslow Loop
6720	Waterloo-Reading	London Waterloo to Reading/Windsor
6730	Waterloo-Shepperton	London Waterloo to Shepperton/Kingston
	Services via Motspur Park	London Waterloo to Guildford/Dorking/Chessington South
	Services via Surbiton	Suburban Services via Surbiton
	Waterloo-Woking	London Waterloo to Alton/Basingstoke
	Guildford-Woking	London Waterloo to Portsmouth

B.2 Service codes not shown in this table (Island Line and non-geographic codes) were considered out of scope

B.3 Table B.2 below shows the mapping used between MOIRA service groups and our service segments. A "1" indicates that the MOIRA service group was included in the service segment in question.

Table B.2: Mapping of MOIRA service groups to service segments

Service segment / MOIRA service group	SG01 Bournemouth	SG02 Portsmouth	SG03 West of Eng	SG04 Isle of Wig	SG05 Basingstoke	SG06 South Coast	SG07 Alton	SG08 Winds Inner	SG09 Winds Outer	SG10 Gld Wok	SG11 Shepperton	SG12 Kingston	SG13 via Mots P	SG14 via Surb	SG15 Reading	SG16 Windsor	SG17 Houns	SG18 Wok main
London Waterloo to Reading/Windsor	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	1	-	-
Hounslow Loop	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-
London Waterloo to Shepperton/Kingston	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-
London Waterloo to Guildford/Dorking/Chessington South	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Suburban Services via Surbiton	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
West of England Services	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
London Waterloo to Portsmouth	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
London Waterloo to Bournemouth/Weymouth	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
London Waterloo to Alton/Basingstoke	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	1
Portsmouth to Southampton/Salisbury to Romsey	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-

C Alternative LENNON Data Sensitivity: Revenue and Journey Weightings

C.1 The weightings presented in Table 4.3 and Table 4.4 and used in the results presented in Chapter 5 are based on LENNON data 2014/15 full year. We carried out a sensitivity test using the most recent full year's data at the time of carrying out the survey, 2014/15 P08 to 2015/16 P07.

C.2 The journey and revenue weightings derived using this more recent dataset are shown in Table C.1 and Table C.2 respectively.

Table C.1: 2014/15 P08 – 2015/16 P07 journey weightings

Route	Weekday 06:00-10:00	Weekday 10:00-16:00	Weekday 16:00-19:00	Weekday 19:00-01:00	Saturday	Sunday	Total
London Waterloo to Reading/Windsor	5.5%	2.8%	4.6%	1.9%	1.6%	0.8%	**17.2%**
Hounslow Loop	4.0%	1.3%	3.3%	1.5%	0.8%	0.4%	**11.4%**
London Waterloo to Shepperton/Kingston	5.4%	1.9%	4.5%	2.1%	1.1%	0.6%	**15.7%**
London Waterloo to Guildford/ Dorking /Chessington South	4.4%	1.5%	3.7%	1.7%	0.9%	0.6%	**12.8%**
Suburban Services via Surbiton	2.7%	1.0%	2.3%	1.1%	0.5%	0.4%	**8.0%**
West of England	1.0%	0.7%	0.9%	0.3%	0.4%	0.2%	**3.5%**
London Waterloo to Portsmouth	1.8%	1.5%	2.3%	0.9%	0.8%	0.5%	**7.7%**
London Waterloo to Bournemouth/ Weymouth	1.8%	1.3%	1.6%	0.5%	0.7%	0.4%	**6.4%**
London Waterloo to Alton/Basingstoke	5.4%	2.2%	4.5%	2.0%	1.3%	0.8%	**16.1%**
Portsmouth to Southampton / Salisbury to Romsey	0.3%	0.2%	0.4%	0.1%	0.1%	0.1%	**1.2%**
Total	**32.4%**	**14.4%**	**27.9%**	**12.2%**	**8.3%**	**4.8%**	**100.0%**

