cerre Centre on Regulation in Europe
Improving network and digital industries regulation

Rail Access Charges: How to reconcile conflicting objectives?

CERRE Executive Seminar

9 May 2018

cerre Centre on Regulation in Europe
Improving network and digital industries regulation

Track access charges: reconciling conflicting objectives

- *Prof. Chris Nash, CERRE & University of Leeds*
- *Prof.Yves Crozet, CERRE & University of Lyon (LAET)*
- *Dr Heike Link, German Institute for Economic Research (DIW)*
- *Prof. Jan-Eric Nilsson, Swedish National Road and Transport Research Institute*
- *Prof. Andrew Smith, University of Leeds*

cerre Centre on Regulation in Europe
Improving network and digital industries regulation

Wear and Tear Costs

Professor Andrew Smith

Institute for Transport Studies, University of Leeds

cerre Centre on Regulation in Europe
Improving network and digital industries regulation

Introduction

- Focus on wear and tear marginal costs
- Great Britain interesting because:
  - ✓High degree of differentiation by type of vehicle
  - ✓Accounting (cost-allocation) and engineering approaches used – substantial differences
  - ✓Engineering evidence from Britain highlights the major difference between engineering and econometric (and cost allocation) approaches

cerre Centre on Regulation in Europe
Improving network and digital industries regulation

Approach to charges in Britain: 2000

- Two step approach
- Cost allocation method to determine overall level of variable charges (engineering judgement)
- Engineering formula used to allocate charges to vehicles (initially based on vertical forces only)
  - ✓Adjusts GTM into EGTM based on unsprung mass; speed; axle load etc.

cerre Centre on Regulation in Europe
Improving network and digital industries regulation

Cost allocation / accounting approach

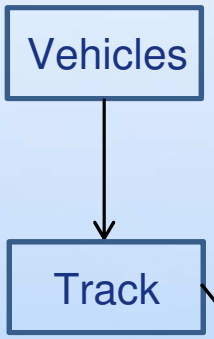
Activity / **asset class**	Variability Proportion: 2000 Regulatory Review	Variability Proportion: 2008 Regulatory Review
Track - maintenance	30%	29%
Track – renewals (plain line)	36%	23%
Track – renewals (switches and crossings)	25%	17%
Signalling - maintenance	5%	5%
Civils – metallic underbridges	10%	8%
Civils – embankments	10%	5%

Source: ORR (2008)

cerre Centre on Regulation in Europe
Improving network and digital industries regulation

Engineering approach

Simulation (track section level)



Weight
Speed

Track type

Damage: e.g. settlement' wear; RCF

Activities: **e.g** tamping or grinding

Unit cost analysis

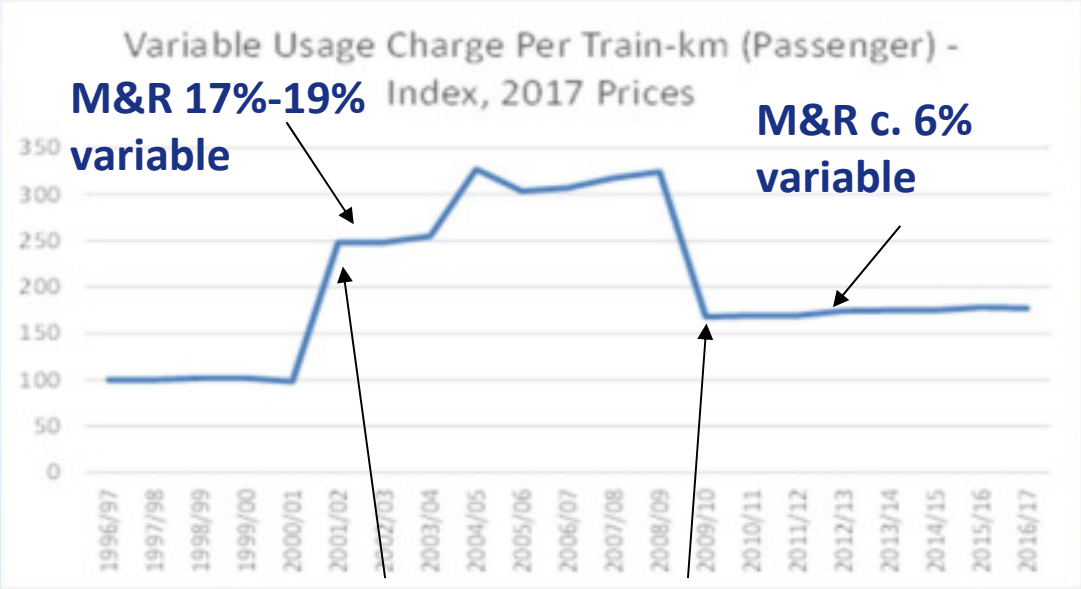
Δ (Volume of tamping)
x
Unit cost of tamping

