# CENTRE *for* ECONOMIC PERFORMANCE

# Occasional paper

## 53

## Regional Differences in UK Transport BCRs: An Empirical Assessment

Nicolás González-Pampillón
Henry G. Overman

## September 2020

THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

UKRI

Economic and Social Research Council

**Abstract**
The UK government uses a Value for Money (VfM) framework to help allocate infrastructure expenditure. At the core of this framework is a benefit to cost ratio (BCR) that is calculated using a set of established monetised impacts and costs, according to Green Book guidance. As part of the debate around transport spending in the UK, it has been argued that these BCRs are biased towards London and the South East. We use a set of BCRs, compiled for the Eddington study, to consider the determinants of variation in BCRs and whether these differ systematically across UK regions. Our descriptive analysis controls for basic scheme characteristics and finds no strong evidence of significant regional differences. While the BCRs in Eddington form the basis for claims made in existing studies a larger set of schemes, evaluated according to current guidelines and including BCRs for unfunded schemes, would be needed to perform a more definitive analysis.

Published by
Centre for Economic Performance
London School of Economics and Political Science
Houghton Street
London WC2A 2AE

## 1    Context and Summary of Findings

Transport infrastructure can play an important role in the economic performance of national and local economies. It reduces transport costs for businesses and commuters, improves access to markets, fosters economic integration, and facilitates agglomeration economies. Given the potential benefits, it is unsurprising that there is debate about how governments make transport spending decisions.

The UK transport appraisal process is based on a Value for Money (VfM) framework which follows HMT Green Book guidance. At the core of the framework is a benefit to cost ratio (BCR) that includes a set of established monetised impacts (i.e. those that are quantifiable and 'well-understood'). An "adjusted BCR" incorporates other evolving monetised impacts (i.e. those that are quantifiable and less well-understood). Finally, the framework combines these monetised benefits with non-monetised impacts to construct a VfM category. As part of the debate around transport spending, some have expressed concerns that this method is biased towards London and the South East (Coyle and Sensier, 2018) with implications for how transport spending might exacerbate, rather than mitigate, spatial disparities.[2]

This short note focuses on one part of those arguments by analysing which factors explain variation in transport BCRs and whether there is evidence of systematic bias towards particular regions. Our descriptive analysis using data on BCRs, controlling for basic scheme characteristics, finds no strong evidence of significant regional differences.

## 2    Data

We use BCR data from the Eddington Transport Study, published in 2006. This dataset has the advantage of reporting homogeneous BCRs across a variety of schemes and has been used by other researchers (e.g. Coyle and Sensier, 2018). It is publicly available and has been subject to public scrutiny. Offsetting this, a major disadvantage is that almost all schemes were approved for funding. If the funding cut-off is uniform across areas, this would reduce our ability to detect systematic variations in BCRs (because projects in areas that tend to produce lower BCRs will not show up in the data).

The data covers around 200 transport appraisals for a variety of modes including rail, light rail, local roads and highways, and bus.[3] The original report refers to four transport appraisal metrics: the conventional or NATA BCR[4] which includes all monetised impacts, and corresponds to the initial BCR in the VfM framework; the GDP per pound which includes the impact on the economy; the wider BCR which includes impacts that are missing in the NATA BCR (i.e. agglomeration benefits, labour market

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[2] Also see https://www.tomforth.co.uk/investmentispolitical/
[3] The category "Bus" also includes some bus interchange schemes.
[4] NATA refers to New Approach to Appraisal (www.webtag.org.uk)

effects, competition impact and reliability); and the VfM BCR, which also includes other impacts on society (e.g. air quality, noise, and landscape). Unfortunately, the archived version of the data only reports the NATA BCR and attempts to track down the other measures have proved fruitless. This creates further issues for the exercise as the current version of the Transport Appraisal Guidance allows for other benefits (e.g. wider benefits) which may introduce systematic variations in BCRs produced since 2006, even if these are not present in the Eddington data.

Despite these underlying problems, we think the analysis we report is worthwhile because a number of commentators have used examples from the same Eddington data to illustrate their concerns about the existing guidance.

## 3    Analysis

We can locate 181 out of 200 schemes in one of ten NUTS1 regions. Given small sample numbers, we aggregate these to six regions (London, South East and South West, East of England, East and West Midlands, Yorkshire, North East and North West). We drop 19 schemes where the description of the project is too vague to locate it. Further details are in the Annex.



