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Economic Impacts of
new or improved rail
lines

Executive Summary
January 2018

Department for Transport Rail
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Introduction

Background and Objectives

- 1.1 The Department for Transport (DfT) Rail Group appointed Steer Davies Gleave and Cambridge Econometrics to undertake this study with the objective of providing empirical evidence, supported by a theoretical framework, for the potential economic impacts of rail infrastructure investment.
- 1.2 The context to this is a recognition that there is currently a lack of robust ex-post evaluation evidence which demonstrates the economic impact of rail investments. For example, the What Works Centre for Local Economic Growth said in 2015 that *“We found no high quality evaluations that provide evidence on the impact of rail infrastructure on employment”*.

Approach

- 1.3 The approach adopted was to use six varied case studies in order to understand the specific context for the investment, and how this affects the outcomes and impacts of the intervention. Comparison areas for each case study were identified, in order to distinguish between the impacts of the rail investment upon economic outcomes and general economic trends. Moreover, the case studies were selected to provide a combination of retrospective (ex post) and baseline (ex-ante) interventions.
- 1.4 These case studies are introduced in the table below, with findings for each summarised in the following sections.

Overview of case studies

Case study	Stations included	Timing of intervention	Stage	Comparison area	Key features
Corby	Corby	2009	Retrospective	Daventry	New line and new station
Falmouth	Falmouth Dock, Falmouth Town, Penmere	2009	Retrospective	Gunnislake	Step change in service frequency along the branch line
Leamington Spa	Leamington Spa	2011	Retrospective	Rugby	Faster journey times to London and Birmingham
Oxford Parkway	Oxford Parkway, Oxford	2015-2016	Baseline & retrospective	East of Oxford and West of Oxford	New station and new lines providing direct service via Bicester Village to London Marylebone and to Oxford
Bromsgrove	Bromsgrove	2017	Baseline	Longbridge and Droitwich	Electrification and signalling works with associated frequency and capacity increases, plus station improvements

Case study	Stations included	Timing of intervention	Stage	Comparison area	Key features
Swindon	Swindon	2018	Baseline	Basingstoke, Ipswich and Tonbridge	The Great Western enhancement programme will ultimately result in faster journeys, more frequent services, greater capacity, and more modern trains

Method

1.5 Each case study involved a combination of:

- analysis of secondary rail and economic data to identify trends in key indicators such as rail usage, population, and employment;
- a tailored programme of primary research and stakeholder engagement in order to provide additional evidence to help understand the nature of any impacts of the rail investment; and
- econometric analysis utilising a Difference-in-Difference (D-i-D) method to isolate and quantify the effects of the investment on local employment and productivity.

1.6 The analysis was orientated around addressing hypotheses developed from an initial literature review workstream, these being:

1. That improved rail services will, by making rail travel more convenient for local people, encourage additional rail trips including some generated trips and some captured from other modes.
2. That improvements to the station and services will make the affected area a more attractive place to (i) live, (ii) work, and (iii) locate a business.
3. That businesses located near the station with improved services will benefit from improved access to potential employees, customers, and suppliers, resulting in greater productivity.

1.7 Hypothesis 1 identifies the initial change in travel behaviour arising from the changes in connectivity delivered by investment in rail services and stations. In turn, hypotheses 2 and 3 consider how those changes in connectivity might affect behaviour in secondary markets for labour, land, property (commercial and residential) and across the wider economy. Due to the nature of the case study approach, however, we only consider these impacts within the vicinity of the stations affected. Displacement, leakage and substitution effects from other localities are not captured or quantified.

Corby case study – Retrospective analysis

Nature of the improvements

1.8 Following improvements to a formerly freight-only line, a new station and service at Corby was opened in February 2009. Services, operated by East Midlands Trains, are hourly and serve Corby, Kettering, Wellingborough, Bedford, Luton and London St Pancras, with a journey time to London of approximately 70 minutes.