ΔCost

From 2008 engineering model used also used to determine level of variable charges

cerre Centre on Regulation in Europe
Improving network and digital industries regulation

Implications for level of variable charges



PR2000: Cost Allocation Approach

PR2008: Engineering Modelling Approach

cerre Centre on Regulation in Europe
Improving network and digital industries regulation

Econometric approach

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

- 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 to be estimated – gives us % of cost variable with traffic and in turn, marginal cost

cerre Centre on Regulation in Europe
Improving network and digital industries regulation

Results from EU-wide econometric evidence

- Overall evidence suggests variability for M&R could be as high as **40-45%**
- The lower part of the range of estimates could suggest a possible range of closer to **25-35%**
- Some uncertainty but strong body of reasonably consistent evidence from multiple countries – similar methods
- Interesting recent evidence from **France** (econometric): **c. 20%** variable for M&R (with some models pointing to higher variability)
- Evidence does **not** support variability **below 20-25%** - so econometric evidence out of line with current GB charges (**c. 6%**)

cerre Centre on Regulation in Europe
Improving network and digital industries regulation

Concluding remarks

- **Cost variability? <10% or >20%?**
- Econometric approach: transparent – actual cost and practice
- Extensive and consistent evidence base
- Similar results at different aggregation levels of data
- Engineering method based on assumptions - which is optimal?
- New research needed to reconcile the approaches
- How to implement econometric approach where data is limited – new approach developed in NeTIRAIL-INFRA project

cerre Centre on Regulation in Europe
Improving network and digital industries regulation

Engineering Judgement approach: Germany

Measure	Cost share		Cost drivers and their share in variable costs		
	Varying with traffic volume	Fixed	Number of trains	Weight of trains	Speed
Clearance of faults	95%	5%	80%	0%	20%
Other individual maintenance measures	80%	20% (due to regular intervals)	33.3%	33.3%	33.3%
Repair of tracks	80%	20% (age, weather, track quality)	0%	50%	50%
Repair of sleepers	50%	50% (age)	0%	100%	0%
Mud removal	15%	85%	20%	80%	0%
Repair of switches	80%	20% (age, weather)	0%	80%	20%
Repair at other facilities other than tracks	80%	20% (age, weather, track quality)	0%	50%	50%

Source: DB Netz

cerre Centre on Regulation in Europe
Improving network and digital industries regulation

Track access charges: is there an optimal mark up?