**Figure 1. BCR by region**

*Notes*: The figure plots the average NATA BCR by region: London, South East and South West, East of England, East and West Midlands, Yorkshire, and North East and North West.
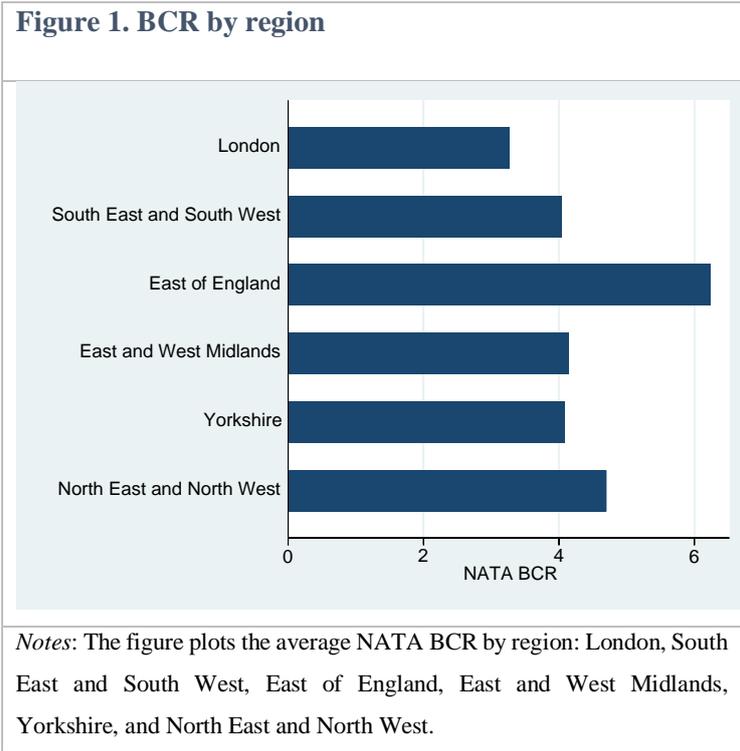
The average BCR across all schemes is 4.32, ranging from 1 to 26.3 and with a standard deviation of 3.36. Figure 1 shows the average BCR across the six regions. Projects in the East of England have the highest BCR, (just below six), followed by the North East and North West (close to five), the East and

West Midlands, Yorkshire and the South East and West (with an average of around four) and finally London (just over three). Differences in these regional averages are quite small relative to the underlying variation in BCRs in the data.

As with similar figures that have been produced on expenditure shares, one problem with this analysis is that London is the only city, while the other five areas are regions including both urban and non-urban projects. To illustrate the issue, Figure 2, reports the mean by using four categories of scheme location provided in the Eddington dataset: London, Inter-Urban and Rural, Major city and Other Urban. Inter-Urban and rural schemes present the largest BCR with a mean of five, while London and the other Major Cities have similar average BCRs of around three.



**Figure 2. BCR by scheme location**

*Notes*: The figure plots the average NATA BCR by scheme location.
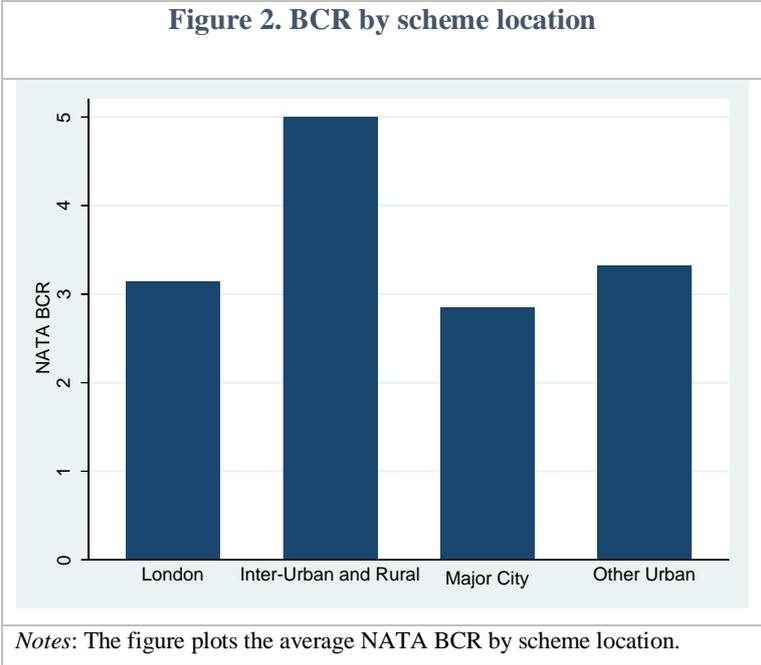
Differences across areas may also be explained by differences in the type of scheme. These are large as shown in Figure 3, which reports the average BCR by transport mode. Highway schemes have the largest average around 4.9, followed by rail schemes with slightly lower average BCRs, and local roads with average BCRs just above 4. Bus and light rail have considerably lower average BCRs of around 1.5.

