



# How can transportation policies affect growth? A theoretical analysis of the long-term effects of alternative mobility systems

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## ABSTRACT

We present an example of how public policies affect the evolution of the economy by influencing consumption habits, life styles and work attitudes. In particular, we show that governments can boost long-run growth by moving public investment away from collective transportation systems and towards infrastructures necessary for using private vehicles. Indeed, by augmenting the relative convenience of using private mobility systems, which are those more costly for the households, the government induces them to increase their labour supply so as to afford larger expenditures in transportation. This has long-term welfare implications depending also on the negative externalities associated with transport.

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## 1. Introduction

In advanced countries, essential services such as education, health and transportation services can be made available at relatively cheap prices through subsidized systems that are often directly managed by the government (as it usually happens in European countries), or, alternatively, at higher prices through systems to which people can have access by paying a larger fraction of their total cost (as in the United States). As a matter of fact, each country is characterized by its peculiar way to combine these two modalities in providing services. This paper argues that in general the particular mix characterizing a country has effects on its long-run growth and welfare.

Specifically, the model presented here focuses on the case of transportation services. Mobility systems are particularly apt to test our intuition because: 1. there exists a clear distinction between private and public modes of transport; 2. both modes of transport require, in order to provide mobility services, a certain amount of public infrastructure (say, highways for private transport, and railways for public transport); 3. some stylized facts (shown in Section 2) are consistent with the assumptions and predictions of our model.

This paper thus offers a simplified treatment of an economy where transportation services can be provided either by a collective transportation system or by the use of private vehicles on public roads. Individual choices concerning the transportation modes are influenced by government decisions regarding the investments to be made in private and public mobility infrastructures.

The main result of the paper is that – keeping unchanged the fraction of privately produced output that is levied by the government to be invested in transportation infrastructures – the government can boost long-run growth by investing more in private mobility systems. This is because, by moving public investment away from collective transportation systems and channelling it into the infrastructures that are necessary for the use of private vehicles, the government shifts the households' demand for transportation services in favour of private modalities of transportation, which are those that require relatively more private expenditures. In its turn, this change in the composition of the households' demand for transportation services raises steady-state growth by inducing the households to increase their labour supply so as to afford larger expenditures in transportation.

In other words, the composition of public investment matters for long-run growth because, by affecting the relative convenience of different modalities of transportation, it can influence the households' consumption habits, life styles and attitudes regarding market activities. A similar intuition applies to changes in households' preferences: a more intense preference for the use of private modalities of transportation

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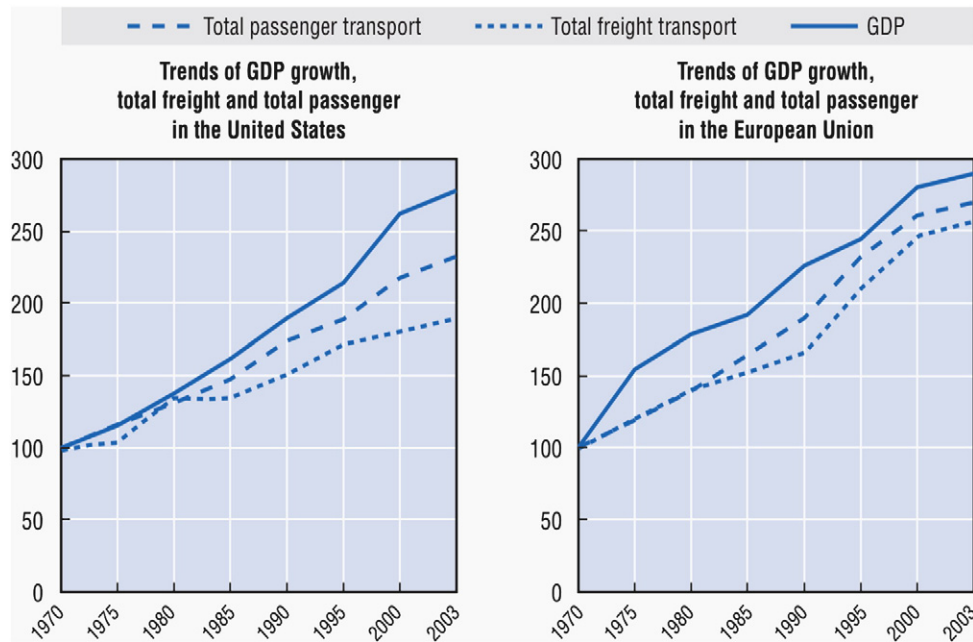