Professor Yves Crozet
Research Fellow, CERRE
LAET, Université de Lyon

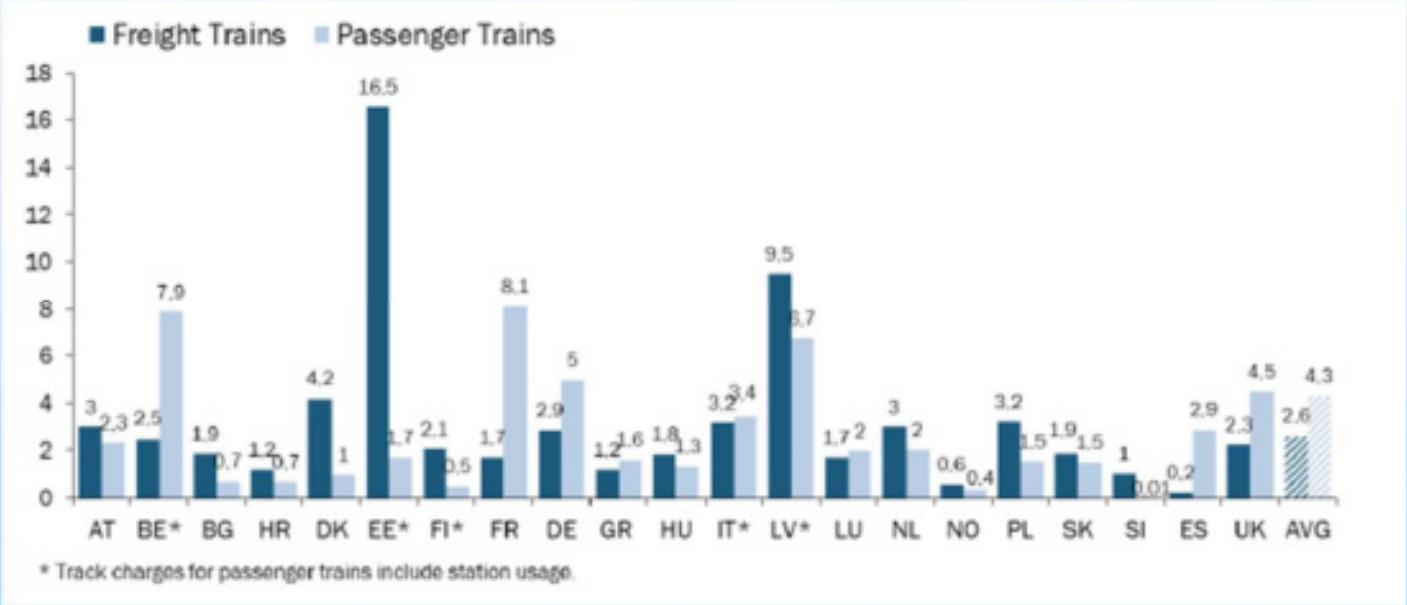
cerre

Centre on Regulation in Europe

Improving network and digital industries regulation

The wide spectrum of rail access charges in Europe

(€ per train-kilometre) in 2015 (IRG-Rail Market Monitoring Report)

