

# TRANSPORT INVESTMENT **AND** ECONOMIC DEVELOPMENT

David Banister and Joseph Berechman



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# Transport Investment and Economic Development

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and  
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David Banister and Joseph Berechman  
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# Objectives and scope

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### **Main issues and structure**

It has always been assumed that a high quality transport infrastructure is an essential prerequisite for economic development, yet this assumption has never really been investigated in depth. Over time it has become axiomatic and part of the underlying rationale for transport investment decisions. The basic purpose of this book is to explore in depth the arguments for and against this assumption and to come to conclusions on the key relationships between transport and infrastructure investment and economic development.

We also accept that there are other important influences on economic development. In particular, we argue that political and institutional factors provide the broader context within which decisions are made. They also influence the means by which finance for investment can be raised and provide the organizational and legal framework for action. In this book we primarily concentrate on the links between transport investment and economic development, but at the end we return to the political and organizational context through the case studies and concentrate on this in the concluding chapter.

The first part of the book outlines the main issues and arguments in the debate, taking a series of different perspectives. First, we examine the historical evidence, then the extensive literature on the productivity of infrastructure investments and the links between infrastructure and development. Most of the book is addressed at infrastructure investment in developed economies, but the very different impacts in developing countries and cities are covered in the overview. We also outline the importance of the subject matter and a series of key questions to be addressed in any analysis of transport infrastructure investment and economic development.

The range of the subject matter is vast and of key concern to all national and local governments. To limit the scope of this book we outline a conceptual approach in Chapter 2, together with a methodological framework within which analysis can take place. A principal element in this framework is the scale at which analysis should be undertaken. Most of the recent research has



concentrated on the links between national economic indicators and infrastructure investment, but causality and time are difficult elements to deal with at this scale. The regional analysis focuses mainly on accessibility changes within networks rather than economic impacts. Our analysis is primarily at the microeconomic level where causality can be implied, but there are still limitations with data.

Part I sets the scene and limits the scope of our investigations. It also acts as the framework within which the other three parts of the book are placed. We then progress on to the changing contemporary world in which decisions are made (Part II), the review of methods and the development of a micro analytic model (Part III), and the presentation of the case study material (Part IV).

# Background and objectives

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### 1.1 Introduction

The belief that public investment in infrastructure will generate economic growth has often been used as a justification for the allocation of resources to the transport sector. Much of the road-building programme in developed and developing countries has been promoted on these grounds, yet the arguments seem far from clear.

In the USA, for example, the Clinton administration has proposed a substantial investment in infrastructure, as it has public support (Gillen, 1993), even though Congress is against it because of the implications for the public budgets. It is popular among users of the road as they can see a higher quality infrastructure that will allow them to maintain their very mobile car-based lifestyles. Industry has also traditionally been a strong supporter of infrastructure investment, arguing that it will make it more competitive, help get the country out of recession and create jobs in the short term. These are all strong arguments but, as we shall see later in this book, the evidence is equivocal, particularly in countries and cities where there is already a high quality infrastructure.

Similar sentiments were being expressed in the UK with the publication of *Roads for Prosperity* (UK Department of Transport 1989). An expanded programme of investment in motorways and trunk roads to relieve congestion was announced. The programme effectively doubled the existing investment plans and was seen as a commitment to the provision of infrastructure 'suited to the single market and other competitive challenges of the 1990s and beyond' (para. 2). It was also argued that the investment was necessary for industry and to improve the country's economic geography, through increasing opportunities for less favoured regions, assisting urban regeneration and helping more prosperous areas to cope with growth. The programme had resulted from a substantial increase in road traffic (+35 per cent) in the 1980s and the prospects of a doubling of road traffic from 1988 to 2025. Something had to be done and the government decided that road building was the main alternative to be pursued. One of the fundamental objectives of the road

programme is to assist economic growth by reducing transport costs. Yet even in the following year when the review of the road programme was made (UK Department of Transport 1990), there was little mention of the economic growth arguments, only those on environment, safety and urban regeneration.

Similar arguments have been presented in Europe. A review of the problems carried out by an international team of experts (Group Transport 2000 Plus 1990) concluded that the overcrowding and saturation of new facilities even at the moment of commission, the need for new links and the choice of layouts, gauges and operating methods were all issues to be addressed. But above all the people consulted by the team of experts focused on infrastructure costs and many of them talked in terms of passing them directly to the users. The costs of constructing new infrastructure and replacing existing infrastructure are considerable and the massive investments in the 1950s and 1960s have been followed by lower levels of investment. Since 1975, investment on inland transport has fallen in west Europe by 20 per cent in real terms and it has halved as a proportion of gross domestic product (GDP) to 0.8 per cent. This reduction in infrastructure investment reflected general reductions in public expenditure, the world recession in the 1970s resulting from high oil prices and the generally lower levels of increase in transport demand. Non-investment in transport infrastructure takes time to show an effect and, given the short-term time horizons of politicians, any delay in commitments to expensive projects meant savings in public budgets and lower taxes. Investment decisions were delayed, particularly expensive new links between countries and those that involved tunnelling. With the economic upturn in the 1980s there was substantial new growth in transport demand, but it also became apparent that growth in traffic had continued throughout the 1970s as well. Investment had not been reduced because of reductions in demand for mobility, but for other macroeconomic reasons such as pressures on public budgets, high interest rates and industrial recession.

