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Track wear-and-tear cost by traffic class: Functional form, zero output levels and marginal cost pricing recovery on the French rail network

[Marc Gaudry](#) (1, 2), [Emile Quinet](#) (3, 4)

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Résumé [en](#) [fr](#)

We address the issue of the allocation of railway track maintenance (wear-and-tear) costs to traffic output classes and consider a very general function relating maintenance cost C to a set of technical production characteristics K used to produce traffic output vector T . We neglect other rail cost categories, such as traffic control and track renewal. The data base pertains to over 1500 sections of the French rail infrastructure in 1999, representing about 90% of the total network of 30000 km of lines in regular service. In addition to the maintenance cost C , it provides by track section 15 technical characteristics (both state S and quality Q) and 4 train traffic outputs T . Input prices, assumed to be uniform in space, disappear from the analysis, as in other national cross-sectional cases. With database subsets of approximately 1000 observations, several functional forms are tested: Linear, Log-Log, trans-Log and generalized Box-Cox. All are embedded in an unrestricted extension (U-GBC) of Khaled's seminal restricted generalized Box-Cox (R-GBC) functional specification. The U-GBC architecture, compared with its 4 principal nested variants, turns out to be by far the most appropriate, in particular when some observed zero traffic sample values are included - an issue rather neglected previously in the literature. It appears that several technical characteristics, such as maximum allowed speed and number of switches, are highly significant maintenance cost factors, which gives a hint that derived marginal costs are short term; also, the relation between maintenance costs and traffic is non linear and differs significantly by train category. Implications of different specifications for marginal infrastructure cost charges by traffic type are outlined.

Mots clés [en](#) [fr](#)

- rail track wear-and-tear
- cost function
- CES
- trans-Log
- generalized Box-Cox
- zero sample values
- maintenance cost allocation by traffic class
- marginal cost by traffic class
- power axle weight damage laws
- cross-sectional data
- rail line sections
- France
- marginal cost pricing

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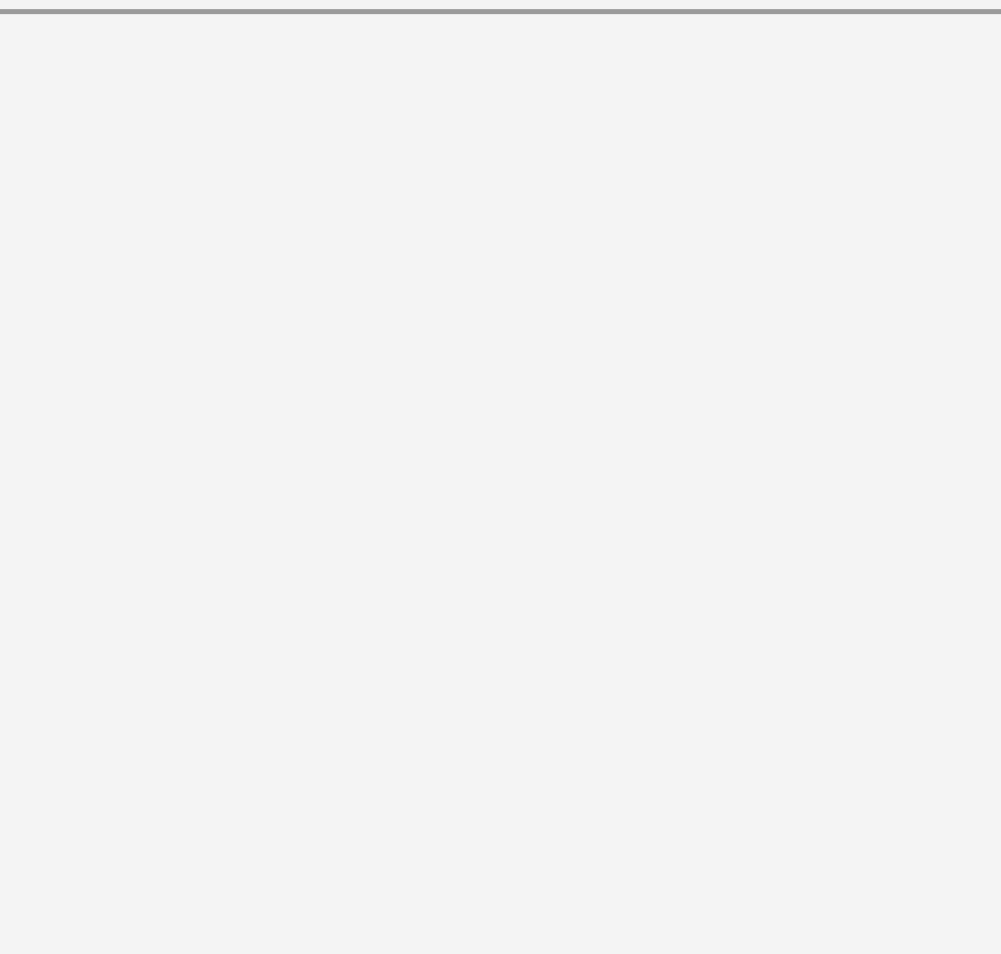
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