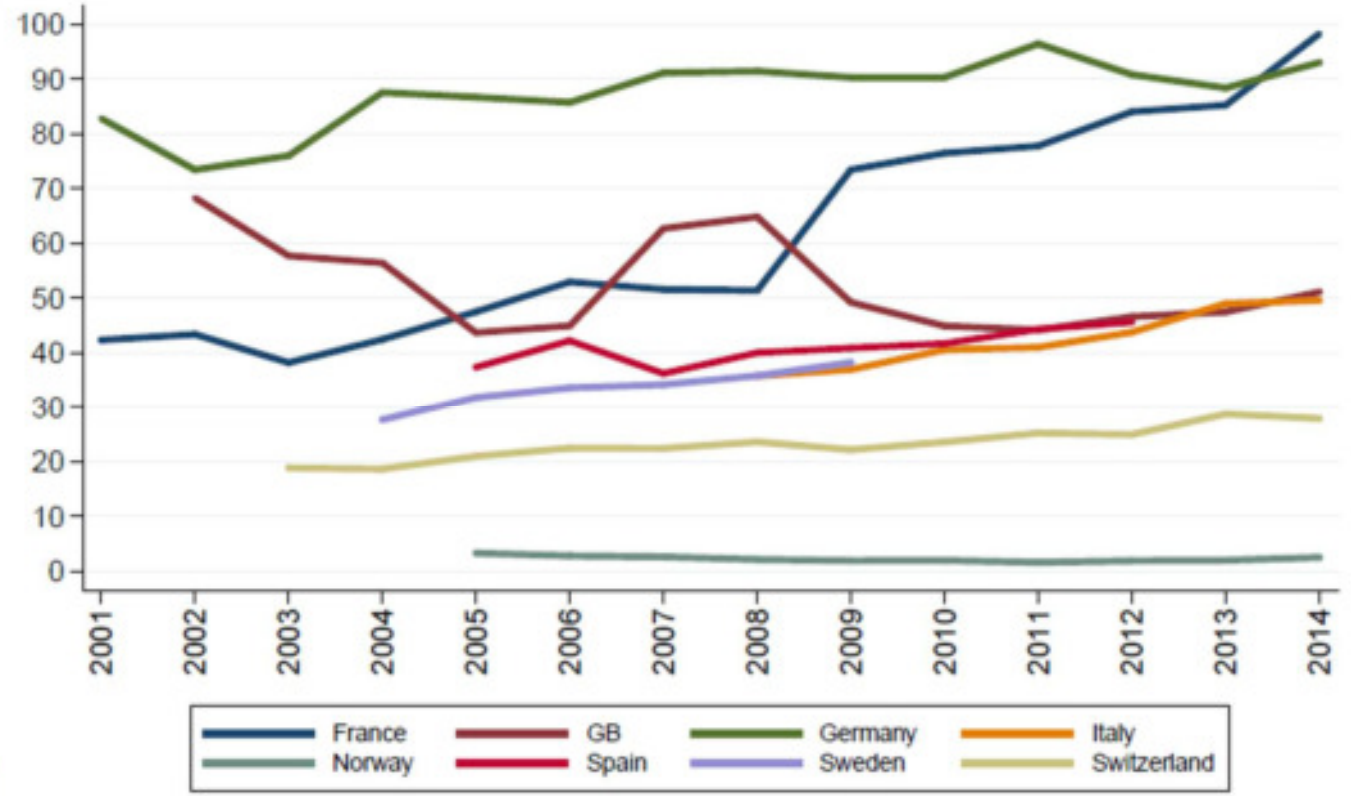


cerre Centre on Regulation in Europe

Improving network and digital industries regulation

The wide spectrum of European practices

Share of infrastructure operating cost covered by access charges 2001-2014 in % (Schaefer 2017)



cerre Centre on Regulation in Europe
Improving network and digital industries regulation

Directive 2012/34 –Article 32.1

- A Member State may, in order to fully recover the costs incurred by the infrastructure manager and, where appropriate, collect increases on the basis of effective, transparent and non-discriminatory principles, while ensuring optimal competitiveness of the rail market segments.

- The pricing system respects the productivity gains made by the railway undertakings.

- However, the level of charges does not exclude the use of infrastructure by market segments that can at least pay the cost directly attributable to the operation of the rail service, plus a rate of return if it is acceptable by the market".

cerre Centre on Regulation in Europe
Improving network and digital industries regulation

What is acceptable by the market ?

- The Ramsey-Boiteux principle as a “scheme of intelligibility”
- 3 key variables

1) Marginal cost (*marginal cost infrastructure utilization charges ensure that infrastructure capacity is used optimally*

2) Opportunity cost of public fund (*a surcharge is acceptable to reduce the public contributions to rail infrastructure*)

3) Price elasticity (the surcharge is acceptable by the market if elasticity is weak)

cerre Centre on Regulation in Europe
Improving network and digital industries regulation

