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Track access charges – British experience

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Track access charges in Britain

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Variable usage charges

Electricity for Traction

Electrification asset usage charge

Capacity charge (congestion) – discontinued in 2019

Fixed charges

Infrastructure cost charges

- Freight
- Open access passenger

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Variable usage charges

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- **Freight**
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EU Legislation - charges must be based on 'costs directly incurred as a result of operating the train service'

- Variable charges cover the Wear and tear element
- Interpreted as the short-run marginal cost of running an extra train on the network – keeping the network capacity constant
- Broadly three approaches used:
  - Engineering approach
  - Econometric approach
  - Cost allocation approach
- Two of the three approaches used in GB

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Cost Allocation Approach: ORR (2000)

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Cost variability proportions by activity / asset class

Activity / asset class	Variability Proportion: PR2000
Track - maintenance	30%
Track – renewals (plain line)	36%
Track – renewals (switches and crossings)	25%
Signalling - maintenance	5%
Civils – metallic underbridges	10%
Civils – embankments	10%

* The proportions introduced following PR2008.

Source: ORR (2008)

- **Overall variability of 17-19%**

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Engineering Approach: illustration

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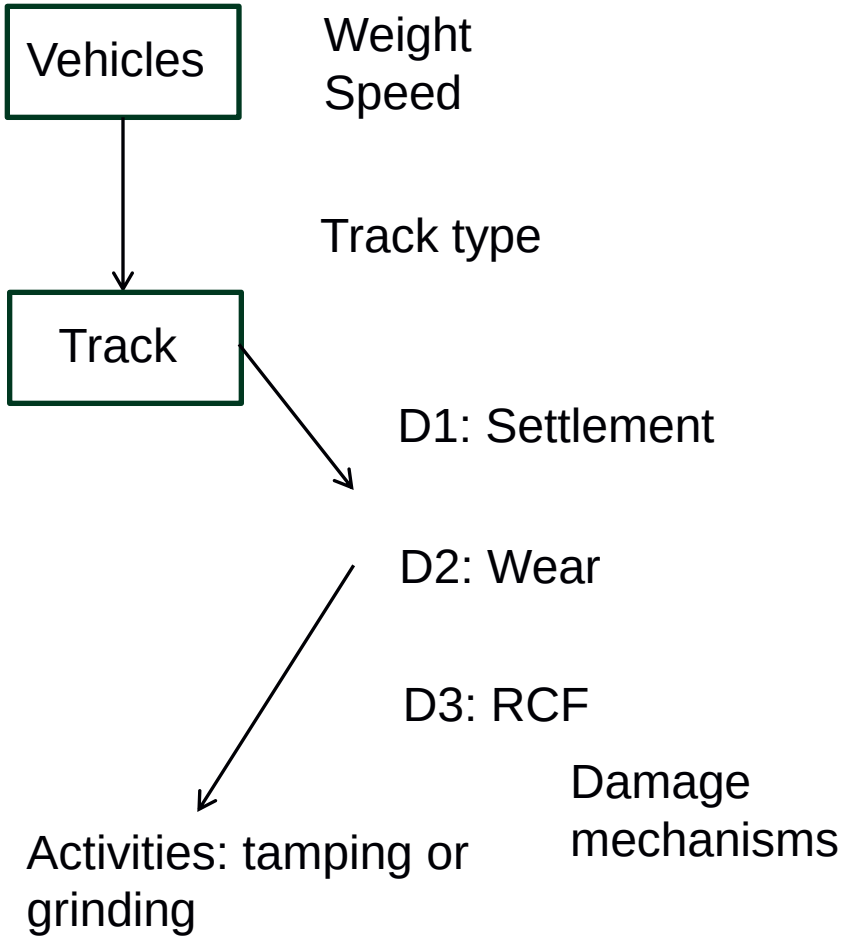
Stage 1: Simulation (track section level)

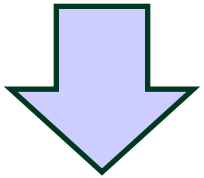


Stage 2: Unit cost analysis

Δ (Volume of tamping)

x

Unit cost of tamping



ΔCost

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How differentiated are the track access charges?

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EGTM = K Ct A0.49 S0.64 USM0.19 GTM (for track)

and **EGTM = L Ct A3.83 S1.52 GTM** (for structures)

where:

K is a constant

Ct is 0.89 for loco hauled passenger stock and multiple units and 1 for all other vehicles

S is the operating speed [mph]

A is the axle load [tonnes]

USM is the unsprung mass [kg/axle]

GTM is gross tonne miles [Tonne.miles]

Example from the British system

Most charges elsewhere are just tonnage based

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Econometric approach – relate costs to traffic in statistical regression

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$$C_{it} = f(Y_{it}, P_{it}, N_{it}, \tau_t; \beta) + v_{it}$$

- C_{it} is the cost measure – say, maintenance and renewal costs
- i is the unit of observation (e.g. track section; maintenance unit; region; country); t is time period (year)
- Y_{it} - output measures (e.g. passenger tonne-km; freight tonne-km)
- β - parameters estimated – **gives % of cost variable with traffic**

$$MC = \beta . AC$$

Track access charges

Notes: P_{it} - input prices (e.g. wage rate; price of materials); N_{it} - exogenous network characteristic variables (e.g. network length; linespeed capability; rail age; proportion of track in a curve; S&CS); τ_{it} represent time variables capturing technical change over time