**Figure 3. BCR by mode**

*Notes*: The figure plots the average NATA BCR by transport mode.
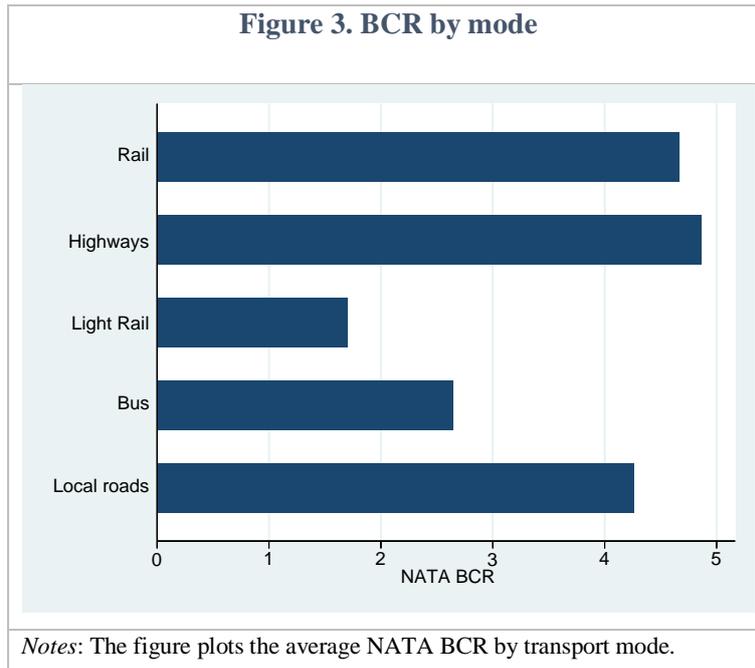
Finally, Figure 4 shows, as one would hope, that funded schemes have a larger BCR than unfunded schemes.



**Figure 4. BCR funded vs unfunded schemes**

*Notes*: The figure plots the average NATA BCR of funded schemes (165) and non-funded schemes (15).
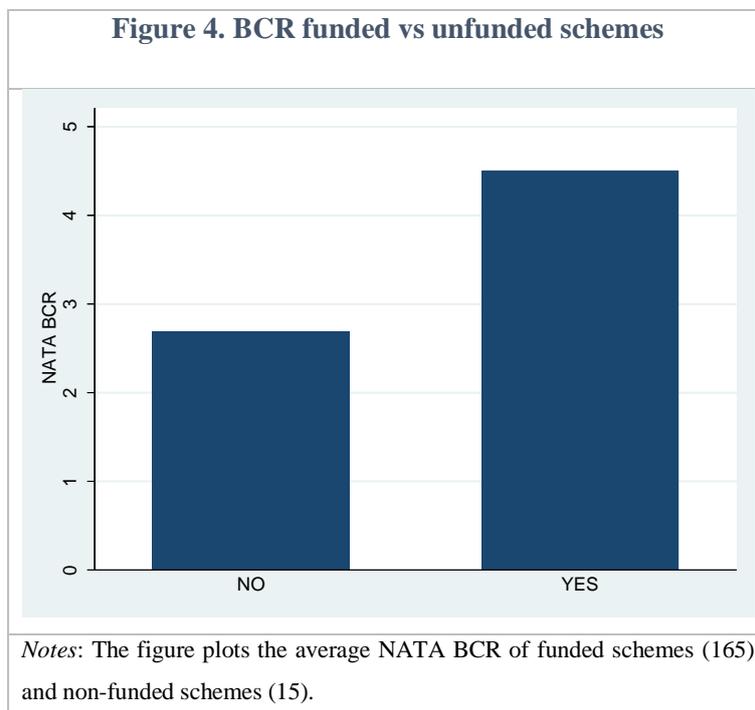
To summarise, while there are regional level variations in BCR these are not particularly large compared to the variation between urban and non-urban schemes, between transport mode or by funded versus unfunded scheme. Given that multiple factors may determine BCRs we turn to simple regression

analysis to consider the role of those different factors. This regression analysis is purely descriptive and does nothing to deal with some of the econometric challenges that we would want to address if we had better data.

