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The problem of homogeneity of rail passenger delay compensation scheme rules in Great Britain: impacts on passenger engagement and operator revenues

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Abstract

A rail passenger delay compensation scheme operates in the EU and Great Britain. British travellers are eligible to claim 50% of fare for delays of more than 30 minutes and 100% for delays of over 1 hour. The scheme rules were chosen arbitrarily and are homogenous across all ticket types and journey lengths. This study quantifies the impact of combined differences in the nature of operation and passenger engagement levels on the scheme's revenue burden for British rail operators. Short, medium and long distance operators repay on average respectively 0.3%, 0.8% and 1.8% of their ticket revenues as the scheme's proportionate revenue burden increases with fares and delay lengths. Further research is needed to either explain the reasons behind the differing revenue impact on different types of operators or suggest how the scheme can be redesigned to take these differences into account.

Keywords: rail delays; rail passenger compensation scheme; delay repay; competition policy; regulation and liberalisation of services; market competitiveness and efficiency

1. Introduction

Delays in transport have been an important research area as they are costly for passengers, operating companies and the infrastructure managers and are one of the crucial aspects of journeys, affecting levels of demand, mode, route or travel time choices (Paulley et al., 2006; Preston et al., 2009; Batley et al., 2011). Passengers may plan for some anticipated disruption and allow extra buffer time to their schedules as a safety margin to increase the probability of arriving to their destination within the preferred time window (Bates et al., 2001). However, as most delays are small,

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longer delays often cannot be predicted and taken into account by travellers as applying appropriate margins may be unreasonable (Rietveld et al., 2001; Bergström and Krüger, 2013). Depending on journey characteristic, travellers perceive 1 minute of delay as being 1 to 6.5 times worse than 1 minute of scheduled journey time (Preston et al., 2009). Following worsening performance, passengers can respond by changing operator, mode, time of travel or decide not to travel at all, but such responses will depend on the availability of alternatives (Preston et al., 2009; Batley et al., 2011; Wardman and Batley, 2014). Both abandoning the journey or spending more time travelling following a delay incurs loss of social welfare. Train operating companies (TOCs) may compensate passengers for the resulting loss for reasons of social responsibility, meeting regulatory requirements, maintaining competitive position and/or to prevent potential demand/revenue losses in the future. The most immediate way to compensate for the increase in travel time following late-running is to repay the passenger an appropriate portion of fare.

Passenger delay compensation schemes operate within EU and GB rail and airline sectors with significant differences in the rules relating to the lengths and types of delays qualifying for compensation as well as how the compensation is calculated. The rail compensation scheme was adopted as part of the EU directive 1371/2007, which details the minimum levels of compensation passengers are entitled to claim for severe delays with operators exempt from paying it in the event of *force majeure* (European Parliament, 2007; 2021). Similarly, airlines are only required to pay compensation in case of delays which can be attributed to the operator's fault. While rail passengers can be compensated to the maximum of fare paid, in case of airlines the compensation is not linked to ticket price and often exceeds the original fare (European Parliament, 2004; Europe Economics, 2019).

The rail passenger compensation scheme rules differ between countries and operators as some decided to compensate the passengers for shorter delays or repay a larger portion of the ticket prices (see Table 1 for examples). Moreover, in some cases, i.e., Spanish operator Renfe or Czech-based open-access operator RegioJet, different delay thresholds apply for different types of services and delays.

Table 1. Rail passenger delay compensation scheme rules across the EU and GB (Source: Operators' websites)

	EU directive 1371/2007 (Germany, Czechia)	Great Britain	Spain (Medium distance)	Spain (AVE high-speed)	The Netherlands	RegioJet (<1.5 h, operator's fault)	RegioJet (<1.5 h, not operator's fault)
15-29		25% (selected TOCs)	25%	50%			
30-44		50%	50%	100%	50%	50%	25%
45-59		50%	50%		50%	50%	25%
60-89	25%	100%	100%		100%	100%	25%
90-119	25%	100%					100%
>120	50%	100% (return)					