Table C.2: 2014/15 P08 – 2015/16 P07 revenue weightings

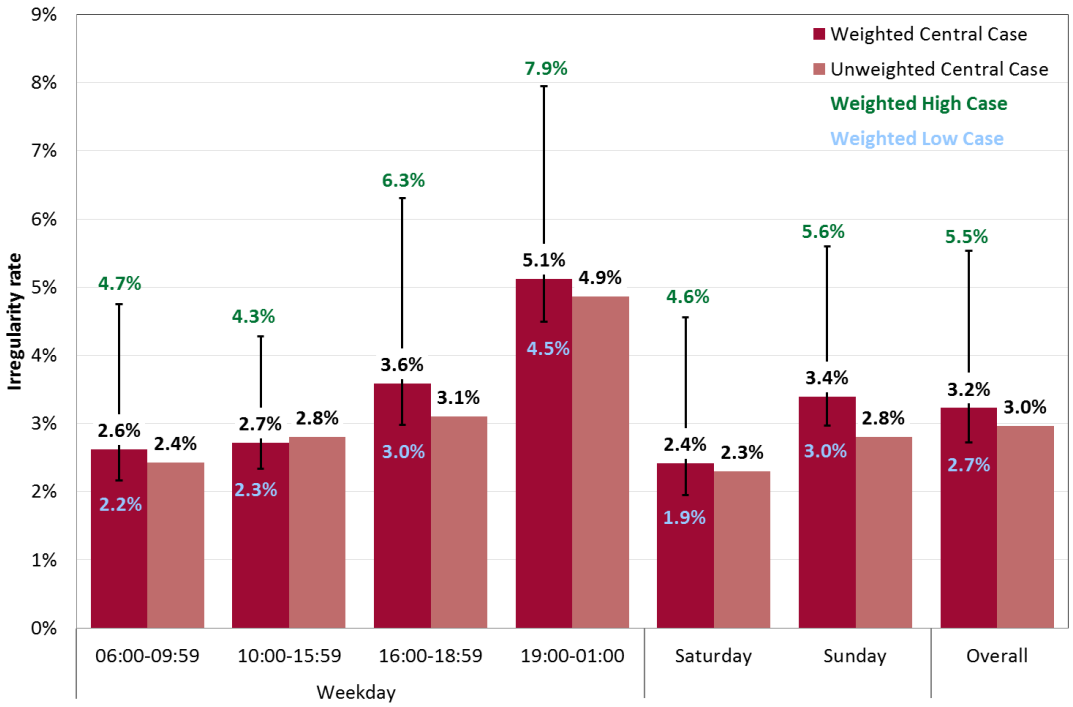
Route	Weekday 06:00-10:00	Weekday 10:00-16:00	Weekday 16:00-19:00	Weekday 19:00-01:00	Saturday	Sunday	Total
London Waterloo to Reading/Windsor	4.4%	2.4%	3.6%	1.4%	1.4%	0.8%	**14.0%**
Hounslow Loop	1.7%	0.6%	1.4%	0.7%	0.4%	0.2%	**5.0%**
London Waterloo to Shepperton/Kingston	2.7%	1.0%	2.3%	1.1%	0.6%	0.4%	**8.0%**
London Waterloo to Guildford/ Dorking /Chessington South	2.6%	0.9%	2.1%	1.0%	0.5%	0.4%	**7.5%**
Suburban Services via Surbiton	1.6%	0.6%	1.4%	0.7%	0.4%	0.2%	**4.9%**
West of England	2.7%	2.2%	2.2%	0.9%	1.0%	0.6%	**9.6%**
London Waterloo to Portsmouth	3.4%	2.9%	4.2%	1.6%	1.3%	0.9%	**14.3%**
London Waterloo to Bournemouth/Weymouth	4.9%	4.1%	4.1%	1.5%	1.8%	1.1%	**17.5%**
London Waterloo to Alton/Basingstoke	6.2%	2.4%	5.1%	2.2%	1.4%	0.9%	**18.2%**
Portsmouth to Southampton / Salisbury to Romsey	0.2%	0.2%	0.3%	0.1%	0.1%	0.1%	**0.9%**
Total	**30.5%**	**17.2%**	**26.6%**	**11.1%**	**9.0%**	**5.6%**	**100.0%**

D Alternative LENNON Data Sensitivity: Results

D.1 In this appendix we present the results under the sensitivity test using the most recent 13 periods of LENNON data (2014/15 P08 to 2015/16 P07) for weightings and total revenue figures. All other assumptions are consistent with those underpinning the results presented in Chapter 5.