**Table 1. Regressions of BCR on location and scheme characteristics**

|  | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **Region** |  |  |  |  |
| London | 0.000 | 0.000 | 0.000 | 0.000 |
|  | (.) | (.) | (.) | (.) |
| South East and South West | 0.765 | 0.762 | 1.133 | 1.131 |
|  | (0.693) | (1.733) | (2.375) | (2.287) |
| East of England | 2.970** | 2.527 | 2.853 | 2.784 |
|  | (1.269) | (2.035) | (2.491) | (2.387) |
| East and West Midlands | 0.875 | 1.340 | 1.655 | 1.540 |
|  | (0.777) | (1.784) | (2.388) | (2.310) |
| Yorkshire | 0.815 | 1.664 | 2.057 | 2.152 |
|  | (0.785) | (1.803) | (2.407) | (2.319) |
| North East and North West | 1.431 | 2.053 | 2.306 | 2.186 |
|  | (1.129) | (2.015) | (2.525) | (2.455) |
| **Scheme location** |  |  |  |  |
| Inter-Urban and Rural |  | 0.454 | -0.260 | -0.044 |
|  |  | (1.791) | (2.262) | (2.204) |
| Major City |  | -1.940 | -2.285 | -2.092 |
|  |  | (1.881) | (2.303) | (2.247) |
| Other Urban |  | -1.236 | -1.719 | -1.596 |
|  |  | (1.878) | (2.337) | (2.276) |
| **Mode** |  |  |  |  |
| Rail |  |  | 0.000 | 0.000 |
|  |  |  | (.) | (.) |
| Highways |  |  | -0.372 | -0.548 |
|  |  |  | (1.624) | (1.566) |
| Light Rail |  |  | -2.103 | -1.890 |
|  |  |  | (1.514) | (1.521) |
| Bus |  |  | -0.953 | -0.778 |
|  |  |  | (1.676) | (1.616) |
| Local roads |  |  | -0.306 | -0.379 |
|  |  |  | (1.641) | (1.576) |
| Funded |  |  |  | 1.377*** |
|  |  |  |  | (0.526) |
| Constant | 3.272*** | 3.146*** | 3.860*** | 2.542* |
|  | (0.619) | (0.562) | (1.468) | (1.476) |
| Nbr. of obs. | 181 | 180 | 180 | 180 |
| Adjusted R squared | 0.022 | 0.071 | 0.058 | 0.066 |

*Notes*: Dependent variable is BCR in levels. Explanatory variables are as described in the text. Robust standard error reported in parenthesis. *** significant at the 1% level. ** significant at the 5% level. * significant at the 10% level.

Table 1 reports results from regressions using the NATA BCR in levels as the dependent variable. The first column reports results when we only include dummy variables for the six regions. We omit London, so positive coefficients indicate an area has higher average BCRs than London. All the coefficients are positive, consistent with Figure 1. But, as we suggested in our discussion of that figure, these variations are small relative to the underlying variation in BCRs, with only the East of England showing statistically significant differences.

The second column adds scheme location. The "Inter-Urban and Rural" category is the only one with a positive significant coefficient, again consistent with Figure 2. But including these scheme categories renders the coefficient on the East of England dummy insignificant, suggesting that this was picking up something about the type of projects, rather than the area per se. Introducing mode dummies (column three) and a funded dummy (in column four) result in small changes to the coefficients on the region dummies. In the final column, it becomes clear that the major explanatory factor for differences in BCRs that are in the database is whether the scheme was funded or unfunded, consistent with what we saw in Figure 4.

Eddington provides a breakdown of the Present Value Benefits (PVB) that are included in the BCR by business, freight, commuter, consumer, and other and reports them relative to the costs. Table 2 reports results from the specification used in the fourth column of Table 1 for each of these PVB components. Again, none of the regional dummies are significant, although a comparison of the coefficient estimates suggests that it is variation in the business benefits that mostly drive the pattern that we saw for overall benefits in column 4 of Table 1. Mode plays a more significant role in explaining variations in the individual components of the PVB with the effect differing across components. The ´funded´ dummy is only significant for business and consumer user benefits.