Underlying these arguments is the premise that there is a fundamental link between growth in transport investment and economic growth. It has been consistently argued that there is a clear relationship over time between GDP growth (a measure of economic growth) and a range of measures of transport and transport-related investments. Such comparisons have generally been made over the last fifty years since the advent of the car, and more recently air travel. It has also been a period of economic growth and stability, as there have been no major wars to reduce or redirect output. Similarly, there has been a substantial increase in trade within and between countries. It is not surprising that the demand for travel has increased in parallel with economic growth. Many other measures of wealth or well-being have also increased in a similar way: for example, the growth in income levels, the purchase of consumer goods, the numbers of people in schools and higher or continuing education, life expectancy, etc.

However, as efficiency and productivity increase, the linear links with GDP may be reduced as there is no a priori reason why transport demand should rise with GDP. Production and distribution processes (and individual passenger travel) could become either less transport intensive or more transport intensive. Conversely, if prices rise substantially or there is a concerted international action, then again the simple linear relationship may be broken. This has already happened with energy consumption as price rises and greater efficiency in production and consumption have resulted in growth levels far less than those in GDP. These trends and relationships are important, but they are not set in tabloids of stone – they are not immovable. Sustainable growth and development has the basic objective of maintaining growth in the national and international economies, but with the use of less resources, particularly non-renewable resources. This means that we would expect a continued growth in GDP but with fewer resources used in transport. This does not necessarily mean that there will be less transport. But it does mean that we have to become more efficient in our use of resources. In addition, the current technological revolution in information and communications may also weaken the links between transport growth and economic growth. The concentration on physical measures ignores the other forms of transactions that take place, such as movement of information, finance, commerce and document handling by informatics and technological means. This is where real substitution is taking place.

Apart from the arguments at the national level, there have also been strong urban and regional arguments for investment in transport infrastructure. The regional development policies in the European Union (EU) are powerful and substantial investment has been transferred from the centre to the periphery. This means that the larger countries of Germany, France and the UK have supported infrastructure projects in the poorer European Union countries of Spain, Greece, Portugal and Italy. The arguments used by the EU are that regional development policy strengthens integration and cohesion of the EU as a whole, while at the same time reducing the disadvantages in peripheral or poorly connected locations. In the longer term it will maintain and enhance the competitiveness of Europe. In other words, it is asserted that expanded transport infrastructure will provide overall economic development in the longer term.

Even here there are many unresolved questions. It is not clear whether such a policy actually provides the greatest benefit to these peripheral regions. Little empirical evidence is available on whether infrastructure investment in the periphery actually strengthens the centre, as it extends market area and permits migration of labour to the centre where opportunities are perceived to be greater. It is unclear whether the local economy in the peripheral region benefits over the longer term. If competitiveness of the EU or the individual country in world markets is being discussed, then infrastructure investment should be in those locations where the greatest return is expected. This is likely to be in the regions with the most buoyant economic conditions or

where particular circumstances are likely to result in high returns, for example, where there is a particular skill or a natural resource available.

The issue here is whether a high quality transport infrastructure is a necessary condition to bring about economic growth in depressed or emerging regions. Traditional arguments (e.g. Botham 1980) and more recent reviews (e.g. Hart 1993) have all suggested that road building is not the key determinant for growth (Section 1.2). The Merseyside situation in the UK is informative here. In Liverpool (the main city in the Merseyside conurbation), substantial road programmes were promoted in the 1960s and 1970s as the expected increases in population and employment, together with rising productivity and income, would all lead to substantial increases in the volume of goods and passenger travel, particularly by car. It was clear even before the studies were completed that the Merseyside conurbation was losing population and employment and that the whole of the local economy needed to be restructured. Inadequate road networks were not a key component of that restructuring process and investment was required in retraining, new industries and a regeneration of the local economy. Nevertheless, the road investment programme was still kept as an integral part of the strategy, only the argument changed. Roads were originally justified on the basis of the expected growth in traffic, and the necessity to accommodate and direct this growth. Subsequently, the same roads were being defended as a means to regenerate the local economy (Banister 1994).

