

# INTRODUCTION

## I. MOTIVATIONS

Since the nineties, European railways are immersed in a restructuring process aimed at improving the effectiveness, quality and economic efficiency of the provision of railway services, as well as stimulating the growth of railway markets. This growth of railway markets should alleviate congestion in roads and in air space, as well as promote sustainable development<sup>1</sup>, by facilitating a shift from road and airways towards more environmental friendly modes of transport such as rail transport.

The aforementioned reform has involved a separation between infrastructure management and operation and the introduction of rail infrastructure charges to regulate the use, by railway undertakings, of the infrastructure managed by infrastructure managers.

Rail infrastructure charges are aimed, in essence, at recovering costs. Nevertheless, they can have an influence on the usage of the infrastructure, especially in corridors where competition between modes exists. Therefore, special attention should be paid on their amount and definition.

In Europe, legislation requires transparent and non discriminatory rail access charges, based on the principles of short run marginal social cost but with mark ups permitted where necessary to satisfy financial requirements. However, it does not specify how these principles should be implemented. As a result of that, the application of the directive on infrastructure charges in the different European countries has given rise to a large spectrum of charging systems.

In recent years, the European Commission (EC), the European Conference of Ministers of Transport (ECMT) and some Regulatory Bodies, among other entities, have done an important research effort in the European rail infrastructure charging framework, in order to analyse the implementation procedure of the European legislation concerning charging for the use of rail infrastructure and to estimate the marginal costs, on which rail pricing systems should be based. However, there is an interest in appropriate and efficient mark ups above marginal cost which has still not been tackled.

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<sup>1</sup> Rail transport being more environmentally friendly than air or road transport.

While, as a general rule, urban or rural transit services lose money and have to be subsidised, intercity trains and especially high speed railways are able to generate cash surpluses. Therefore, high speed railways would be one market segment where the application of mark ups should be permitted.

Mark ups above marginal costs applied to high speed railways are unknown, but the frequent railway undertakings' complaints on the level of infrastructure charges may be hinting at the fact that the level of mark ups above marginal cost charged to high speed railways could be having a negative impact on the use of the European high speed network.

Given that the European Union is making an important effort to help finance and, consequently, build a European high speed network for strengthening railways and redressing modal share imbalances, it is of great interest to know if current charging levels could be negatively affecting the competitiveness of high speed services.

## **II. OBJECTIVES**

The main objective of this PhD Thesis is to determine the impacts and, therefore, the consequences that current levels of rail infrastructure charges implemented in the European framework have on the competitiveness of the high speed passenger services that run on the European railway network.

Reaching this main objective requires reaching three consecutive main sub-objectives:

- To characterise the order of magnitude of a rail infrastructure charge for European high speed lines/services based on the marginal cost, which is the charging principle required by the European legislation.
- To characterise the rail infrastructure charging systems applied to European high speed services/lines, in order to detect if mark ups above the marginal cost of wear and tear are being applied to those services and if so, how they are applied.
- To quantify the impacts on traffic volumes and mode split resulting from bringing the current levels of rail infrastructure charges (applied in the European high speed network) to the level of marginal cost of maintenance and renewals and to the optimal Ramsey mark up.

### III. CONTENTS AND STRUCTURE

The contents of this document have been structured into seven chapters.

Chapter 1 focuses on the introduction of rail infrastructure charges in the European Union. On a first stage, it tackles the reasons of their introduction in the European railway context and revises the principles of infrastructure pricing. On a second stage, it analyses the legislative pricing framework established by the European Commission. It ends with an estimation of the order of magnitude that rail infrastructure charges should have according to the legislative framework previously analysed. This last stage implies an in-depth revision of the estimation of marginal costs, on which European rail infrastructure pricing systems should be based.

In chapter 2 a state of the art of the main characteristics of rail infrastructure charging systems implemented in Europe are presented. Special emphasis is put on the analysis of cost allocation to charges for infrastructure use, in order to analyse the cost categories and variables used by the different pricing systems implemented in the European railway network. This analysis allows distinguishing special characteristics on the implementation of mark ups above marginal costs in pricing systems applied in networks where high speed lines are in operation. On the basis of these first results, the objective of this PhD Thesis is explicitly formulated.

The methodology established and the assumptions made for reaching the aforementioned objective are presented in chapter 3.

Chapter 4 presents an in-depth analysis of the structure and value of the charges for the use of rail infrastructure implemented in European countries with high speed lines in operation. Special attention is paid to the application of mark ups above marginal cost for high speed lines, in qualitative and quantitative terms. The search for similarities in the application of mark ups above marginal costs is analysed by an attempt of quantifying the influence that the consideration of wear and tear costs, investment costs and the commercial position of the market by pricing systems can have on the value of charges for high speed lines.

On the basis of the results obtained in chapter 4, chapter 5 deals with the analysis of the link existing between rail infrastructure charges and rail revenues from the ticket sales, as a preliminary stage before quantifying the impacts that actual prices charged to high speed trains are likely to have on high speed railways competitiveness.

In chapter 6 the impact that a reduction in rail infrastructure charges can have on traffic volumes and on mode split is evaluated for two case scenarios, namely: a reduction of rail infrastructure charges equivalent to reducing mark ups either to zero or to the optimal mark up.

The results of the previous chapters enable establishing the consequences that current levels of rail infrastructure charges implemented in the European framework have on the competitiveness of high speed passenger services running on the European railway network. Chapter 7 is devoted to the presentation of the conclusions and the possible further research envisaged by the PhD candidate.

## **IV. CONTRIBUTIONS**

The main contributions of this PhD Thesis are:

- The detailed characterisation of high speed railways infrastructure charges and the analysis of the correlation of their value with infrastructure characteristics and their commercial position.
- The establishment of a methodology for quantifying the impacts on traffic volumes and mode split of a variation in the level of rail infrastructure charges.
- The quantification of the impact on European high speed traffic volumes of reducing mark ups either to zero, or to the optimal level of charges derived from the rule of the mark up proportional to the inverse of the price elasticity of demand.
- The quantification of the impact on European high speed mode split of reducing mark ups either to zero, or to the optimal level of charges.
- Proving that the current level of infrastructure charges applied to high speed lines and services are negatively affecting the volumes and the market share.