
Book Review: The Economics of Infrastructure Provisioning, The Changing Role of the State

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This book grew out of an interdisciplinary seminar organized by CESifo in Venice in summer 2013. It contains 16 papers by infrastructure experts from Europe, the American continent, and Asia, covering theoretical and historical aspects of infrastructure provision as well as empirical studies in the energy-, telecommunications-, water-, and transport-sectors. The following review focuses primarily on the chapters relevant for transportation.

After a brief introduction by the editors, Hugh Goldsmith, an infrastructure economist with the European Investment Bank (EIB), takes us on a *tour de force* through the history of infrastructure provision from 9000 BCE to the present. The chapter is lengthy (69 pages) but very worth reading. In order to wet the reader's appetite I shall deal with it and a related chapter by Hofmann in somewhat more detail than with the other papers. Readers who are solely interested in the economic parts of the book may immediately jump forward to page 6 of this review.

Goldsmith's narrative begins with a piece of "religious infrastructure", namely Göbekli Tepe, probably the world's first temple, built around 9000 BCE in Upper Mesopotamia (6000 years before work began in Stonehenge!) and then continues with the infrastructural achievements in Mediterranean antiquity. The description makes it abundantly clear, that know-how about irrigation, water supply, sanitary systems, libraries, and roads was already surprisingly well developed long before the era of the Greeks and the Roman Empire. The chapter continues with the decay of the Roman road infrastructure in the Middle-Ages until its revival with the rise of city-states in Flanders and Northern Italy. The amazing capabilities of the Romans in infrastructure construction are too well known to need much elaboration here. Goldsmith covers them at some length. It is still almost unbelievable that at its

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peak the paved part of the Roman road network had a length of 30 000 km, whereas the unpaved secondary network spanned a further 320 000 km and reached to the most distant parts of the empire.

How was the system built and paid for? What were the roles of the state and private industry? In general it can be said that the road network was built by the military and private contractors with financing from general taxation. Before Augustus, the construction of long distance roads was organized by the state under the responsibility of a military consul. Within towns, in contrast, each municipality financed roads out of a mixture of taxes and gifts by wealthy persons (Julius Caesar being one of them). Under Augustus the system was reformed and responsibility went to a commission of senators, the Supervisors for Roads, which was responsible not only for construction but for maintenance too and which made ample use of private contracting. Thus, private involvement in infrastructure provision was already substantial in the times of the Roman Empire. Slavery, of course, played a large role in the supply of the necessary workforce. Passenger travel on roads was free, but transport of goods was subject to tolls levied at bridges and town gates. The ensuing revenues, however, were not exclusively used for maintenance but rather as a convenient way to raise local taxes.

As Goldsmith states, the roads, aqueducts, sewer systems, public baths and public spaces of the Romans constituted an infrastructure “that would not be matched again in Europe until after 1800”. The reason for this large stand-still was a change in the economic paradigm. Whereas the Roman infrastructure reflected the needs of a more or less market driven economy (and military needs too, of course), feudalism of the middle-ages relied more heavily on “castles and cathedrals”. Civil infrastructure was largely neglected. As Goldsmith puts it, “... it is hard to point to any great achievements in infrastructure before 1000 CE.” The Roman road infrastructure slowly decayed. Frequently the paving material was stolen and used for the construction of other buildings.

With the rise of the city-states in Flanders and Italy roughly after 1000 CE the focus of infrastructure building shifted back to the needs of trade and industry. But the real change, according to Goldsmith occurred around 1500 EC when the role of private capital and private initiative in the provision of public infrastructure increased dramatically, particularly in Britain and primarily in transport and water supply. Goldsmith spends some time on the water supply projects in London around 1500 CE when the role of private capital and private initiative in the provision of public infrastructure increased dramatically. He proceeds to the more familiar story of the turnpike roads and railroads in England and ends with the host of new technologies in transportation (motorways, tramways) and telecommunications (telephone, telegraph, internet) which the second half of the 19th century and the 20th century brought forth.

In line with the theme of the conference and the title of the book, Goldsmith focuses on the changing division of labour between the public and the private sector in the supply of infrastructure. This distinguishes his article from other comparable overviews. In the early an-

cient times in Asia there was naturally very little involvement of the private sector (if a “private sector” in the modern sense existed at all). In the author’s own words, “Command-and-control policies built civilizations” (Picot et al. (2005), p. 61.).