Mark up and the risk of full cost coverage

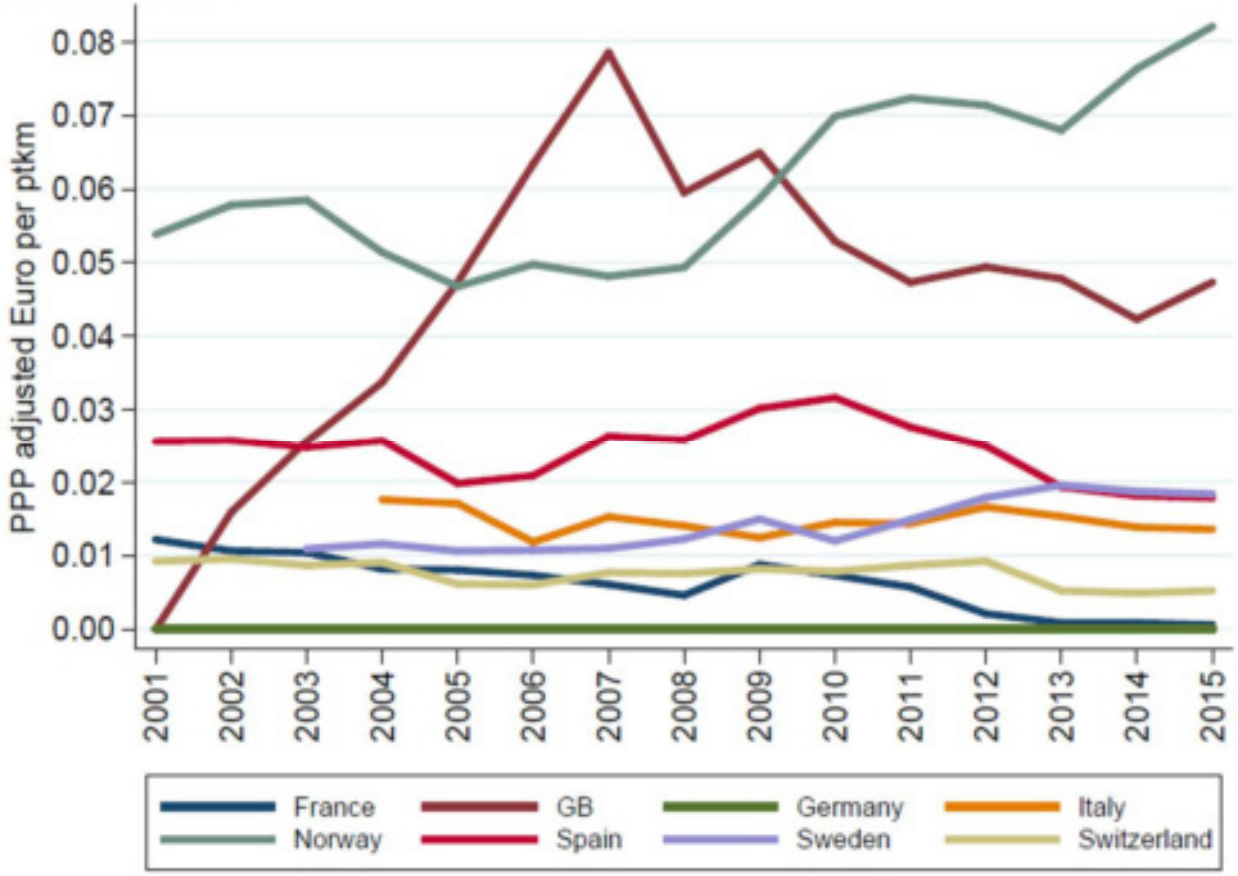
- Marginal cost: a first risk occurs when the marginal cost does not reflect wear and tear costs (over or underestimation)
- Cost of public funds: a second risk occurs when the mark up is calculated in order to obtain a predetermined level of revenue, mainly related to the high cost of maintenance (no benchmark, no incentives….)
- Elasticity: a third risk occurs when the high level of rail access charges leads to cuts in service (-8% of HSR trains in France in 2016)

cerre Centre on Regulation in Europe

Improving network and digital industries regulation

What is the objective function of the government?

Public contribution to infrastructure revenue 2001-2015 in € PPP per ptkm (Schaefer 2017)



cerre Centre on Regulation in Europe
Improving network and digital industries regulation

Additional questions

- For passenger commercial services, the situation is not the same if there is, or not, competition between rail operators.
  - If no competition, the train operator reduces the number of services in case of high RAC (HSR in Belgium, France, Germany).
  - In Italy, there is competition on HSR between NTV and FS. The RAC have been reduced as recommended by the regulator.
- For freight services, in a lot of countries, rail operators are hardly able to pay the marginal cost (except Baltic states ?)
- For trains under public service obligation (PSO) the mark up is paid by the transport authorities, as an equivalent of public subsidies. The money is coming from the same pocket.

cerre Centre on Regulation in Europe
Improving network and digital industries regulation

Conclusions

1. Rail services need public money and there is a cost of public funds
2. Mark ups are acceptable when the consumers have the ability to pay (commercial high speed services between big cities)
3. If there is a risk of service cuts because of the mark up, the welfare loss has to be compare with the advantages of high fares
4. And mark ups can't be justified as a way to cover the extra costs or the low productivity of the infrastructure manager
5. A benchmark against the costs of other infrastructure managers would be more useful than a study on the optimal mark up!