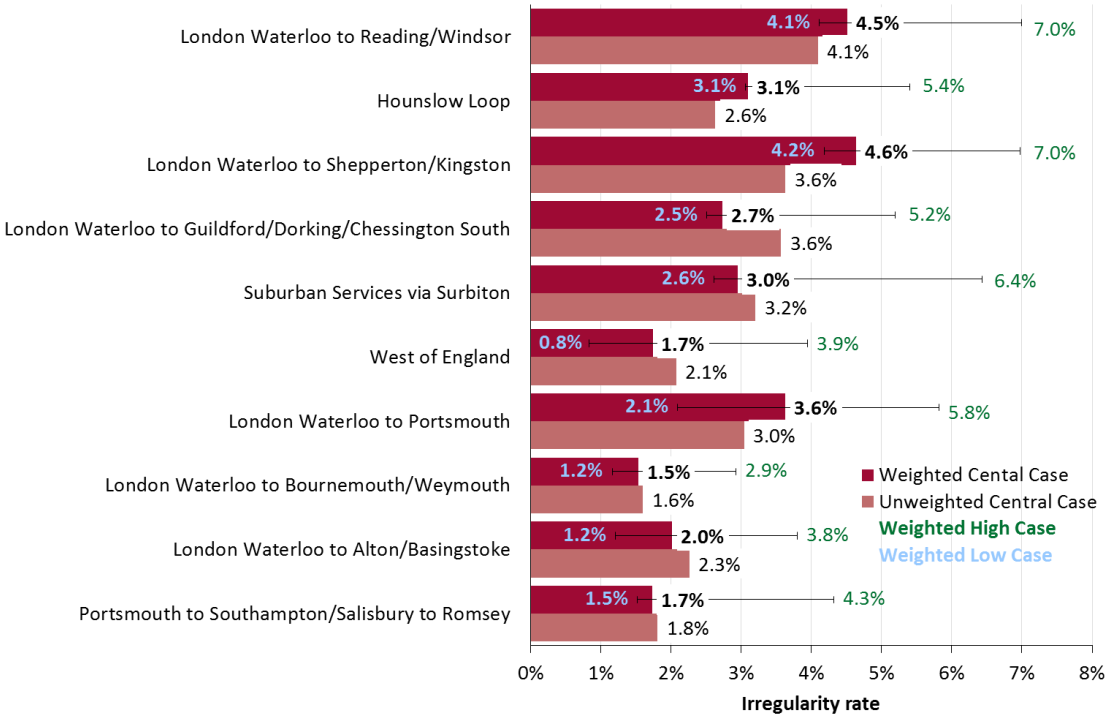
D.2 Figure D.1 shows the irregularity rate estimates by time period weighted by 2014/15 P08 – 2015/16 P07 data, alongside the unweighted Central Case. The results are very similar to the 2014/15 full year results, with the only difference to the irregularity rates to one decimal place being the Low Case for Saturdays (1.9% vs. 2.0%). The weighted irregularity rates for the franchise as a whole are the same to the level of accuracy reported as the 2014/15 full year results, at 3.2% in the Central Case, 2.7% in the Low Case and 5.5% in the High Case.

Figure D.1:Irregularity rate by time period (LENNON sensitivity results)



D.3 Figure D.2 shows the irregularity rate by service segment weighted by 2014/15 P08 – 2015/16 P07 data. To the level of accuracy reported, there are no differences between these results and those based on 2014/15 full year data.