As time moved on, however, private initiative became more important. The Greeks were already quite sophisticated in drawing up contracts for the private provision of infrastructure. Goldsmith reproduces a contract between the Greek town of Eritrea and a foreign contractor named Chairephanes, which is amazingly modern in its terms, for instance with respect to the provisions covering risk allocation. The contract was carved on a marble stele which was on public display, in order to increase the transparency of the deal for the citizens. German readers may remember how difficult it was, even for members of the parliament, to obtain any detailed information on the contract between Toll Collect, the provider of the German tolling system for highways, and the federal government. As of late, however, the contract can be found in the internet, the modern equivalent of the technology of *steles*.

As mentioned before, the big structural break with respect to the involvement of the private sector occurred around 1500 CE with the big water supply projects in England. Suddenly the classic entrepreneur begins to emerge, who develops “grand” projects and who succeeds in persuading investors to contribute large sums to his projects (in the case of the New Canal even the King himself). Note that this is also the time where the East India Company and similar ventures are being formed.

The second even greater leap with respect to private sector participation happened alongside the railway revolution. It has often been pointed out that there was a close complementarity between the development of railways and the development of modern financial markets. To quote just one interesting number, 90 percent of all stocks and bonds traded at the New York Stock Exchange in 1880 were related to the railway sector. Rating firms like Moody’s (John Moody) or Standard and Poor’s (Henry Varnum Poor) trace their origins back to railway investment guides. Goldsmith points out that railways created modern financial mass markets and that without these markets railways hardly would have developed, notwithstanding the various bubbles and “manias” that temporarily slowed down the development and destroyed a huge amount of private savings (like the “turnpike mania”, the “canal mania”, or the two railway manias in the 1830s and 1840s). Analogies to our times immediately come to mind.

In Goldsmith’s view, infrastructure development before 1800 was mainly driven by the state, by institutional innovations, and by private capital. After 1800 the development becomes mainly technology driven and is pushed forward by private entrepreneurs like Edison, Bell, Marconi, and similar personalities. The role of the state in this historical stage is more the role of a “midwife”. To quote Goldsmith, “If a new infrastructure was perceived as strategic, the state would try to get it built, first with private capital and then, if that failed, with guarantees, other incentive mechanisms, or eventually public ownership” (ibid., p. 65.). It is possible, that this picture reflects too much of an Anglo-Saxon perspective. On

the European continent, state involvement seems to have been far greater. Belgium, for instance, did not rely on the private sector to develop its railway network. It embarked right from the beginning on a governmental master-plan. Private capital was admitted only in the later stages of development. In Germany the railroad network was built privately at first, but later under a regime of competition between private and public railway firms.

These remarks bring us to the more theoretical parts of Goldsmith's chapter in which he tries to draw lessons from his historical sketch. What has mainstream economic theory to offer to explain the history of infrastructure development? Goldsmith screens the "usual suspects" and finds very little to satisfy him. To him neoclassical theory (including endogenous growth theory) does not really capture the essence of long-term growth which, in his view, is not just "more of the same" but contains discontinuous jumps and radical disruptions. Grübler's evolutionary diffusion models (Grübler (1990)) seem to be the most to his liking. Interestingly, Grübler, from his point of view, finds similarities between the growth-patterns of infrastructure in the United States and the former USSR. He concludes that infrastructure growth is not necessarily correlated with a particular economic system, a claim that Goldsmith endorses, but which is certain to be disputed by others. Where he criticises Grübler, and where therefore is still room for neoclassical analysis, is Grübler's disregard of relative prices and quality differences. As Adam Smith already pointed out in 1776, mode choice, be it in passenger or freight transport, depends crucially on price and quality. It transpires from Goldsmith's text that nevertheless his sympathies are primarily (a) with approaches taken from the economics of innovation, and (b) interdisciplinary approaches that are able to do justice to the strong interplay of technological and institutional drivers of infrastructure development.