For both airlines and rail, the data on passenger delay compensation are typically not available or limited to a brief summary in case of most countries. The European Regions Airline Association (2019) estimated that the current scheme costs its member airlines around €20m with compensation paid to over 90,000 passengers per annum. According to ERA (2019), if the EU minimum rail compensation scheme rules (i.e. based on the 1371/2007 directive) applied instead, €11m would be paid to 260,000 passengers. Some of the airlines claimed that the current scheme costs up to 5% of their turnover, affecting the possibility to grow their networks (ERA, 2019). The focus of this study remains on Great Britain, where data on both performance and compensation have been published for multiple years for each of the franchised TOCs. British rail passengers were repaid £89.4m (€105m) in 2019 (Gov.uk, 2020). In Germany, 2.7m rail passengers were repaid in 2018 with the total compensation reaching €53.6m (The Local, 2019). In Spain, 2.56 claims were submitted per 1000 passengers on high-speed/long distance journeys and 1.05 on medium distance journeys in 2019 (Renfe, 2019). While all these values provide some valuable insights, they are aggregate and not directly comparable between the countries due to the differences in the rules and the claiming processes.

All of the British franchised TOCs are required to provide compensation for passengers affected by all types of delays of over 30 minutes with a number of TOCs voluntarily paying compensation for delays of over 15 minutes as

detailed in Table 1 (ORR, 2016). It can be expected that passengers place some value on the existence of the compensation scheme, but how the scheme's benefits compare with the costs is currently unknown. In fact, little is known about the scheme's benefits and the impact of the scheme's design on its costs. The costs are driven by the number of passengers eligible to claim compensation and the proportion who decided to submit claims. Eligibility is determined by the scheme rules and is driven by performance. At the same time, the engagement levels (i.e. propensity to claim compensation) may differ between passengers due to differences in awareness and sensitivities to lateness, but also as a result of expected costs and benefits of claiming compensation (i.e. opportunity cost of not claiming compensation). This has generally been confirmed by the surveyed passengers stating length of delay and ticket price as the most important determinants of their engagement with the scheme (Department for Transport, 2020).

The aim of the present study is to review the rail passenger compensation scheme and empirically test the impact of the differences in TOC characteristics on the compensation payments to improve the understanding of the scheme's revenue burden. In this way we seek better understanding of the practicalities of the scheme, which might give cause for reflection on the design of the scheme and how it might be improved.

This paper starts with review of current design of the 'Delay Repay' compensation scheme in GB, followed by the summary of data and methodology used. The remaining sections describe the results of this work and provide some policy recommendations along with future research directions.

2. Passenger 'Delay Repay' scheme in GB

In Great Britain, the 'Delay Repay' (DR) scheme has been introduced as a means of compensating passengers experiencing severe delays and to regulate the minimum customer service requirements for treatment of passengers following late-running (ORR, 2014; 2016). The scheme is not connected to the Schedule 8 payment regime - an incentive mechanism, where affected TOCs (and the infrastructure manager) compensate each other for the effects of late-running on long-term ticket revenue. As argued by ORR (2014; 2016), while both schemes reflect performance - they serve different roles. Schedule 8 relates to compensation and incentive arrangements between TOCs and the infrastructure manager, and passenger 'Delay Repay' serves as means of compensating passengers for delays.

Both the guidelines provided by the European Commission and the GB's implementation of the scheme have been arbitrary with no documented economic research into the effects that late-running has on passengers and the value passengers place on such a scheme as compared with the costs. The DR scheme rules have been mostly standardised across the TOCs since 2016, which makes objective comparison possible. Since then, total compensation payments have been oscillating between £74m-£84m per annum. The introduction of the DR15 scheme in 2019 (compensation for delays between 15-30 minutes) led to an additional £5.2m compensation being paid to passengers. However, the timing of the introduction of the scheme differed between TOCs and with only one (not full) year of pre-COVID data available, analysis of the impact of introducing DR15 scheme is currently not in the scope of this work.

In recent years, there has been interest from the regulatory bodies, the public and TOCs regarding passengers' levels of engagement with the DR scheme. The Department for Transport (2020) noted that while the proportion of passengers claiming compensation has been increasing, only 37% of surveyed passengers who experienced a delay qualifying for compensation decided to engage with the scheme. Passengers quoted length of delay and ticket price as two major characteristics of their journey motivating their attitude towards the scheme with estimated claim rates ranging from 22% for Transport for Wales to 64% for LNER (Department for Transport, 2020). When thinking about engaging with the scheme, the passenger will choose whether or not to claim compensation based on the disutility resulting from delay and expected benefits minus perceived costs of submitting a claim (Europe Economics, 2019). This mechanism, in fact, is very similar to switching bank accounts or energy providers with a potential for benefits after having engaged with the process, which requires the investment of both time and effort (The Social Market Foundation, 2015; Europe Economics, 2019).