**Table 2. Regressions user benefits relative to costs on location and scheme characteristics**

| | Business | Freight | Commuter | Consumer | Other |
|---|---|---|---|---|---|
| Region | | | | | |
| London | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | (.) | (.) | (.) | (.) | (.) |
| South East and South West | 1.385 | -0.079 | -0.006 | 0.116 | -0.253 |
| | (2.240) | (0.124) | (0.261) | (0.366) | (0.174) |
| East of England | 2.145 | 0.072 | 0.149 | 0.479 | -0.053 |
| | (2.277) | (0.180) | (0.291) | (0.446) | (0.194) |
| East and West Midlands | 1.628 | -0.122 | -0.055 | 0.065 | 0.043 |
| | (2.271) | (0.091) | (0.255) | (0.360) | (0.162) |
| Yorkshire | 2.137 | -0.126 | 0.053 | 0.328 | -0.216 |
| | (2.274) | (0.090) | (0.263) | (0.367) | (0.163) |
| North East and North West | 1.569 | 0.159 | -0.018 | 0.268 | 0.203 |
| | (2.260) | (0.331) | (0.260) | (0.451) | (0.217) |
| Scheme location | | | | | |
| Inter-Urban and Rural | -0.473 | -0.045 | 0.095 | -0.081 | 0.451** |
| | (2.172) | (0.175) | (0.263) | (0.362) | (0.219) |
| Major City | -1.315 | -0.058 | -0.032 | -0.632 | -0.072 |
| | (2.187) | (0.187) | (0.278) | (0.404) | (0.236) |
| Other Urban | -1.245 | -0.137 | -0.070 | -0.348 | 0.239 |
| | (2.195) | (0.177) | (0.280) | (0.425) | (0.250) |
| Mode | | | | | |
| Rail | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | (.) | (.) | (.) | (.) | (.) |
| Highways | -2.467 | 0.319** | 0.484** | 0.569** | 0.535*** |
| | (1.513) | (0.133) | (0.208) | (0.273) | (0.130) |
| Light Rail | -2.948** | -0.001 | 0.687** | 0.002 | 0.354* |
| | (1.405) | (0.156) | (0.324) | (0.427) | (0.184) |
| Bus | -3.166** | 0.197 | 0.700*** | 1.028*** | 0.430** |
| | (1.515) | (0.136) | (0.234) | (0.352) | (0.186) |
| Local roads | -2.172 | 0.205** | 0.603*** | 0.842*** | 0.131 |
| | (1.523) | (0.101) | (0.215) | (0.295) | (0.147) |
| Funded | 0.994*** | -0.039 | -0.005 | 0.414** | -0.005 |
| | (0.322) | (0.055) | (0.101) | (0.194) | (0.156) |
| Constant | 2.350* | 0.076 | -0.019 | 0.349 | -0.191 |
| | (1.363) | (0.188) | (0.231) | (0.335) | (0.248) |
| Nbr. of obs. | 180 | 180 | 180 | 180 | 180 |
| Adjusted R squared | 0.165 | -0.037 | 0.055 | 0.011 | 0.179 |

*Notes*: Dependent variable and explanatory variables are as described in the text. Rrobust standard error reported in parenthesis. *** significant at the 1% level. ** significant at the 5% level. * significant at the 10% level.

**Table 3.** Robustness checks

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Region | | | | | |
| London | 0.000 | 0.000 | 0.000 | | 0.000 |
| | (.) | (.) | (.) | | (.) |
| South East and South West | -0.912 | -1.279 | 1.339 | | 0.208 |
| | (1.301) | (1.582) | (2.684) | | (0.450) |
| East of England | -0.623 | -1.212 | 3.054 | | 0.489 |
| | (1.300) | (1.567) | (2.822) | | (0.570) |
| East and West Midlands | -1.391 | -1.758 | 1.707 | | 0.046 |
| | (1.303) | (1.594) | (2.689) | | (0.406) |
| Yorkshire | -0.464 | -1.004 | 1.926 | | 0.458 |
| | (1.322) | (1.607) | (2.716) | | (0.494) |
| North East and North West | -1.457 | -1.765 | 2.459 | | 0.178 |
| | (1.343) | (1.632) | (2.836) | | (0.423) |
| Aggregated regions | | | | | |
| South | | | | 0.000 | |
| | | | | (.) | |
| Midlands | | | | 0.919 | |
| | | | | (0.594) | |
| North | | | | 1.181 | |
| | | | | (0.717) | |
| Scheme location | | | | | |
| Inter-Urban and Rural | -0.118 | -0.000 | -0.211 | 0.967 | -0.050 |
| | (1.232) | (1.504) | (2.590) | (0.757) | (0.409) |
| Major City | 0.325 | 0.798 | -2.552 | -1.239 | -1.224** |
| | (1.290) | (1.552) | (2.628) | (0.932) | (0.543) |
| Other Urban | -1.131 | -0.654 | -2.014 | -0.620 | -0.839 |
| | (1.288) | (1.540) | (2.670) | (0.990) | (0.696) |
| Mode | | | | | |
| Rail | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | (.) | (.) | (.) | (.) | (.) |
| Highways | -3.117*** | -3.117*** | -0.933 | -0.148 | 1.948*** |
| | (0.740) | (0.957) | (1.711) | (1.192) | (0.359) |
| Light Rail | -2.209** | -1.672 | -2.886* | -1.542 | 0.410 |
| | (1.050) | (1.145) | (1.587) | (1.209) | (0.640) |
| Bus | -2.868*** | -2.803*** | -1.278 | -0.413 | 1.877*** |
| | (0.854) | (1.018) | (1.788) | (1.218) | (0.562) |
| Local roads | -2.886*** | -3.055*** | -0.704 | -0.043 | 2.700*** |
| | (0.770) | (0.975) | (1.742) | (1.196) | (0.459) |
| Funded | -0.363 | -0.676 | | 1.346*** | 0.613 |
| | (0.543) | (0.549) | | (0.511) | (0.424) |
| Constant | 16.246*** | 15.465*** | 4.386*** | 2.247* | 1.337** |
| | (0.801) | (0.924) | (1.578) | (1.161) | (0.584) |
| Nbr. of obs. | 180 | 179 | 163 | 180 | 158 |
| Adjusted R squared | 0.343 | 0.393 | 0.060 | 0.070 | 0.111 |

*Notes*: Robust standard error reported in parenthesis. *** significant at the 1% level. ** significant at the 5% level. * significant at the 10% level.