Is there anything to be critical about in Goldsmith's long essay? It must be left to specialists in economic history to pass final verdict on Goldsmith's historical narrative. In comprising 11 000 years of history into 70 pages it is inevitable, that sometimes the painting becomes a little sketchy and that some complex issues are simplified. It is to be hoped that Goldsmith's essay will arouse the reader's interest enough to consult standard references like Fritz Voigt's (1965) classic treatise to get a fuller picture. As already mentioned, in the present reviewer's view there is sometimes too strong a focus on the developments in the Anglo-Saxon world. This is certainly justified given the importance of the industrial revolution and the important role of England and the United States in the 19th and 20th century. Still, the reader might have been interested in hearing something about the role that transport infrastructure played in Colbert's Mercantilism in the 17th century in France, like the *Canal du Midi*, or about the competition between state owned and private railway companies in Prussia during the 19th century. Both episodes were in many aspects different from the developments in the Anglo-Saxon world. Still, I can only recommend Goldsmith's contribution to this book. Among the many lessons history can teach us, is certainly the one that many things are not as new as they seem to be at first glance, and Goldsmith's essay certainly bears this out.

I advise the reader after having digested Goldsmith's chapter to jump immediately forward to Chapter 8 entitled "Connecting People – An Evolutionary Perspective on Infraculture", which has many interesting connections to Goldsmith's analysis. This chapter was written by Klaus Markus Hofmann, a consultant in Berlin, who is closely related to Deutsche Bahn AG. Hofmann argues for an interdisciplinary approach to infrastructure theory. In fact, the very term *infraculture* reflects this perspective and is intended to convey the notion that "... it is not possible to evaluate an infrastructure project separate from its systemic effects in relation to existing structures, the natural environment, and economic and social structures, that is the entire cultural context" (ibid., p. 246.). As Hofmann says, the chapter "... follows the sociologist perspective on infrastructure and technology of Popitz and Toynbee ... in describing distinct epochs of infracultural co-evolutionary development in socioeconomic history" (ibid., p. 239.). As can be expected from this introductory remark, the reader has to fight his way through a lot of sociological jargon, at least in the first few sections of Hofmann's essay, but is rewarded from Section 8.3. onwards with an interesting and thought-provoking division of history into nine "infracultural epochs", beginning around 6000 BCE. These infracultural epochs are: the epoch of agrarian communities, of urban melting pots, of transurban networks, of infracultural network nodes, of intellectual networks, of industrialized networks, of automation networks, of interactive networks, and of transformative networks. The discussion here goes beyond Goldsmith's perspective in so far as it puts the development of infrastructure in a particular epoch in the context of other simultaneously evolving cultural technologies (for instance the development of movable type printing). By looking at developments in this way it becomes evident that, for instance, Goldsmith's view of the Middle-Ages may be too bleak. According to Hofmann, monasteries and convents were important "infracultural network nodes" (epoch number four), where scriptures were preserved and where human capital was created through teaching the rural population to read and write. Ironically, it was largely the church which preserved the old Roman know-how of infrastructure construction, a fact that is mentioned by Voigt in his treatise too.

Of course, any division of history into "epochs" or "eras" like this always carries an amount of arbitrariness with it. Nevertheless, schemes like Hofmann's are useful to organize thought on an apparently chaotic stream of events.

Hofmann closes his article with a plea for "... an orchestrated transdisciplinary initiative for systemic research of the infrastructure system and comprehensive infracultural education for engineers and economists in the sector" (ibid., p. 257.). Much of what he says in this last section of his paper for me smacks too much of "gee-whiz" managerial "megatrend" talk, but it's up to the reader to decide.

I now turn to the more transportation economics oriented contributions in the volume.

The editors' introduction and Goldsmith's long essay constitute Part I of the book. Part II turns to investment, growth and policy issues. Chapter 3, entitled "Population Density, Optimal Infrastructure, and Economic Growth", is written by Sumit S. Deole and Asmae El

Gallaa, two young researchers related to the Aix Marseille School of Economics. They develop an endogenous growth model, which links improvements in transportation infrastructure to the fertility and education decisions of parents and tests the predictions of the model with time-series data on India for the period 1961 to 2012. The model is an overlapping-generations model in which the utility of a household depends on the household's consumption, the number of children, and the human capital of the children. The parents in the household divide their time between work and rearing children. Total income is spent on consumption, education and the transportation of children. The cost of the latter is dependent on the distance of a household's residence to educational facilities. The authors deduce within the framework of their model that transportation costs negatively influence the number of children parents wish to have. Accordingly, a denser spacing of transportation infrastructure (railway stations, in the authors' paper) should influence fertility in a region or country and, consequently, its growth rate. A railway-company, however, will invest only according to profitability. But profitability depends on population density because of agglomeration effects. Thus, railway authorities should tend to invest in more densely populated areas so that the whole mechanism results in a self-reinforcing growth process.