Transport impacts of improvements

- 1.9 In the first year of operation (2010-11) 115,000 journeys were made to/from Corby, with growth above the regional and national averages since then.
- 1.10 The demand at Corby is partly due to abstraction from Kettering and Market Harborough, and partly due to new rail demand. The exact balance of these two effects is hard to establish because of the Great Recession which coincided with the opening of the new station.
- 1.11 Trends in the rail usage data are supported by primary research with station users, local residents and local businesses. Some pertinent findings include:
- the proportion of local residents living in Corby who travel by rail is greater than for residents living in Daventry (61% v 50%) although, typically, Corby residents use the rail services less than once a week;
 - a substantial proportion of Corby station users (62%) reported that they either started travelling by rail only since the station opened (8%) or increased their usage of rail in this time (54%);
 - some (24%) also reported a decrease in car driver trips, though not all of this can be directly attributed to the effects of the new station and rail services; and
 - the majority (86%) of Corby station users agreed that travelling by rail was more convenient following the opening of the station.

Economic impacts of improvements

- 1.12 Population data from the Office for National Statistics (ONS) shows that Corby has been the fastest growing town in England (on average) since 2006, although this trend predates the rail investment.
- 1.13 However, the primary research provides some support for the hypothesis that the improved rail provision has encouraged people to live in the area: 27% of Corby residents said that rail services were an important consideration when choosing where to live. This compares with 21% of Daventry residents.
- 1.14 In terms of employment effects, the econometric analysis shows that there was a statistically significant positive impact on employment in both the Retail and the Wholesale, Transport and Storage sectors in the six years post-intervention (2009 – 2015). For employment across all sectors there was a marginal but not statistically significant positive impact.
- 1.15 Again, the primary research supports these findings:
- 20% of Corby businesses said that rail is an important factor in choosing where to locate a business (compared to 19% in Daventry);
 - 30% said that rail is important for clients or suppliers visiting the site (compared to 17% in Daventry); and
 - 25% said that it is important for receiving customers (compared to 12% in Daventry).
- 1.16 In terms of productivity, there were no statistically significant effects identified by the econometric analysis.

- 1.17 The evidence suggests that the intervention has been positive in supporting local population growth trends. Some sectors, notably those providing tertiary services, have grown following opening of the new station and commencement of rail services, although this appears to have offset declines in other sectors. This suggests that rail services may support a larger resident population of outbound commuters, rather than generating significant additional economic activity in Corby itself.

Falmouth case study – Retrospective analysis

Nature of the improvements

- 1.18 In May 2009, improvements to the Falmouth Branch line delivered an increase in route capacity which facilitated a doubling of the train service frequency to two trains per hour (tph), at evenly spaced intervals throughout the day, to Truro.

Transport impacts of improvements

- 1.19 An important part of the context for this case study is the relative importance of tourists, visitors and students to rail demand. Overall across the three Falmouth stations, our station user's survey found that a fifth of users are tourists or day visitors, and nearly a third are students.
- 1.20 Since the improvements (that is, between 2008-09 and 2015-16) the annual growth in usage across the Falmouth stations has been 8%, compared with 1% at Gunnislake (the comparator area) and 3% for the county average (Cornwall).
- 1.21 This growth in station usage based on Office for Rail and Road (ORR) data is supported by the primary research which showed that 22% of station users said that they increased their use of rail since the service improvements. An important factor behind this seems to be improved convenience of the rail services (reported by 38% of users).
- 1.22 There is also some evidence of mode shift since 11% of Falmouth residents said they had decreased the number of car journeys (car-driver) since the improvements to the rail service.