The total amount of compensation repaid to passengers depends on how many passengers are eligible to claim compensation and the percentage of eligible passengers that submitted claims. Eligibility (which can be understood as total compensation passengers could have claimed) depends on performance, fare levels and is determined by the scheme rules, which are predefined. Engagement, on the other hand, is expected to increase with delay length, ticket price and depends on variation in the marginal disutility of lateness of different passengers (due to heterogeneity in sensitivity to lateness) and opportunity cost of not claiming compensation.

Since the introduction of the scheme, the TOCs and the regulator have made efforts to make the claiming process easier and thence less costly for delayed passengers in order to increase engagement levels (ORR, 2016; Europe Economics, 2019; Williams Rail Review, 2019). The most obvious way of increasing engagement is automating the claiming process, which would also reduce the administrative costs and the number of fraudulent claims (Railway Technology, 2020). While on average, compensation constituted around 1% of ticket revenue, it differs somewhat across TOCs and ranges from 0.1% to almost 3% as shown in Figure 1. While this may look like the scheme has a marginal impact on the TOCs' ticket revenues, automation of the scheme would further increase the compensation volumes. On the one hand, the delay compensation can be seen as an additional cost of delays with TOCs having little incentive to encourage passenger engagement. However, passengers may actually value the existence of the scheme, but it remains difficult to estimate the impact the scheme has on demand and revenue vis-à-vis its costs.

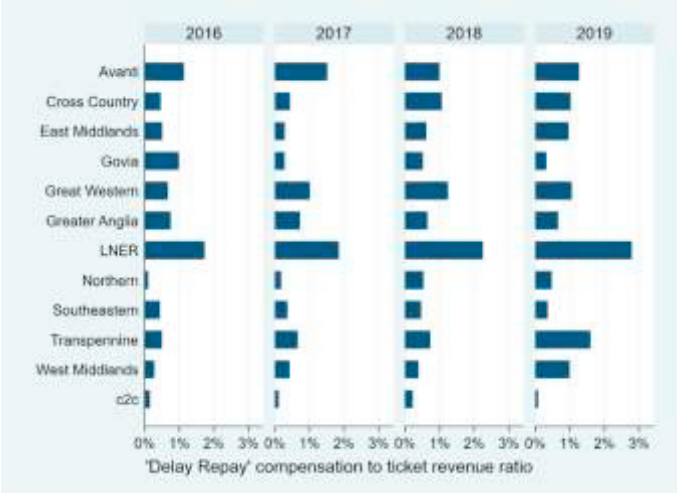

Fig. 1. 'Delay Repay' compensation to ticket revenue ratio

3. Methodology and data

An econometric model was constructed to empirically test the impact of performance levels and TOC characteristics on the compensation payments made to passengers through the DR scheme. The scheme rules have been fairly consistent across the 12 selected TOCs and 4-year period covered by the dataset between 2016 and the COVID era (though DR15 payments have been excluded since these only commenced in 2019). As compensation represents a percentage of ticket price, it is natural that (assuming common levels of performance and engagement), the total compensation increases with demand and ticket prices. Thus, to make comparisons between TOCs possible, the compensation was divided by the ticket revenue with the ratio representing the scheme's revenue burden, dependent on eligibility (determined by performance) and engagement (determined by both performance and fares).

It is important to note that average passenger lateness (APL) and percentage of station stops delayed by over 15 minutes are highly correlated and increase both eligibility and engagement. Therefore, the APL coefficient represents the combined effect that eligibility and engagement have on compensation levels due to the impact of lateness on disutility levels. The TOC type category or average fare refer to the additional effect that the increased fare (and thus journey length as both are highly correlated) has on engagement levels due to increased opportunity cost of not claiming compensation. Dummy variables for each of the years control for the possibility that compensation payments have been increasing throughout the years due to increased engagement as passengers have become more familiar with the scheme and TOCs have made efforts to reduce the costs of claim submission.