The authors offer a first test of their model by looking at time-series of GDP per capita in Indian provinces, population density, and net-revenues of Indian Railways between 1961 and 2012. In this model the variation of GDP per capita seems to be well explained by past values of population density and railway revenues.

The authors claim that their paper offers a compromise between models of the physical capital approach variety and the human capital approach variety in endogenous growth theory. Indeed, the analysis seems to show that both approaches are needed. Growth is stimulated by investments in human capital, but investments in human capital are a function of the availability of transport infrastructure.

In the opinion of the present reviewer, the paper certainly offers an interesting perspective on the complementarity of physical and human capital in economic growth-processes and contains attractive modelling ideas. From the perspective of a transportation economist it has to be reminded, however, that transportation expenses in a typical household rarely exceed 15% of income. In the early 60s the share was even less. Furthermore, the transportation cost of children to school is only a fraction even of this percentage. The authors do not give any information in how far these numbers apply in India too. If this were true, however, it stretches credibility that transportation costs are critical for a family's decision to bear children or to invest in their education. Perhaps it may be possible to interpret "transportation costs" in a wider sense that makes them more relevant, especially in the context of very backward countries (for instance, when one considers the opportunity cost of travel in these countries). But even then, motives like provision for old age seem far more important. Other endogenous growth models, like Bröcker's (2013), focus on the human capital reinforcing effects of transport infrastructure too, but offer a more plausible

causal link between (long-distance) transport and human capital, namely the reduced cost of face-to-face communication.

Concerning the empirical part of the article, it is not clear to me why the authors have used revenues as an indicator of profitability. Also, data from the annual reports of railways usually are highly aggregated and have to be taken with great care.

I don't want to be overly critical about the model of Deole and El Gallaa, but the doubts about their results seem to be reinforced by Sumedha Bajar's Chapter 7 on the "Infrastructure-Output Nexus – Regional Experience from India". Bajar is currently a post-doc associate at the National Institute for Advanced Studies in Bangalore and at the time of writing of this paper was at the Institute for Social and Economic Change in the same city. Bajar addresses the output effects of infrastructure in a more traditional manner using basically a macroeconomic production function approach. She analyses panel data from 17 major Indian states over the time period from 1980 to 2010 and finds an output elasticity of transport of around 0.10 which is approximately in the order of what other studies find in developed countries (see e.g. Wieland in Heft 1/2015 of this journal). The coefficient is, however, statistically insignificant. This result seems to contradict the empirical findings of Deole and El Gallaa who find a substantial effect, at least of railway infrastructure (more precisely the spacing of terminals). Bajar cites several explanations from the literature to account for her surprising result. First, it may be the case that infrastructure investments are not primarily driven by economic considerations but rather by criteria which are decisive for the re-election of the responsible politicians. Thus, investments may occur primarily in areas which are likely to generate most votes. Second, and relatedly, re-election considerations may lead to overinvestment in transportation infrastructure and negative marginal returns. Third, quality may play an important role. Roads are built, but their quality and accordingly their productivity effects may be low.

It is clear that the growth model by Deole and El Gallaa takes a longer perspective than Bajar's paper. The time period they consider ranges from 1962 to 2012, whereas Bajar considers the period from 1980 to 2010. Still, the difference is only 20 years and the discrepancy in the results is too large to make the result of Deole and El Gallaa credible.

In a sense the traditional macroeconomic approaches like the one in Bajar's article represent a dead end. It seems that it is hard to gain really new insights into the relationship between a country's or region's GDP and its investment in infrastructure along these lines. Stéphane Straub, a professor at the Toulouse School of Economics, in a concise and lucid overview (Chapter 9 of the book) describes the direction in which new research has developed to overcome the deadlock.