Economic impacts of improvements

- 1.23 Population growth in Falmouth since the improvements has been significantly higher than in the comparison area of Gunnislake, and it has also been marginally higher than for Cornwall.
- 1.24 From the survey of Falmouth residents, 39% of people moving house since 2010 reported that the rail services were an important consideration when doing so. This supports the hypothesis that at least some of the population growth has been supported by rail improvements.
- 1.25 Employment in Falmouth has also outperformed that in Gunnislake, with 8% growth compared with 15% decline respectively between 2009 and 2015. The growth in Falmouth employment has been particularly evident in the Accommodation and Food sectors, potentially reflecting the role of tourism in the area. The econometric analysis confirmed this trend, with Falmouth outperforming Gunnislake in tourist related sectors, although the effect of rail investment is difficult to isolate definitively since it appears that Gunnislake was particularly badly affected by the Great Recession.
- 1.26 Primary research with local businesses in Falmouth does indicate that rail has an important role in supporting businesses, with 40% saying that rail is important for receiving customers, and 18% that it is important for clients or suppliers visiting their site. Furthermore, around a

third of tourists in the rail user survey said that rail was important to their choice of where to stay.

- 1.27 Analysis of productivity effects shows that although the trend in turnover was significantly better in Falmouth compared with Gunnislake post-intervention, there is insufficient evidence to establish causality.
- 1.28 However, the evidence does suggest that the rail investment improved the resilience of the Falmouth economy to the Great Recession in comparison to Gunnislake.

Leamington Spa case study – Retrospective analysis

Nature of the improvements

- 1.29 Rail infrastructure improvements, completed in 2011 as part of the Chiltern Evergreen 3, Phase 1 programme, have led to faster journey times between Leamington Spa, London and Birmingham. These improvements are summarised in the table below.

	2007 (Pre-Evergreen 3)	2017 (Post-Evergreen 3)	Minutes saving
Leamington Spa – London Marylebone	91 minutes	71 minutes	20 minutes
Leamington Spa – Birmingham Moor Street	33 minutes	29 minutes	4 minutes

Transport impacts of improvements

- 1.30 Since the improvements (that is, between 2010-11 and 2015-16), use of Leamington Spa station has increased by 5.6%. However, this growth is slightly below that for Rugby, the comparator area, and the West Midlands region where the growth rates were 7.8% and 6.6% respectively.
- 1.31 These trends are reflected in the primary research amongst station users at Leamington Spa and Rugby in which the proportions saying they had increased their use of rail over the past 5 years were higher in Rugby than in Leamington. Specifically, while 12% of Leamington Spa users said they had increased the amount they travel to London, for Rugby users the equivalent figure was 29%. The results were similar for trips to Birmingham, with some increases from Leamington but greater increases from Rugby. However, it is worth noting that the results for Rugby may reflect the significant improvements to the West Coast Main Line in 2008.
- 1.32 Similarly, user satisfaction levels in the station user surveys were higher in Rugby than in Leamington Spa. While the majority of users (70% plus) identified themselves as quite or very satisfied at both stations, the proportion that was very satisfied was considerably higher for Rugby users.
- 1.33 One other apparent transport effect of the improvements at Leamington Spa is a shift in the mix of rail destinations. Thus, while there was an increase in the proportion of trips from Leamington Spa to London Marylebone from 20% to 23%, the increase to Birmingham stations was greater (21% to 28%). Furthermore, the mix of Birmingham stations changed, with a shift from New Street to Moor Street and Snow Hill, that is, the stations served by the Chiltern Main Line and benefitting from the Evergreen 3, Phase 1 investment programme.

- 1.34 The primary research also provides some evidence of a potential small mode shift effect, with 12% saying they had decreased their car driver trips since the service improvements compared with 6% saying they had increased their car driver trips.

Economic impacts of improvements

- 1.35 The evidence from the secondary economic data on population, employment and productivity suggest that the effects of the improvements on the local economy have been limited. Population growth in Leamington has largely tracked that of Rugby and the West Midlands region suggesting that the rail improvements have not had a substantive effect. This is likely to be at least in part because of the commuting patterns of residents living in Leamington Spa, the majority of whom commute within the Warwick local authority area, or Coventry, and therefore do not benefit noticeably from the improvements.
- 1.36 Analysis of employment and turnover effects using the D-i-D approach were also inconclusive. There is some evidence of an increase in employment in the Hotels and Restaurants, and Retail sectors relative to Rugby although this cannot be conclusively attributed to the rail investment. No reliable results were obtained from the D-i-D analysis of turnover due to the lack of a common trend between the treatment and comparator areas prior to the intervention.
- 1.37 The evidence suggests that the intervention has been positive in supporting passenger growth and satisfaction levels that are comparable with other locations, and so maintaining rather than significantly changing the town's existing economic position within the West Midlands.