Figure D.2: Irregularity rate by service segment (LENNON sensitivity results)



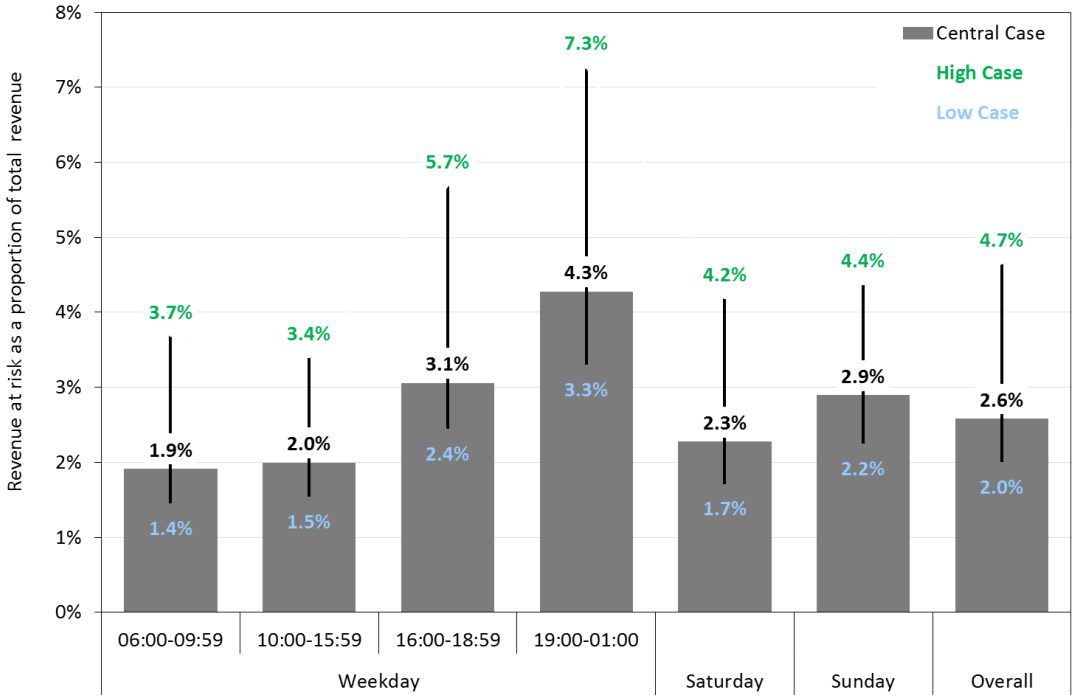
D.4 Table D.2 presents the weighted revenue at risk by time period and service segment, based on 2014/15 P07 to 2015/16 P07 LENNON data. The overall revenue at risk is £25.9m annually. This is higher than the result using 2014/15 full year data, with the difference largely due to a higher franchise revenue. Note that these figures are in nominal terms (we have not adjusted to 2014/15 prices).

Table D.3: Revenue at risk by service segment and time period (£m nominal, 2014/15 P08 to 2015/16 P07)

Service Segment	Weekday 06:00-09:59	Weekday 10:00-15:49	Weekday 16:00-18:59	Weekday 19:00-01:00	Saturday	Sunday	Total	% of Total
London Waterloo to Reading / Windsor	0.77	0.83	2.62	1.07	0.24	0.14	**5.67**	21.9%
Hounslow Loop	0.38	0.21	0.32	0.60	0.03	0.03	**1.57**	6.0%
London Waterloo to Shepperton / Kingston	1.41	0.29	1.21	0.67	0.05	0.13	**3.75**	14.5%
London Waterloo to Guildford / Dorking / Chessington South	0.37	0.37	0.48	0.49	0.30	0.10	**2.11**	8.1%
Suburban Services via Surbiton	0.54	0.18	0.22	0.24	0.13	0.09	**1.41**	5.4%
West of England	0.15	0.47	0.42	0.30	0.09	0.09	**1.51**	5.8%
London Waterloo to Portsmouth	0.48	0.28	1.44	0.73	0.34	0.67	**3.94**	15.2%
London Waterloo to Bournemouth / Weymouth	0.48	0.35	0.99	0.04	0.30	0.22	**2.38**	9.2%
London Waterloo to Alton / Basingstoke	1.24	0.43	0.43	0.60	0.56	0.15	**3.42**	13.2%
Portsmouth to Southampton / Salisbury to Romsey	0.05	0.03	0.05	0.01	0.03	0.00	**0.16**	0.6%
Total	**5.86**	**3.45**	**8.17**	**4.75**	**2.06**	**1.63**	**25.92**	100.0%
% of Total	22.6%	13.3%	31.5%	18.3%	7.9%	6.3%	100.0%	