It is well known that the traditional approach, based on macroeconomic production or cost functions, is plagued by three econometric problems: reverse causality, unobserved effects, and measurement error problems. "Reverse causality" here refers to the problem that it is not clear whether countries or regions are rich (or grow fast) because they have invested

heavily in infrastructure or whether they invest heavily in infrastructure because they are rich. The term “unobserved effects” refers to unobserved differences at the country or regional level which are affecting growth and infrastructure investment at the same time. The notion of “measurement errors” refers mainly to the variables used to quantify the stock of transport infrastructure. In principle all three problems could be dealt with by selecting appropriate instrumental variables. An instrumental variable is a variable which can be used as a proxy for an unobserved or error-prone variable in an econometric estimation, but for which reversed causality and measurement errors can be excluded. This means that in using instrumental variables feed-back effects can be ruled out. In macroeconomic infrastructure studies this strategy has proven difficult. In the last years, however, researchers have used spatially disaggregated and geocoded data (GIS data) to construct suitable instrumental variables. Some studies, for instance, use historical maps and plans. As Straub points out, “The underlying logic is that these maps should reflect the priorities of earlier periods, and that these should not be affected by contemporary economic outcomes such as changes in population, employment, or output” (ibid., p. 272.). In line with the type of data used, these studies no longer refer to the national economy as a whole but rather to the level of regions or counties. Another ingenious strategy has been developed independently in papers by Banerjee, Duflo, and Qian in 2004 (revised version 2012) on the impacts of road building in China, and by Atack et al. on railroads in the USA in the 19th century. The strategy consists in drawing straight lines between historically important cities and then measuring the distance of a region or county to these straight lines. (“Historically important” means independent of economic importance, if this is possible.) If it is true that railroads did have a substantial effect on economic growth, then *ceteris paribus* regions, counties, or provinces which are farther away from these straight lines should exhibit slower growth than those situated closer to them.

Straub reviews the literature which has developed along this new line of research and concludes that this literature “...represents a big step forward” because it allows to deduce conclusions which are “...directly policy relevant for population growth, output, trade, and firm spatial patterns” (ibid., p. 279.). In how far this optimistic view will come true remains to be seen. Robust policy conclusions can only be drawn when the results of studies converge to some extent. Past experience with econometric advances, however, has been that the greater sophistication of methods has led to divergence rather than to convergence. The traditional research programme in this field, based on macroeconomic production or cost functions, is a good example. Furthermore, there is the danger that the very micro-approach, with its focus on specialized data and its concentration on selected regions or even counties, may dissolve the whole approach into a selection of case studies or econometric “stories”, just as it has been the case in Industrial Organization, where it appears that no clear cut policy recommendations can be derived anymore. Finally, on another level, there is the risk that politicians may use the results to further the interests of their local or regional constituency and that therefore many studies will be written to reflect these political preferences, increasing the diversity of results even more.

The book also contains two papers on the renegotiation of PPP contracts in infrastructure provision. The first paper by Laure Athias, an Associate Professor at the University of Lausanne, and by Antonio Nunez from LET at the University of Lyon focuses on toll-road concessions and deals with the question in how far the possibility of renegotiation influences a bidder's behaviour in an auction of a concession contract right from the start (ex ante). Obviously, when a bidding firm believes that it will be easy to renegotiate ex post, it will bid more aggressively than otherwise. Credibility, of course, sets a limit to this strategy, but especially with respect to toll-road concessions the uncertainty of traffic-forecasts makes it difficult to differentiate credible from incredible bids. Thus, Athias and Nunez hit on the idea to use the ratio between actual and forecasted traffic as a proxy for a firm's ex ante bidding behaviour in their econometric work. Using a (very heterogeneous) dataset of 49 toll road concession contracts (highways, bridges, tunnels, in the period 1989 to 2003) from countries all over the world, they confirm three hypotheses which they derive from a theoretic common value auction model, namely:

- (1) The greater the number of bidders the more cautious the bids that they will submit. In other words, in an auction with many participants bidders will tend to revise traffic forecasts downwards.
- (2) The greater the degree of common uncertainty about the project the more conservative bidders will be as the number of bidders increases.
- (3) The higher the chances of renegotiation, the less conservative bidders will be when competition increases.