From a firm's perspective, similar conclusions can be drawn. There are many ways in which firms can use the transport system to their own advantage so that costs can be minimized. If a road network is improved, then the firm is likely to make longer and more frequent journeys, which may minimize their own costs, but raise substantial environmental costs (McKinnon and Woodburn 1994). Conversely, firms could make more use of logistics systems and new forms of management and organization to minimize transport costs (Weijers 1995). Similarly, firms might consolidate on one site or disperse to several sites to maintain competitiveness. In all cases, there seem to be a range of alternatives available so that profit levels are maintained or increased. Transport costs are only one part of that decision, yet there are many ways in which each firm can maintain its competitive position.

The evidence cited here gives a flavour of the main issues and problems to be raised in this book. At one level the traditionally held view that there is a strong link between transport infrastructure growth and economic growth does seem to be supported, particularly if national statistics on trends over the last fifty years are used. However, this aggregate view simplifies the more interesting political and economic arguments for investment, the regional variations and the actions of individual firms and people in their own decisions.

Some governments are less convinced by the strengths of these arguments. In Canada there has been a recent recommendation (cited in Gillen 1993) against any large public investment in transport infrastructure. Part of the

justification for this recommendation was the lack of any clear understanding of how such investment would lead to long-term economic growth and development. The recommendation from the Royal Commission on National Passenger Transportation was first to get the pricing of the infrastructure right.

This chapter aims to set the scene for the book by outlining some of the main debates in greater detail. The development of the argument is presented through an historical perspective on the debate, particularly the huge interest in the subject in the 1980s and its current revival. This is followed by a review of the triggers for this renewed interest, principally through the debate on the productivity of infrastructure investments from the macroeconomic literature. We then turn to the development literature to explore the seemingly clearer relationships in developing countries. All of these debates have taken place at the macro level, while most of the remainder of the book concentrates on the regional and local scales.

## **1.2 The debate: a historical perspective**

### ***1.2.1 Introduction***

The debate over the links between transport infrastructure investment and economic development is not new. Ever since roads and railways were built, one of the main arguments has been the impact that the infrastructure would have on production costs. Initially, as there were few links in the network, the impacts would be clearly identified and causal relationships could be inferred. Transport investment would help open up new areas for agricultural production, create new markets for goods and link in isolated areas with the main towns and cities. Essentially, this is the development argument that has been applied more recently to countries passing through the development stage (see Section 1.4). We have no fundamental disagreement with these arguments. Our contention is to establish whether the same arguments are still relevant in advanced economies where the infrastructure is already well developed, where more complex market systems are in operation and where transport costs play a less important role in the total production costs. We are also addressing the new forms of production based on post-industrial and technological developments, with high levels of car ownership and mobility, and high levels of employment in service industries. In this section we ask whether the arguments used nearly two hundred years ago are still relevant today.

### ***1.2.2 The early days 1800–1970: location theory***

Early studies by economists opened up a debate as to whether a reduction in transport costs brought new areas and products into the market. Rostow

(1960a) argued that this was the case and that transport investment also contributed to a major new export sector and was instrumental in the development of the modern coal, iron and engineering industries. Conversely, Mitchell (1964) in his extensive economic history of the UK railway system concluded that these necessary conditions stated by Rostow were already met in the UK before the railways were built. In the UK the railways were effectively completed in 1852 and did not have a great immediate effect on the economy. There were substantial direct effects in the construction phase through the employment of unskilled labourers and stimulation of the iron and steel industries, but their major effect was in the development of the capital market and the levels of savings. They encouraged investment in profitable (and unprofitable) enterprises.

A fascinating study of the development of the horse-drawn barge (*trekschuit*) and the canal network (*trekvaart*) and its impact on the Dutch economy also illustrates this historical debate (De Vries 1981). The growth in the canal network was phenomenal, with some 658 km constructed (1632–1839), linking thirty cities so that people (and freight) could travel around the country. The passenger services were used for both business and pleasure, with charges being made to travel or to walk (the charging points for walkers were the bridges). Demand peaked in the 1670s, but decline followed which was attributed to poor maintenance, dishonesty by skippers, competition from unregulated carriers and poor economic conditions. There was a revival in the 1800s, but the canals were then being replaced by railways and roads. At the end of his investigations, De Vries (1981) concluded that the economic rationale for the canal network was unclear, as it may have only affected the level of economic performance, not the actual rate of economic growth. But the canal system may have contributed more to gross regional production (in 1670) than the railways did two hundred years later (in 1850).