We run several robustness checks reported in Table 3. The first and second column uses the log of present value benefits and present value costs as the dependent variable, respectively. The third column drops the 15 unfunded schemes. The fourth column, further aggregates regions into Greater South East (South East, South West, London), Midlands (West and East Midlands, East of England), and North (North East, North West, Yorkshire and the Humber). The fifth column drops the top and bottom 5% of BCRs. For all columns, results remain unchanged, and region dummies are not statistically significant.

The analysis so far uses the NATA BCR as the dependent variable. As discussed above, this is problematic as wider benefits have been increasingly important since Eddington. Given this data is not available, we tried some robustness tests that involve computing an `adjusted´ BCR by adding 10-80 percent of the business, commuter, and consumer user benefits to the present value benefits (PVB). This implies wider benefits proportional to some components of the underlying BCR. The results (Table A in the Annex) remain unchanged. The "funded" dummy remains the main explanatory factor.

In addition, we tried slowly uplifting the business, commuter, and consumer user benefits for all the regions of the UK except for London to identify at what level of uplift we begin to observe significant regional differences. The idea underlying this exercise is that it indicates the extent to which the reported BCR would have to understate the benefits of schemes outside London for regional differences in actual BCR to be significant. The results (in Table B in the Annex) show that the East of England coefficient becomes statistically significant for a 30% uplift in monetised benefits, while Yorkshire and the North East and West require uplifts of 40% and 60%, respectively. Remember these BCRs exclude wider benefits that are likely skewed towards London, suggesting we would need to be underestimating the benefits of non-London transport schemes by a large margin to conclude that the actual (as opposed to reported) BCRs are systematically biased.

## 4 Conclusion

Descriptive analysis using data on BCR, controlling for basic scheme characteristics finds no strong evidence of significant regional biases. There may be systematic variations in reported BCRs across regions, but the data provided in Eddington do not provide evidence that allows us to conclude this with any certainty. A simple analysis, involving the uplifting of benefits outside London, suggests that BCRs would need to be underreporting benefits of non-London schemes by a large margin to change this conclusion.

We also stress that the data we, and others, have used is highly problematic as it ignores recent developments in the guidance and only reports results for funded projects. Despite these caveats, it has been used by others to support their arguments around regional bias in BCRs. It is difficult to see how this conclusion is warranted based on the analysis that we report here.

## References

Diane Coyle & Marianne Sensier (2020) The imperial treasury: appraisal methodology and regional economic performance in the UK, Regional Studies, 54:3, 283-295, DOI: 10.1080/00343404.2019.1606419

Department for Transport (2006), Data on investment returns from transport schemes considered by the Eddington Study. http://webarchive.nationalarchives.gov.uk/20080807161546/http://www.dft.gov.uk/about/strategy/transportstrategy/eddingtonstudy/pubeddingbase

## Annex

## Data

Data on BCRs from the Eddington Report was downloaded from the national archive.[5] The dataset includes the NATA BCR (and in some cases the VfM category) and scheme characteristics described in the text but does not include information about the location of the scheme by regions. For each scheme, we searched for the location of the scheme through different websites (e.g. Highways England, road.org.uk, local newspapers, the National Audit Office, and other websites). We categorised location using NUTS1, which is the first level of aggregation in the EUs nomenclature of territorial units. We only use schemes from the 9 statistical regions of England. For the six schemes that involved more than one territorial unit, we consider one separate scheme for each region. We further aggregate regions as described in the text to have a reasonable number of schemes in each region. One drawback of the dataset is the lack of information about which schemes were finally funded. As with the region of the scheme, we constructed the funding variable ourselves using a variety of different online sources (e.g. Highways England, roads.org.uk, and local newspaper websites).