Most delay, compensation and journey characteristic data are available on ORR data portal and Department for Transport website annually for the 12 selected British franchised TOCs as summarised in Table 2. All the variables are characterised by large ranges of values as different TOCs generally represent different types of journeys and cover different geographies. TOCs were divided into three categories based on average fare and journey length, representing

short (up to 50 km), medium (50-100 km) and long distance journeys (over 100 km). This categorization acts as a proxy for differences in passenger and journey characteristics that impact on levels of engagement for different journey lengths. Additional categorization was based on whether the TOC was operating within the South East of England where London is a major attraction as these passengers have usually been showing significant differences in fare or journey time elasticities, highlighting the potential for differences in engagement across TOCs. A large increase in compensation payments by LNER in 2019 cannot be fully explained by a similar increase in APL. To mitigate that, an additional dummy variable representing 2019 LNER was introduced to the model.

Table 2. Descriptive statistics

	Min	Max	Mean	SD
APL [min]	0.8	10.5	4.1	2.1
Average Fare [£]	3.0	36.8	11.9	10.5
Average Journey Length [km]	24.5	260.6	79.7	71.9
Claims per 1,000 passengers (2018-2019)	0.5	21.6	6.2	5.4
Compensation per passenger journey [pence]	0.3	102.7	14.0	22.7
Compensation to revenue ratio [%]	0.1	2.8	0.8	0.6
% of stops delayed by over 15 min	0.3	8.7	3.1	2.2

Punctuality metrics have usually focused on the supply side of delays, weighting delays by trains or stops rather than the number of affected passengers (Rietveld et al., 2001; Preston et al., 2009). Within the GB railway, there are two metrics describing lateness relevant to eligibility and engagement with the 'Delay Repay'. APL is an estimated length of delay an average passenger on British rail is subjected to. While APL represents the mean lateness, the compensation scheme only depends on the number of passengers affected by the lengthier delays. Therefore, this will depend more on the skewness of the delay distribution, rather than its mean. It can, however, be expected that average lateness generally increases with more passengers being delayed by over 15 minutes. Network Rail periodically publishes performance data - for example, between the 7th and 31st March 2021 across the whole GB network over 80% of stops were on time, with only 0.5% of station stops being delayed by 15 minutes with 1.7% of stops being cancelled altogether. At the same time, APL of 1.06 minutes was estimated.

4. Results and discussion

Before investigating the impact of differences in journey types on how much compensation is repaid by each of the TOCs, the differences in the nature of their operation need to be investigated and understood in more detail. As the pricing model suggests, longer journeys are usually more expensive with average fare per kilometer of journey length ranging from 12 to 18 pence. As expected, average journey length and average fare are characterised by almost perfect positive correlation (r=0.99) as showed in Table 3. As more expensive journeys attract more engagement, this may translate to a higher proportion of revenue repaid by TOCs serving longer journeys. If it was assumed that delays are distributed evenly across the network (i.e., probability of being delayed increasing linearly with journey length), it could also be expected that longer journeys are characterised by longer delays. Average journey length is positively correlated with average lateness (r=0.78) and percentage of stops delayed by over 15 minutes (r=0.86) as marginal delay decreases with journey length, possibly due to differences in journey characteristics. Taking all this into account, passengers travelling on longer (and thus more expensive services) will usually be subjected to longer delay, but resulting in a smaller percentage increase in journey time. This, in turn, means that while a higher percentage of passengers on the more expensive journeys will be eligible to claim compensation, higher claim rates can be expected due to longer delays and more expensive tickets as was also suggested by surveyed passengers (Department for Transport, 2020). This is likely to have an impact on the proportion of ticket revenue repaid by different TOCs.

Table 3. Correlation matrix

	(1)	(2)	(3)	(4)	(5)
(1) Compensation to revenue ratio	1.00				
(2) Average passenger lateness	0.88	1.00			
(3) % stops delayed by over 15 min	0.85	0.94	1.00		
(4) Average fare	0.81	0.75	0.84	1.00	
(5) Average journey length	0.82	0.78	0.86	0.99	1.00

As APL ranges from 0.8 to 4.7 minutes on short distance TOCs, 3.2 to 8.4 on medium distance and 3.9 to 10.5 on long distance, it can be expected that the variation in compensation to revenue ratios may to some extent be due to differing eligibility levels. It is now also of interest to investigate the impact of increased engagement, having controlled for delay levels. If long distance TOCs repay a larger proportion of their revenues, it might be necessary to find an economic or regulatory explanation for this discrepancy.