cerre Centre on Regulation in Europe
Improving network and digital industries regulation

Track access charges: reconciling conflicting objectives

Findings & policy recommendations

Professor Chris Nash
Research Fellow, CERRE
University of Leeds

cerre Centre on Regulation in Europe
Improving network and digital industries regulation

Objectives of study

- To examine research and practice in a sample of European countries (namely Great Britain, Sweden, France and Germany)
- To reach recommendations to guide policy makers, infrastructure managers and regulators in dealing with key issues, including:
  - How to measure the direct cost of wear and tear on the infrastructure?
  - How to charge for congestion and scarcity?
  - How to charge necessary mark-ups in a way that damages efficiency of infrastructure use as little as possible?

cerre Centre on Regulation in Europe
Improving network and digital industries regulation

Approaches to wear & tear costs

- 3 approaches permitted
  - Cost allocation (rules say what costs must be excluded)
  - Engineering models
  - Econometrics
- Econometric approaches give much higher estimates than engineering model (Britain) or judgement (Germany)
- Based on what actually happens rather than estimates of what should happen (so inefficiency may explain part of the difference)

cerre Centre on Regulation in Europe
Improving network and digital industries regulation

Important factors influencing wear and tear

- Gross weight
- Number of axles
- Unsprung mass
- Maximum speed of the vehicle
- Type of bogies

cerre Centre on Regulation in Europe
Improving network and digital industries regulation

Charges for Planning & Operations

- Are there marginal costs of running additional trains in terms of timetabling, signaling and real time traffic control?
- CATRIN cost elasticity with respect to train km 0.15 (based on a single econometric study for France)
- So best evidence is that it is correct for these charges to be small.
- In practice, there are small charges in Germany and France; none in Britain and Sweden

cerre Centre on Regulation in Europe
Improving network and digital industries regulation

Capacity

- Charging for capacity may help encourage efficient use of the network; at least it raises money in an incentive compatible way
- Need to distinguish between congestion (impact of additional trains on reliability) and scarcity (inability to satisfy all demand); methodologies exist to estimate both.
- Limited use of such charges at present:
  - Britain (congestion); Sweden (scarcity)
  - None in France and Germany

cerre Centre on Regulation in Europe
Improving network and digital industries regulation

Environmental Externalities

- Little used for rail as no explicit environmental charges on other modes:
  - Britain – none
  - France – none
  - Germany - noise charges for noisy freight trains (and discount for low noise vehicles)
  - Sweden - air pollution charges for diesel traction (varying with fuel consumption and type of engine)

cerre Centre on Regulation in Europe
Improving network and digital industries regulation

How to estimate efficient mark ups

1. Where competition drives prices down to costs, it may be reasonable to assume increased track access charges are simply passed on to the final customer as increases in charges, and to apply Ramsey pricing. OK for freight?
2. For commercial passenger operations, with little on-track competition, it may be reasonable to assume operators are maximising revenue. Response will therefore be to cut services rather than raise price. So estimate of welfare loss must be based on this rather than higher prices; highly differentiated charges needed to avoid service cuts
3. For services operated under public service contracts, charges or other government contributions, should at least cover avoidable cost.

cerre Centre on Regulation in Europe
Improving network and digital industries regulation

Efficiency

- Prices should be based on efficient costs (with possible phasing-in of reductions) based on benchmarking
- Thought needs to be given as to how to incentivise public sector monopolies (managerial bonuses, reputational incentives)
- Performance regimes with penalties/bonuses based on the full social costs of delays are necessary to avoid the incentive to reduce costs by cutting quality

cerre Centre on Regulation in Europe
Improving network and digital industries regulation

Conclusions

1. Econometric evidence suggests charges for wear and tear are often too low
2. Lack of charges for congestion and scarcity (except in Britain and Sweden) fails to raise money in an efficient way
3. Cuts in service may be the response in commercial passenger services, rather than price increases.
4. Mark-ups or other government contributions should at least cover the avoidable costs of services run under public service contracts
5. Charges should be based on efficient costs based on benchmarking
6. Progress on efficiency of infrastructure pricing needed on all modes