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[5]

http://webarchive.nationalarchives.gov.uk/20080807161546/http://www.dft.gov.uk/about/strategy/transportstrategy/eddingtonstudy/pubeddingbase

## Additional regressions

**Table A. Uplifiting BCR by to allow for Wider Benefits**

| | X% | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 |
| **Region** | | | | | | | | |
| London | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | (.) | (.) | (.) | (.) | (.) | (.) | (.) | (.) |
| South East and South West | 1.313 | 1.463 | 1.612 | 1.762 | 1.911 | 2.061 | 2.210 | 2.360 |
| | (2.526) | (2.759) | (2.993) | (3.228) | (3.462) | (3.696) | (3.930) | (4.165) |
| East of England | 3.069 | 3.346 | 3.623 | 3.901 | 4.178 | 4.455 | 4.733 | 5.010 |
| | (2.634) | (2.878) | (3.121) | (3.365) | (3.609) | (3.853) | (4.097) | (4.341) |
| East and West Midlands | 1.723 | 1.887 | 2.051 | 2.215 | 2.379 | 2.543 | 2.706 | 2.870 |
| | (2.551) | (2.789) | (3.026) | (3.264) | (3.501) | (3.739) | (3.977) | (4.214) |
| Yorkshire | 2.426 | 2.678 | 2.929 | 3.181 | 3.433 | 3.684 | 3.936 | 4.188 |
| | (2.561) | (2.799) | (3.037) | (3.275) | (3.513) | (3.751) | (3.989) | (4.227) |
| North East and North West | 2.362 | 2.544 | 2.726 | 2.907 | 3.089 | 3.271 | 3.453 | 3.635 |
| | (2.699) | (2.938) | (3.177) | (3.417) | (3.658) | (3.898) | (4.139) | (4.379) |
| **Scheme location** | | | | | | | | |
| Inter-Urban and Rural | -0.100 | -0.146 | -0.191 | -0.237 | -0.283 | -0.329 | -0.375 | -0.421 |
| | (2.432) | (2.657) | (2.882) | (3.107) | (3.333) | (3.558) | (3.784) | (4.010) |
| Major City | -2.306 | -2.504 | -2.702 | -2.900 | -3.098 | -3.296 | -3.494 | -3.692 |
| | (2.480) | (2.709) | (2.939) | (3.168) | (3.398) | (3.628) | (3.858) | (4.088) |
| Other Urban | -1.728 | -1.894 | -2.061 | -2.227 | -2.393 | -2.560 | -2.726 | -2.892 |
| | (2.511) | (2.742) | (2.974) | (3.206) | (3.438) | (3.671) | (3.903) | (4.136) |
| **Mode** | | | | | | | | |
| Rail | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | (.) | (.) | (.) | (.) | (.) | (.) | (.) | (.) |
| Highways | -0.703 | -0.845 | -0.986 | -1.128 | -1.269 | -1.411 | -1.552 | -1.694 |
| | (1.724) | (1.881) | (2.038) | (2.195) | (2.352) | (2.509) | (2.666) | (2.823) |
| Light Rail | -2.131 | -2.357 | -2.583 | -2.808 | -3.034 | -3.260 | -3.486 | -3.712 |
| | (1.668) | (1.820) | (1.972) | (2.124) | (2.276) | (2.428) | (2.580) | (2.733) |
| Bus | -0.956 | -1.099 | -1.243 | -1.387 | -1.531 | -1.675 | -1.818 | -1.962 |
| | (1.780) | (1.940) | (2.101) | (2.263) | (2.424) | (2.586) | (2.747) | (2.909) |
| Local roads | -0.464 | -0.537 | -0.610 | -0.682 | -0.755 | -0.828 | -0.900 | -0.973 |
| | (1.739) | (1.899) | (2.059) | (2.219) | (2.379) | (2.539) | (2.699) | (2.860) |
| Funded | 1.501*** | 1.641*** | 1.781*** | 1.921*** | 2.062*** | 2.202*** | 2.342*** | 2.483*** |
| | (0.570) | (0.616) | (0.663) | (0.710) | (0.757) | (0.804) | (0.852) | (0.899) |
| Constant | 2.834* | 3.102* | 3.370* | 3.638* | 3.906* | 4.174* | 4.442* | 4.710* |
| | (1.619) | (1.762) | (1.905) | (2.049) | (2.193) | (2.338) | (2.482) | (2.627) |
| Nbr. of obs. | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 |
| Adjusted R squared | 0.063 | 0.061 | 0.060 | 0.059 | 0.058 | 0.057 | 0.056 | 0.055 |

*Notes*: Dependent variable is BCR + X% of the sum of business, commuter, and consumer user benefits, in levels  Robust standard error reported in parenthesis. *** significant at the 1% level. ** significant at the 5% level. * significant at the 10% level.