Oxford Parkway case study – Early impacts and baseline analysis

Nature of the improvements

- 1.38 This case study comprises two inter-related elements: the opening of the Oxford Parkway station and a rail chord to the Chiltern Main Line at Bicester in October 2015 and the completion of route upgrades to Oxford station in December 2016, enabling direct services between Oxford and London Marylebone.
- 1.39 Oxford Parkway station is located four miles north of the city centre, within Cherwell local authority. Using the new station and the new chord at Bicester, Chiltern Railways offers comparable journey times to the Paddington route operated by GWR but at lower levels of frequency (currently 2tph compared to 6tph).

Transport impacts of improvements

- 1.40 The 2015/16 ORR station usage data which includes a part-year of data for Oxford Parkway prior to the chord being opened shows 275,000 entries and exits (equivalent to approximately 1,400 per day) at the new station and approximately 6.6 million entries and exits per year, or approximately 22,000 per day at Oxford. Examining the trends for passenger demand from Oxford and Oxford Parkway combined shows a 3% increase, which is greater than the South East average and is consistent with some trip generation (or mode switching to rail), as well as some abstraction.

Both ORR station usage data and primary research findings amongst users of Oxford and Oxford Parkway indicate that some of the demand at Oxford Parkway has been abstracted from Oxford station, and some is from new rail trips mainly being made by people living to the north of Oxford.

1.41 The rail user survey results for Oxford Parkway passengers provides further evidence for the observed behavioural impacts. When asked how they made their current trip before Oxford Parkway was opened:

- 41% said they previously made the trip via Oxford and 30% via another station;
- 10% reported they previously made the trip by car and a further 10% by bus; and
- the remaining 19% said they were making new trips they did not make previously.

Anticipated economic impacts of improvements

1.42 Initial indications from the analysis of transport impacts support the hypothesis that the rail investment could make the case study area a more attractive place to live and work, due to improved rail connectivity. However, the parkway nature of the station means that these effects are likely to be spread over a relatively wide geographic area, including in particular the area to the north of Oxford.

1.43 In addition, it is hypothesised that improved connectivity could increase the attractiveness of the area surrounding Oxford Parkway to businesses, encouraging new businesses to locate there and hence increasing local employment, although few businesses are currently located in this area so this effect may be slow to emerge without further public sector intervention.

1.44 Finally, it is possible that the investment could help to improve business productivity through improved connectivity and reduced costs of travel, particularly between Oxford and London. This will be captured within the transport user benefits of the scheme. Agglomeration and wider labour market impacts are likely to be minor, given the limited improvements to connectivity within the city of Oxford itself, and the current strength of the Oxford labour market.

Bromsgrove case study – Baseline analysis

Nature of the improvements

1.45 The primary improvement to be evaluated is the forthcoming route electrification and associated timetable improvements. However, in July 2016 a new and improved station at Bromsgrove was opened in place of the existing station, and this will need to be taken into account within any further monitoring and evaluation work.

1.46 As part of a strategy to accommodate a forecast increase in demand between Birmingham and Bromsgrove a programme of electrification and re-signalling of the line between Barnt Green and Bromsgrove is being implemented. This will enable the extension of the current electric Cross-City services from Longbridge. In 2014, the first phase of this strategy was successfully delivered when electric Birmingham Cross-City services to Redditch increased from two to three trains per hour. The second phase of line upgrade work is due to be implemented in December 2017, enabling an enhanced service between Longbridge and Bromsgrove from May 2018.