This debate was complicated by the more sophisticated economic arguments of Fogel (1964), who conducted an historical study of the impact of railroad development on the American economic growth during the nineteenth century. He concluded that railways had a primary impact on the costs of transport and that there were social savings resulting from the movement of agricultural output by rail. The social saving was defined as the difference between transport by rail and the second best alternative, mainly waterways. His analysis covered the four commodities (wheat, corn, pork and beef) which accounted for over 90 per cent of agricultural regional movements in the USA in the nineteenth century. Fogel also examined the derived effects or those consequences that followed from the savings in transport costs. These were divided into those which would have been induced by any innovation that lowered transport costs (disembodied) and those that specifically related to railways (embodied). His conclusions were very different to those reached by Rostow. Fogel thought that ‘no single innovation was vital for economic

growth during the 19th century'. Economic growth was a consequence of the knowledge acquired in the course of scientific revolution and this was the basis for a multiplicity of innovations. Rail development in the USA has helped shaping growth in a particular direction but was not a prerequisite for it.

In the UK the industrial revolution was completed before the railways were built. The railways were part of that process, not a precondition. They emerged out of an effort to apply scientific and technological knowledge to the improvement of products and the reduction of costs. Cheap inland transport is a necessary condition for economic growth, but the satisfaction of this condition did not entail a specific form of transport.

The land use transport links were explicitly included in Von Thünen's classic (1826) study on the impact that transport has had on patterns of agricultural development. As the quality of transport improves, the land devoted to agricultural production is extended. This in turn allows land values and land uses to be reflected in the relative location advantages which the transport system provides. Many other studies, all classics, developed from this starting point (e.g. Isard 1956; Wingo 1963; Alonso 1964). They were based on concepts of urban economics, land economics and rents using methods that assumed optimality and equilibrium in land allocation, a single market and no uncertainties.

As distance from the centre increased, the total costs of transport also increased, and these factors determined the highest use value of any particular location. As distance from the centre increased, land values decreased. This theory simplifies reality and promotes transport as the main determinant of land value and hence uses. Changes in the costs of transport will influence the distribution of activities through the land market. As cities become more complex with high quality transport, they will increase in size and residential densities will reduce. The lower transport costs and lower peripheral land costs mean that with a fixed budget more can be spent on housing. These theories have had great intuitive appeal over the last two hundred years as their logic is simple and the mechanisms driving them are transparent.

The research of Christaller (1933) in southern Germany was the most influential as he demonstrated the links between transport costs and the spatial distribution of economic activity. He proposed an urban hierarchy of a number of market towns, each with different transport costs, specializations and differential product values. As the towns went up the hierarchy, the range of products increased and the quality of transport improved. The larger centres were able to increase their share of the total economic activity and this in turn led to concentration of economic activity with a few centres dominating the region. Improvements in transport infrastructure strengthened the accessibility and dominance of the central city – central place theory.

The economic base to these early theories was complemented by other studies in the USA which focused more on historical and social factors and on



cycles of growth and decline (e.g. Hurd 1924; Burgess 1925; Hoyt 1939). Rather than assuming that all activities could locate anywhere within the 'ideal' city, additional constraints were placed on the requirements of particular types of activities. For example, certain industries require waterside facilities and their workforce would locate nearby, thus limiting other types of activities. Similarly, high quality housing might locate near the city centre, but over time high income people would move out to the city fringe and this 'old' housing would be cascaded to lower income households. Simple concepts of distance were replaced by evolutionary approaches to location. Harris and Ullman (1945) concentrated on specialization, agglomeration economies, clustering and class segregation as reasons why ideal patterns do not emerge in real cities. Instead of one centre emerging, several sub-centres would develop. This in turn has led to concepts of hierarchies of development (Berry 1967).

These studies have their limitations, but they have formed the basis of much current thinking. They were essentially descriptive and used simplifications designed to establish causal relationships to help understand the development of urban areas. Monocentricity of employment is perhaps the most widely criticized assumption (Deakin 1991). But other factors, such as the standard household structure with one worker, the dominance of transport, the power of market forces and the limited treatment of time, space, political, institutional, legal and social factors, all mean that new approaches are needed (Alcaly 1976).

The critique of these early approaches was both technical and conceptual. In the 1970s and 1980s questions were asked about the methods being used and the underlying logic of the links between transport and economic development. Initial scepticism turned into full-scale criticism. For example, Wilson (1978) stated:

When we turn to transportation, the roles that improved transportation are supposed to play are numerous. For example, transportation improvements have been cited as having important positive effects on political unity, social cohesion, economic growth, specialisation, and price stability as well as on attitudinal change. Yet . . . precisely opposite effects are equally plausible.

(Wilson 1978: 102)

The developmental tradition (Hart 1983) has involved a strong belief that transport made a vital contribution to economic growth. His historical analysis traces both public and private involvement in transport infrastructure investment, with assumed high rates of return and substantial multiplier effects. Yet, many of the early companies, in particular those involved in rail investments, went bankrupt. But this may have been due to other factors such as macroeconomic factors and conditions for competition. The conclusion