Fig. 1. Comparison of trends of GDP and transport growth, 1970–2003 (1970 = 100). Source: OECD (2006).

causes the same effects on households behaviour that are induced by an increase in the fraction of public investment devoted to private modalities of transportation.

To the best of our knowledge, there is no other attempt in the literature to model these intuitions.<sup>1</sup> The value added in this exercise lies in showing analytically that, simply by allocating differently its investment expenditures, the government can have effects on both long-run economic growth and people's well-being. Indeed, this conclusion is not obvious, since without a formal demonstration one could argue that a policy shift moving public investment away from collective transportation systems and towards private ones (or vice versa) would have only a temporary impact on growth and welfare.

The formal setup presented here offers a rigorous explanation of why the rapid development of transportation modes based on the mass diffusion of the automobile played a crucial role in driving economic growth in advanced countries. One may observe that the same pattern of development is occurring in developing countries all over the world. It is well-known, however, that transportation systems can have detrimental side-effects on environmental assets. Therefore, it is not surprising that the long-term welfare effect of a government policy aimed at favouring private modalities of transportation may be negative, in spite of its positive impact on long-run growth. It should be emphasized that this conclusion does not hinge on the fact that a certain quantity of services generated by the private transportation system causes more pollution than the same quantity of services provided by the collective transportation system, but rather on the fact that a policy favouring the use of private vehicles induces the households to spend more and to work more hours, thus stimulating private investment and leading to a more rapid increase in the demand for transportation and in the emission of pollutants.

<sup>1</sup> We focus on a channel whereby public investment can affect economic growth that is not explored by the existing literature. As a matter of fact, the latter generally accounts for the impact of public investment on growth by assuming that public capital increases total factor productivity and/or by introducing public capital as an additional input in production functions. For a recent survey of the theoretical and empirical literature on the subject see Romp and de Haan (2007).

The paper is organized as follows: Section 2 discusses some stylized facts, Section 3 presents the basic model, Section 4 characterizes the equilibrium trajectory and the balanced growth path of the economy, Section 5 treats the long-run welfare implications of the model by introducing negative externalities, and Section 6 concludes.

## 2. Some stylized facts

Transport has always been tightly connected to economic growth. Technological innovations in transportation means and infrastructures played a crucial role in the Industrial Revolution and western economic development (Szostak, 1991). Gross domestic product and transport tend to grow together (see Fig. 1), and there has been a large debate among experts and policy makers on the possibility to “decouple” the two trends (OECD, 2006; SACTRA – Standing Advisory Committee on Trunk Road Appraisal, 1999).

In particular, transport growth has been driven by the expansion of road transport. As is well-known, the ascent of automobile as mass means of transportation has immensely increased mobility possibilities in terms of travel distances, flexibility of route, comfort and privacy. Automobile diffusion has triggered a revolution that has gone beyond mobility, drastically modifying social lifestyles, broadening individuals' realization opportunities, and stimulating economic growth and consumption. Automobile has also been significant as a productive sector per se: during the last 25 years, the share of U.S. auto industry – which is the first sector in terms of R&D spending – in U.S. GDP floated between 3 and 4% (CAR – Center for Automotive Research, 2003). The automotive sector gives employment – if spillovers, downstream and upstream sectors are considered – to around 13 million people, approximately 10% of total U.S. active population. In comparison, the employment contribution of public transport is very limited.<sup>2</sup>

<sup>2</sup> 383,000 people according to APTA (2009).

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