Some results from SNCF Reseau Data – track maintenance model

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Dependent variable: (log) in €: Track maintenance costs + Fixed installations costs allocated to the Track **Ln (cost/track-km)**

(log) Passenger traffic (tkm per track km)	0.215
(log) Freight traffic (tkm per track km)	0.042
(log squared) Passenger traffic (tkm per track km)	0.011
(log squared) Freight traffic (tkm per track km)	
(log) Passenger traffic (tkm per track km) *(log) Freight traffic (tkm per track km)	
(log) Maximum speed on the SEG in km/h	0.128

About 25% of costs variable with adding extra trains to a given line (most costs are fixed) – this in line with literature (25-35%)

Marginal costs per tonne-km estimated for passenger (separately TGV) and freight – then converted to charges per train-km for different traffic types based on weight of train

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Pros and cons of approaches

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- Cost allocation approach requires information on cost variability and cost drivers – where from? Judgement versus evidence?

- Engineering approach – requires engineering models which can be complex and time consuming. Requires assumptions about activities and unit costs. May not reconcile to actual costs

- The power of the econometric approach – uses actual cost data – provides information directly from the actual cost data on the fixed / variable proportion and on the cost drivers

- Econometric approach an approximation to reality: has to be subject to testing / evaluation

- **Key message – they give very different answers as is particularly evident in GB**

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Method for computing direct costs makes a difference

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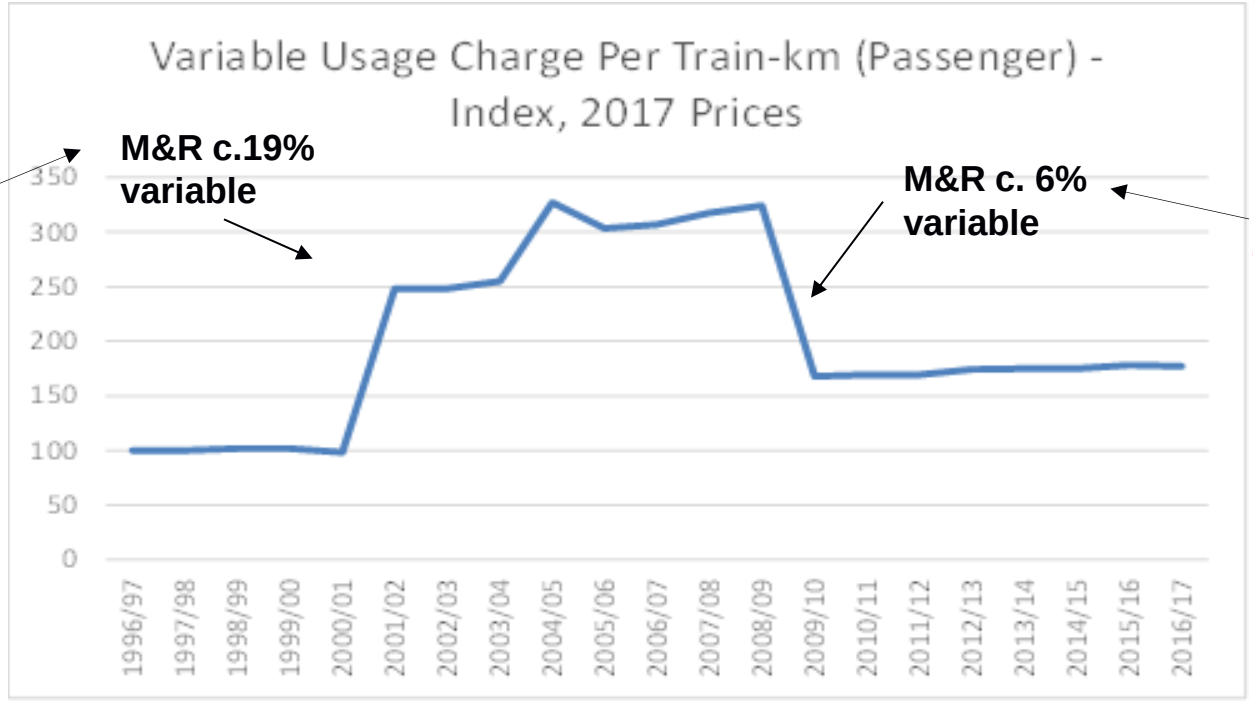
- Precise method: econometric; engineering; cost allocation affects the computation of variable charges

Cost allocation approach

Similar to econometric approach in terms of variability



Engineering approach

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Approaches to wear and tear costs

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1. Engineering model – charges per vehicle km differentiated by type of vehicle (Britain)