The OLS econometric model was run to test the impact of increasing lateness and fares on the revenue burden of the scheme on different TOCs through increased eligibility and engagement. Random effects were found to be non-significant in the Breusch-Pagan Lagrange multiplier (p=0.13), suggesting that a simple OLS model is valid. The results are presented in Table 4, suggesting that for each £1m ticket revenue, a minute of average lateness costs TOCs more than £2000 in compensation. Long distance TOCs repay an additional £4500 (or £2000 for each £10 of average fare) while London and South East operators repay an additional £1700-£2300. A time trend was not statistically significant, suggesting that changes in the scheme have not had any significant impact on engagement.

Table 4. Modelling results

	OLS1	OLS2	RE
Average passenger lateness	.0024***	.0021***	.0024***
	(.0005)	(.0004)	(.0005)
% stops delayed by over 15 min	-.0444	-.0378	-.0559
	(.0545)	(.0476)	(.062)
Long distance	.0045***		.0049***
	(.0012)		(.0016)
London and South East	.0017**	.0023***	.0015
	(.0008)	(.0007)	(.0011)
LNER 2019	.0096***	.009***	.0096***
	(.0021)	(.002)	(.002)
2017	-.0005	-.0004	-.0005
	(.0008)	(.0007)	(.0007)
2018	-.0001	.0001	0
	(.0008)	(.0007)	(.0007)
2019	.0005	.0007	.0005
	(.0008)	(.0008)	(.0007)
Average fare		.0002***	
		(0)	
Constant	-.0025**	-.0038***	-.0022*
	(.001)	(.0009)	(.0012)
N	48	48	48
R-squared	.89	.91	.91

*Standard errors are in parentheses, *** p<.01, ** p<.05, * p<.1*

At the same time, as pointed out previously, APL increases with journey length and, in turn, with average fare. Table 5 shows average fare and APL for short, medium and long distance TOCs. These are then used to compute the average effects of performance on eligibility and engagement and additional engagement effect of average fare. Thus, on average, the effect of APL on compensation increases from 0.6% of revenue on short distance TOCs to 1.5% for long distance TOCs. The additional engagement related to the increased opportunity cost of not claiming compensation translates to 0.1% of revenue for short distance TOCs to 0.7% for long distance TOCs. Both effects combined lead to an increasing burden of the scheme for TOCs operating longer journeys.

Table 5. Average impact of eligibility and engagement on ticket revenues of different types of TOCs

	Short	Medium	Long
Average passenger lateness	2.72	4.63	7.01
Average fare	4.75	11.80	33.61
Eligibility	0.57%	0.97%	1.47%
Additional engagement	0.10%	0.24%	0.67%
Constant	-0.38%	-0.38%	-0.38%
Total	0.29%	0.83%	1.76%

5. Conclusion

Rail passenger delay compensation schemes have been introduced in the EU and GB to protect the rights of delayed passengers. The scheme rules differ between the EU countries and GB, but the economic rationale behind the schemes is similar. GB's 'Delay Repay' scheme was the focus of this paper, because data was readily available, enabling comparison of DR's revenue impact on different types of TOCs. Approximately £80m is repaid to passengers every year as part of the DR scheme in GB, what translates to between 0.1% and 3% of TOCs' ticket revenues. While scheme rules are homogenous (i.e., proportion of ticket price passengers are eligible to claim back does not change with journey or delay lengths), longer journeys are usually characterised by longer delays. This has an impact on the number of passengers being eligible to claim compensation, what is further amplified by the marginal propensity of claiming compensation increasing with delay lengths and ticket prices.

While more research is needed to understand the differences in engagement rates, this work provides additional evidence that propensity to claim compensation increases with delay lengths and ticket prices. The differences in eligibility (increasing with delay lengths) and engagement (increasing with ticket price and delay lengths) lead to significant differences in DR's revenue burden for different TOCs. On average, 1 minute of APL translates to 0.2% of ticket revenue being compensated to passengers. The additional engagement effect on long distance and London and South East operators results in respectively additional 0.5% of ticket revenue (or 0.2% for each £10 of average fare) and 0.2% being repaid to the passengers.