1.47 Bromsgrove is currently served by a diesel-operated semi-fast hourly off-peak / half-hourly peak service from Birmingham New Street to Hereford / Worcester, with a journey time of approximately 26 minutes between Bromsgrove and Birmingham. From May 2018, this is due to be supplemented by three electric Cross-City Line trains to Lichfield / Four Oaks via Birmingham New Street, which currently terminate at Longbridge, with a journey time of approximately 35 minutes to New Street. These will call at all stations on the Cross-City Line between Birmingham and Bromsgrove, and be operated by higher-capacity electric vehicles.

While this service will be higher-frequency, it may also lead to some increased journey times due to more stops on the route.

Anticipated transport impacts of improvements

- 1.48 Following the introduction of the enhanced timetable at Bromsgrove, it is anticipated that rail patronage will increase with additional rail demand arising through existing rail users travelling more frequently, trips shifting from other modes, and some newly generated journeys.
- 1.49 By making it easier to travel to Birmingham there could be an increase in leisure, commuting and business trips by people living near to Bromsgrove station.

Anticipated economic impacts of improvements

- 1.50 The investment at Bromsgrove may increase the attractiveness of Bromsgrove as a place to live as it will improve connectivity with Birmingham. This could result in upward pressures on population, housing demand, and subsequent induced demand for other local services in the Bromsgrove station catchment area.
- 1.51 It may increase the attractiveness of Bromsgrove to businesses, encouraging businesses to locate there and hence increase local employment. Further, pre-existing Bromsgrove firms will likely benefit from increased agglomeration benefits, as closer links to the centre of economic mass in Birmingham City Centre allows them increased opportunity for trade with other firms in the wider West Midlands region, and a relative increase in productivity as generalised transportation costs are reduced. Other firms may decide that the increased level of connectivity makes the possibility of relocation to Bromsgrove an option.
- 1.52 To isolate the effects of the rail investment from wider economic trends it will be appropriate to use comparison areas, with Longbridge and Droitwich Spa identified as suitable stations to use for this purpose.

Swindon case study – Baseline analysis

Nature of the improvements

- 1.53 Swindon is expected to benefit from the series of committed and planned improvements to the Great Western Main Line, which includes electrification between London, Bristol and Swansea and the introduction of new Hitachi Super Express Trains (SETs) to deliver: increased capacity, frequency enhancements and faster journey times. Network Rail currently expects electrification of the route between London and Cardiff to be delivered by December 2018.
- 1.54 The SETs are to be progressively introduced from Summer 2017, although the current timetable is dependent on the progress associated with the electrification of the route. These trains will be bi-mode multiple units, and will offer an enhanced level of comfort and additional seating capacity. Ten carriage trains on peak services will provide 580 standard class seats, compared to the 504 standard class seats on a high-capacity HST today.

Anticipated transport impacts of improvements

- 1.55 Additional rail demand at Swindon is expected to arise through existing rail users travelling more frequently, trips shifting from other modes, and some newly generated journeys which take advantage of the opportunities presented by the enhanced rail service.

- 1.56 Given the quality of the existing services at Swindon, the rail improvements are likely to have an incremental rather than transformational impact on the accessibility of the town, and hence would not necessarily be expected to deliver a step-change in rail patronage.

Anticipated economic impacts of improvements

- 1.57 It is anticipated that the improvements at Swindon will result in a small increase in the attractiveness of the town, especially as a place to live. Evidence from primary research suggests that individuals value the benefits of rail connectivity, and station users at Swindon report the location of the station as an important factor when choosing where to live. The improved accessibility of the station would therefore be expected to make the town – in particular the areas with close proximity of the railway station – a more desirable place to live.
- 1.58 Businesses may also find Swindon a more desirable place to locate, especially for those that regularly rely on rail for access to clients and customers, including those within Central London. Existing firms located in Swindon may also benefit from a small increase in productivity, where they benefit from a reduced time spent travelling by their employees, and alternatively better access to customers and new markets.
- 1.59 In order to isolate the effects of the rail investment from wider trends it will be appropriate to use comparison areas, with Tonbridge, Ipswich and Basingstoke identified as a suitable group of towns to use for this purpose. Multiple comparison areas have been identified since no single town has a sufficiently close match to the economic, socio-demographic and transport characteristics of Swindon.