2. Econometric model – charges per train km differentiated by type of train (France)

3. Econometric- charges per gross tonne km, axleweight (Sweden) – **very low – only covers maintenance**

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Final reflections

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- In most cases relatively simple charges **per tonne-km or train-km** for different train types (e.g. freight or different generic types of passenger train)
- Some systems e.g. GB, Switzerland have **much more differentiation by vehicle type** (depending on **damage done** to the infrastructure)
- Differentiation – incentive to develop / use more **track-friendly** vehicles
- **Evidence that differentiated charging has led to variation to vehicle design for use in GB**
- **But general low level of charges, and different regimes per country, limits such incentives for vehicles running cross-border**

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Capacity charges

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- Applied where an additional train can be accommodated but will reduce punctuality (so didn't cover pure scarcity)
- Delays directly caused by that train charged for by the performance regime
- But there is still a further externality in that an additional train may add to reactionary delay even when not the direct cause of delays itself

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Reactionary delay

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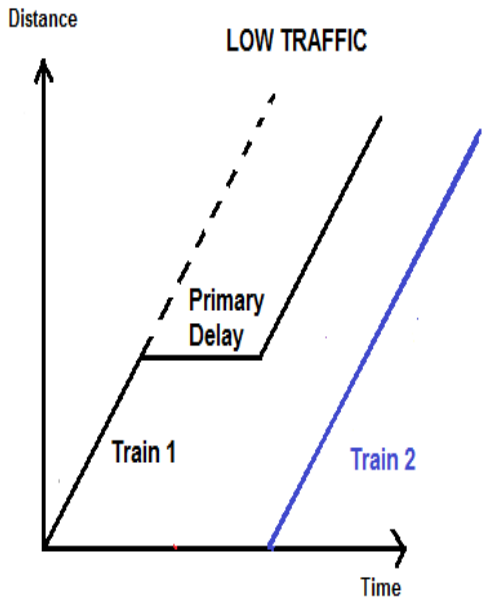

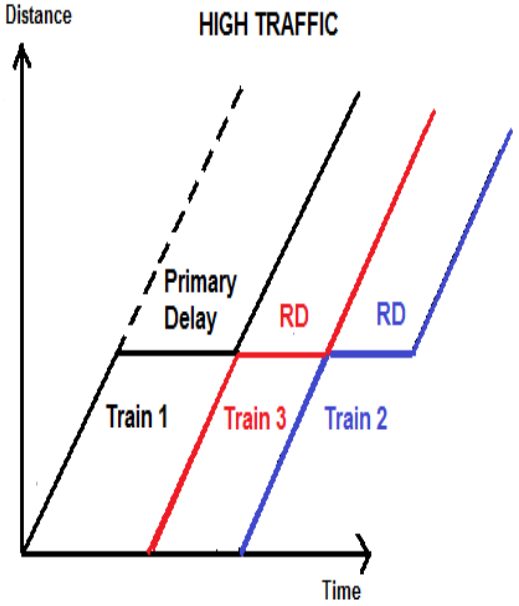

Adapted from diagram in ：Network Rail (2012) Periodic Review 2013 – Consultation on the Capacity Charge

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Capacity charges

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Based on regression of reactionary delays on capacity utilization

Differentiated by route section (but not time of day)

Abandoned in 2019 as ineffective

- Most passenger services franchised – had no choice of route (or time, except at the margin)

- Other services generally had to accept what route and time was available

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Fixed charges

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- Paid by holders of public service contracts
- Based loosely on avoidable fixed infrastructure costs
- exceed £60m p.a. for key main lines
- If correctly estimated could have beneficial effects on incentives, particularly where the PSC is awarded by a body other than the owner of the infrastructure

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Infrastructure charges are markups that raise prices above marginal cost to contribute to fixed cost in accordance with willingness to pay

For freight, it is reasonable to assume that competition drives price down to marginal cost (train operating cost plus payment for use of infrastructure) and that any increase in infrastructure charges will be passed on by an increase in prices to the final consumer.

Thus the price elasticity of demand for track access charges is the elasticity in the final market times the proportion of cost that is track access charges.

Passenger is more complex. Prices are set to maximise revenue. So cost increases lead to cuts in services rather

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Infrastructure charges 2024-25 prices

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commodity	ICC rate (£ per kgtm)
Biomass	1.9137
Coal ESI	1.3748
Iron Ore	1.4077
Spent Nuclear Fuel	23.3493

Open access passenger 5.1950

£per train mile

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Conclusions

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1. British charges distinguish between types of rolling stock more finely than those of most other countries and there is some evidence of an impact on choice of rolling stock
2. Some other countries, including France and Sweden, have imposed higher charges on congested routes but these do not appear to be based on the degree of evidence used in the British charges. All three countries have ceased using congestion or scarcity as an argument for differentiation.
3. Charging devolved authorities the avoidable cost of the infrastructure they use encourages efficient use of infrastructure. Britain and France both do this; Sweden does not

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Conclusions continued

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4. Several countries including France use Ramsey pricing to impose markups, but do not differentiate by commodity. Sweden only has a markup on freight crossing the Oresund bridge.

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Final comment

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- When Great British Railways takes over the infrastructure and operation of the current DfT franchisees, there will cease to be track access charges for the bulk of passenger services

- But track access charges will remain for non GBR operations, including freight and open access passenger

- These operators are very nervous about future levels of charge

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