This study serves as a motivation for regulators to require TOCs to collect and publish more detailed data on compensation. While compensation accounts for only a small percentage of TOCs' revenues, greater automation of the scheme would contribute to increasing compensation payments, highlighting the need for further research looking at comparing the scheme's costs with its benefits. This could lead to a study looking at redesigning the scheme rules based on economic theory combined with empirical evidence available on how the compensation scheme works in practice. While the hypothesis tested in this study may be directly applicable to GB, the results also highlight the need for enhanced data collection and monitoring of the impacts of corresponding schemes across the EU.

There are two immediate areas which would benefit from further research. First of all, more detailed data on compensation in combination with ticket data would allow a deeper analysis of the differences in eligibility and engagement. Secondly, understanding the shape of marginal disutility of lateness function could provide more insight into how the impact of lateness on passenger's satisfaction changes with delay levels and journey lengths.

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References

Bates, J., Polak, J., Jones, P., Cook, A. 2001. The valuation of reliability for personal travel. Transportation Research Part E: Logistics and Transportation Review, 37, 191-229.

Batley, R., Dargay, J. & Wardman, M. 2011. The impact of lateness and reliability on passenger rail demand. Transportation Research Part E: Logistics and Transportation Review, 47, 61-72.

Bergström, A., Krüger, N. A. 2013. Modeling passenger train delay distributions – evidence and implications. CTS Working Paper, 3.

Department for Transport. 2020. Rail delays and compensation 2020. Moving Britain ahead. London.

Europe Economics. 2019. Delay repay claims companies market review. London.

European Parliament. 2004. Regulation (EC) No 261/2004 of the European Parliament and of the Council of 11 February 2004 establishing common rules on compensation and assistance to passengers in the event of denied boarding and of cancellation or long delay of flights, and repealing regulation.

European Parliament. 2007. Regulation (EC) No 1371/2007 of the European Parliament and of the Council of 23 October 2007 on rail passengers' rights and obligations.

European Parliament. 2021. Regulation (EU) 2021/782 of the European Parliament and of the Council of 29 April 2021 on rail passengers' rights and obligations.

ERA. 2019. An ERA study into regulation EU261: passenger compensation for delayed or cancelled flights.

Gov.uk. 2020. Rail passenger compensation paid by train operating companies. [online]. Available at: https://www.gov.uk/government/publications/train-operating-companies-passengers-charter-compensation/train-operating-companies-passengers-charter-compensation. [Last accessed 10 March 2022].

ORR. 2014. Passenger compensation and refund rights for delays and cancellations.

ORR. 2016. Office of Rail and Road super-complaint response report: Which? Super-complaint - compensation arrangements in the market for passenger rail services.

Paulley, N., Balcombe, R., Mackett, R., Titheridge, H., Preston, J., Wardman, M., Shires, J., White, P. 2006. The demand for public transport: The effects of fares, quality of service, income and car ownership. Transport Policy, 13, 295-306.

Preston, J., Wall, G., Batley, R., Ibanez, J. N., Shires, J. 2009. Impact of delays on passenger train services: Evidence from Great Britain. Transportation Research Record, 2117, 14-23.

Railway Technology. 2020. Tackling rail fraud in the UK. [online]. Available at: https://www.railway-technology.com/features/rail-fraud-in-the-uk/. [Accessed 3 March 2021].

Renfe. 2019. Informe de responsabilidad social y gobierno corporativo 2019.

Rietveld, P., Bruinsma, F. R., Van Vuuren, D. J. 2001. Coping with unreliability in public transport chains: A case study for Netherlands. Transportation Research Part A: Policy and Practice, 35, 539-559.

The Local. 2019. Rail passengers in Germany paid €53.6 million compensation over late trains. [online]. Available at: https://www.thelocal.de/20190219/train-passengers-in-germany-given/. [Last accessed 10 February 2022].

The Social Market Foundation. 2015. Should switch, don't switch. Overcoming consumer inertia.

Wardman, M., Batley, R. 2014. Travel time reliability: a review of late time valuations, elasticities and demand impacts in the passenger rail market in Great Britain. Transportation, 41, 1041-1069.

Williams Rail Review. 2019. The user experience of the railway in the Great Britain. London.