Lessons relevant to future work

- 1.60 This project has been valuable not only for the new evidence it has obtained but also for the lessons it has provided in terms of the approach and methodologies used in obtaining this evidence. Some of these lessons are summarised here.

The limits of the impacted area

- 1.61 One of the findings has been that both the transport and economic impacts of rail investment studied here have been quite narrowly focussed around stations. This is illustrated by the finding that, on average, 85% of outbound station users live within 4km of the station they are using (station user surveys).

The underlying dynamism of the economy

- 1.62 The rail improvements investigated in this study did not sit in isolation and there were many other changes occurring, both to the rail network and to the economy, including the Great Recession. This had implications for isolating the impacts of the investment, and for determining the appropriate pre and post intervention periods. It also highlights the importance of collecting adequate contextual and control data to identify exogenous influences upon economic performance.

The importance and challenges of comparison areas

- 1.63 Given the dynamic nature of the economy and the changes to the rail network, the use of comparison areas is crucial, since time-series analysis will be affected by all the other changes which it will be difficult to isolate. At the same time, it also makes finding a suitable comparison area more difficult, since two requirements are a common historic trend on key

outcomes of interest (e.g. rail use and economic indicators), and no new transport or economic interventions in the comparison area.

- 1.64 One way in which this was addressed within this study was the use of regional comparisons to supplement those of the selected comparison area. Primary research was also useful in helping to identify the reasons for changes in behaviour in the intervention area and in the comparison area (where primary research was available). This provided a narrative to help understand and explain the findings from the secondary data and econometric analysis.

The apparent impact of the visibility of the improvements

- 1.65 One factor which seems to affect the scale and timing of both the transport and economic impacts is their visibility to the general public. Improvements which are more discrete and obvious, such as a new station or new trains, achieve greater awareness amongst the general population than a more incremental change such as a new timetable. In turn, this inevitably appears to influence the scale of the impacts, but also the speed with which changes are made.

The benefits and weaknesses of the D-i-D approach for econometric analyses

- 1.66 Overall, the D-i-D approach was shown to be a useful tool which can provide additional quantification of trends seen in the descriptive data. A strength of the D-i-D approach is that it can isolate the effects of the intervention while also overcoming selection bias, though to do so requires an effective comparison area.

- 1.67 Difficulties arose when trying to measure the effect of smaller scale or more incremental interventions since their effects could be obscured by noise in the data. A further difficulty arose in defining the end of the pre-treatment period and start of post-treatment period - though a new service might open officially at a certain date, it might not be fully running until several months or a year later. In addition, it is possible that significance will not have been tested correctly if the businesses were correlated with each other within an area under study.

Lessons learnt on the Business Structure Database (BSD)

- 1.68 The BSD is the only dataset we have found with the level of detailed business coverage to allow the type of analysis employed in this study, particularly the D-i-D analysis at local firm level.
- 1.69 Nevertheless, its limitations should be borne in mind: notably that enterprise turnover data can be dominated by a small number of particularly large enterprises, and results can be skewed if an enterprise is a small head office of a national corporation. In addition, there were some potentially misleading spikes in the data which needed to be explained and removed where appropriate.

The value of sector specific analyses

- 1.70 One finding from across all the case studies was that the effects of the rail improvements, as assessed by the econometric analysis, varied by industry sector. The primary research helped to explain this by providing some insights into the types of improvements which businesses said they found most beneficial. For example, making it easier for customers to visit the site was an important benefit, but mainly applies in industrial sectors such as retail and leisure where customers visit in person.

The benefits and weaknesses of a case study approach

- 1.71 The case study approach has been successful in providing econometric outputs which are supported by a detailed narrative. This narrative gives extra weight to the statistical results by explaining how and why they are likely to have arisen. On the other hand, a weakness of the approach is that the results from the case studies cannot be readily generalised. Nevertheless, the case study approach has resulted in identifying some lessons which, if applied appropriately, can be used to inform a wider view on the interaction between rail investment and the economy.

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