### Table B. Uplifting BCRs outside London to allow for systematic underreporting of benefits

| | | | | X% | | | | |
|---|---|---|---|---|---|---|---|---|
| | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 |
| **Region** | | | | | | | | |
| London | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | (.) | (.) | (.) | (.) | (.) | (.) | (.) | (.) |
| South East and South West | 1.676 | 2.195 | 2.714 | 3.233 | 3.752 | 4.271 | 4.791 | 5.310 |
| | (2.393) | (2.502) | (2.615) | (2.733) | (2.854) | (2.978) | (3.105) | (3.235) |
| East of England | 3.429 | 4.073 | 4.716* | 5.360* | 6.004** | 6.648** | 7.292** | 7.935** |
| | (2.508) | (2.632) | (2.761) | (2.894) | (3.031) | (3.171) | (3.313) | (3.458) |
| East and West Midlands | 2.085 | 2.618 | 3.150 | 3.682 | 4.215 | 4.747 | 5.280* | 5.812* |
| | (2.420) | (2.532) | (2.650) | (2.772) | (2.897) | (3.026) | (3.157) | (3.291) |
| Yorkshire | 2.784 | 3.400 | 4.017 | 4.633* | 5.249* | 5.866* | 6.482** | 7.098** |
| | (2.431) | (2.547) | (2.667) | (2.791) | (2.918) | (3.049) | (3.183) | (3.319) |
| North East and North West | 2.725 | 3.277 | 3.829 | 4.381 | 4.933 | 5.485* | 6.037* | 6.589* |
| | (2.575) | (2.697) | (2.824) | (2.955) | (3.089) | (3.226) | (3.366) | (3.508) |
| **Scheme location** | | | | | | | | |
| Inter-Urban and Rural | -0.170 | -0.282 | -0.394 | -0.506 | -0.618 | -0.731 | -0.843 | -0.955 |
| | (2.283) | (2.365) | (2.450) | (2.539) | (2.632) | (2.728) | (2.826) | (2.927) |
| Major City | -2.383 | -2.654 | -2.925 | -3.196 | -3.467 | -3.739 | -4.010 | -4.281 |
| | (2.335) | (2.425) | (2.519) | (2.617) | (2.718) | (2.823) | (2.931) | (3.041) |
| Other Urban | -1.801 | -2.037 | -2.272 | -2.508 | -2.744 | -2.980 | -3.216 | -3.452 |
| | (2.368) | (2.463) | (2.562) | (2.664) | (2.771) | (2.880) | (2.993) | (3.108) |
| **Mode** | | | | | | | | |
| Rail | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | (.) | (.) | (.) | (.) | (.) | (.) | (.) | (.) |
| Highways | -0.732 | -0.910 | -1.088 | -1.266 | -1.444 | -1.622 | -1.800 | -1.978 |
| | (1.719) | (1.870) | (2.020) | (2.171) | (2.323) | (2.474) | (2.625) | (2.777) |
| Light Rail | -2.044 | -2.173 | -2.301 | -2.430 | -2.559 | -2.688 | -2.817 | -2.946 |
| | (1.645) | (1.771) | (1.898) | (2.026) | (2.155) | (2.284) | (2.414) | (2.544) |
| Bus | -0.977 | -1.149 | -1.321 | -1.492 | -1.664 | -1.835 | -2.007 | -2.179 |
| | (1.775) | (1.930) | (2.085) | (2.241) | (2.397) | (2.553) | (2.709) | (2.865) |
| Local roads | -0.488 | -0.592 | -0.696 | -0.800 | -0.904 | -1.007 | -1.111 | -1.215 |
| | (1.735) | (1.889) | (2.044) | (2.199) | (2.354) | (2.509) | (2.664) | (2.819) |
| Funded | 1.493*** | 1.628*** | 1.764*** | 1.899*** | 2.034*** | 2.170*** | 2.305*** | 2.441*** |
| | (0.565) | (0.607) | (0.650) | (0.694) | (0.738) | (0.782) | (0.827) | (0.872) |
| Constant | 2.576 | 2.579 | 2.583 | 2.587 | 2.591 | 2.595 | 2.598 | 2.602 |
| | (1.601) | (1.725) | (1.850) | (1.975) | (2.102) | (2.229) | (2.357) | (2.485) |
| Nbr. of obs. | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 |
| Adjusted R squared | 0.068 | 0.073 | 0.077 | 0.081 | 0.085 | 0.088 | 0.092 | 0.095 |

*Notes*: Dependent variable is BCR for London, BCR + X% of the sum of business, commuter, and consumer user benefits for all other regions (in levels). Robust standard error reported in parenthesis. *** significant at the 1% level. ** significant at the 5% level. * significant at the 10% level.

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For more information please contact the Publications Unit
Tel:  +44 (0)20 7955 7673;  Email: cep.info@lse.ac.uk
Website http://cep.lse.ac.uk