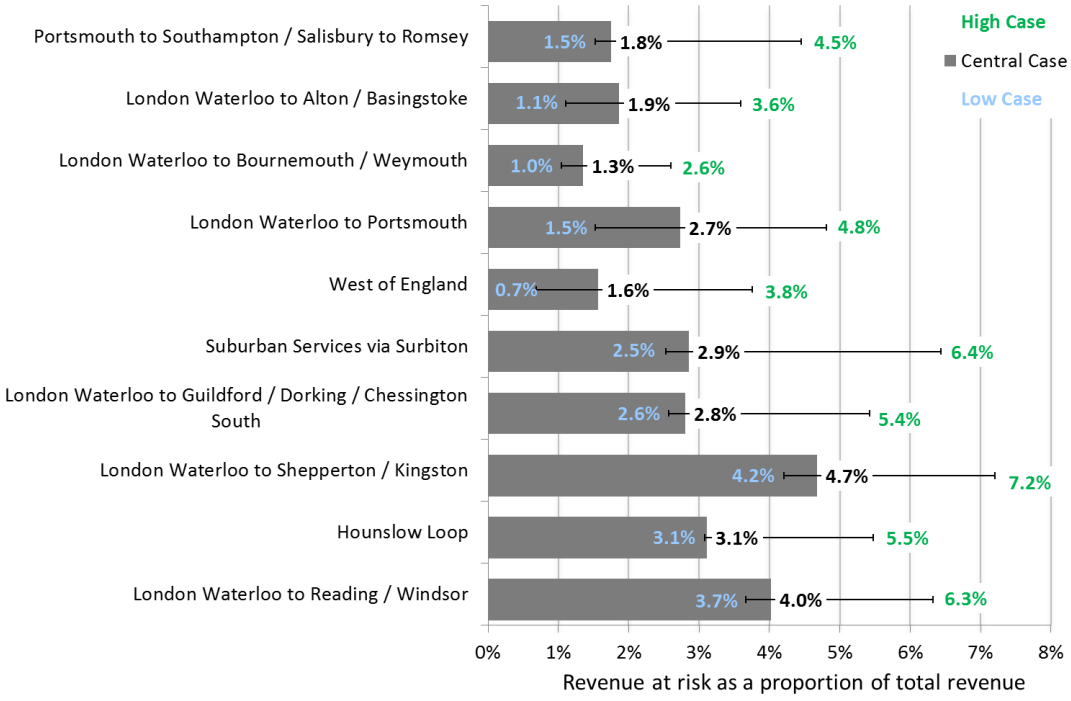
D.5 Figure D.3 illustrates the proportion of revenue at risk by time period based on 2014/15 P08 – 2015/16 P07 LENNON data, in the Low, Central and High Cases. The results are very similar to those for 2014/15 full year, which highlights that the increase in monetary revenue at risk in this scenario is driven more by the increase in franchise revenue than the slight changes in the weighting profile.

Figure D.3: Proportion of revenue at risk by time period (LENNON sensitivity results)



D.6 Figure D.4 illustrates the proportion of revenue at risk by service segment based on 2014/15 P08 – 2015/16 P07 LENNON data. The results are very similar to those for 2014/15 full year, with all Central Case revenue at risk proportions the same at the level of accuracy reported.

Figure D.4: Proportion of revenue at risk by service segment (LENNON sensitivity results)



CONTROL INFORMATION

Prepared by	Prepared for
Steer Davies Gleave 28-32 Upper Ground London SE1 9PD +44 20 7910 5000 www.steerdaviesgleave.com	Department for Transport Great Minster House 33 Horseferry Road London SW1P 4DR

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Author/originator	Reviewer/approver
Sarah Berman	Chris Whitehouse

Other contributors	Distribution
Emma Brown, Kabir Seehra	*Client:* Jag Maitala, George Clarkson, Nigel Nuttall *SDG*: Project team

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