In testing these hypotheses the authors control in their regression, apart from the number of bidders, for other variables like the amount of experience of a regulatory agency with tendering or the wealth of a country. In the authors' view both factors should affect the probability of renegotiation negatively. Of course, as always with econometric exercises, there are several open questions left (heterogeneity of the data set, endogeneity of the number of bidders, specification of variables, like physical length of the infrastructure object as a proxy for uncertainty, or the use of the variable "common law") but this does not make the authors' approach less interesting.

The novelty of this paper's results lies in the fact that they contradict a standard wisdom of auction theory, namely the phenomenon of "the winners' curse". The winner's curse refers to the empirically observable fact that the winner of an auction tends to be the bidder with the most optimistic and therefore frequently mistaken estimation of the contract's value. The results of Athias and Nunez seem to imply that the possibility of renegotiation has an important effect on the likelihood with which the winner's curse occurs. The authors therefore seem justified when they conclude that in judging the efficiency of auctions it is necessary to consider the tendering process as a whole, not just the auction itself.

A comparable result, from the perspective of the positive theory of regulation, is reached by the second paper on renegotiation by Julio Aguirre, an associate researcher and part time professor at the Universidad del Pacifico in Peru, who investigates the relationship between electoral cycles and renegotiations of concession contracts in Peru. In Peru, the Board of Directors of the transport infrastructure regulator changes every five years, following the election of the President of the Republic. Aguirre uses a database of 27 transport infrastructure concession contracts awarded after 1999 to test whether the rate of renegotiation rises during electoral periods. The infrastructure projects in question contain airports, roads, railways, and ports. Aguirre is able to confirm his hypothesis which he explains by the weakened authority of the regulatory agency during election periods. When their jobs are at stake, regulators are apparently more willing to submit to firms' demand for renegotiation. Accordingly, Aguirre proposes to disentangle the election of the regulatory body's Board of Directors from the general elections and to move it to a later or earlier time period. As it occurs often in studies on the positive theory of regulation, Aguirre is not able to prove his hypotheses directly. To do this, he would need data that show the political influence on the selection of the regulatory agency's staff directly. But such data are usually not at hand.

There is one last paper on transportation policy that has to be mentioned, and this is the paper by Biswa Nath Bhattacharyay on connectivity policies for the Asian-Pacific region. The author was formerly at the Asian Development Bank and is now at the University of South Pacific, Fiji, and the University of International Business and Economics, Beijing. His paper in this volume is in a sense an outlier, since it has more the character of a policy paper than of a technical paper like the other articles in the book. Nevertheless, the chapter is worth reading to get an insight in the transportation policy problems Asia is facing. As the author reminds us in his opening paragraph, Asia has 4.1 billion habitants and thereby accounts for more than 60 percent of the world's population. Its economy is approximately equal to the economies of Europe and North America and will be even more important in the future. Europeans therefore have good reason to be interested in the developments on this heterogeneous continent. Bhattacharyay's paper is very long (44 pages) and contains too much material to be summarized here in a few sentences. Suffice it to say that the author offers a comprehensive development plan for Asia's transport and communications infrastructure and discusses issues like governance, prioritization of projects, financing needs and instruments, and sustainable development. Concerning financing needs Bhattacharyay identifies 1.202 projects in the period from 2010 to 2020 amounting to an estimated US\$ 229 billion (or US\$ 20.8 billion per year).

The rest of the papers in the volume do not have their main focus on transportation infrastructures. They are, however, in several cases related to transportation issues. For instance, I found the paper by Santandrea, Bailey, and Giorgino about the financing of PPPs useful and interesting. They distinguish between funding and financing of a PPP, where funding refers to the up-front investments for the provision of the respective infrastructure object and financing to the revenues needed to compensate the private investors for their capital and operating costs. What seems to be a purely semantic distinction at first glance turns out to be quite useful when discussing the financial structuring of a PPP.

Égert gives a concise and useful overview over the interdependence between the regulation of infrastructure monopolies and their investment and produces empirical evidence from OECD member countries. It turns out that the move from rate-of-return regulation to price-capping or the establishment of an independent regulator do not have a substantial effect on investment if taken individually. If implemented jointly, however, they may stimulate investment significantly. In this way the other papers in the volume too certainly are worth reading, even if they have not been treated in this review in detail.

To sum up, the volume makes interesting reading and gives a good introduction to the current scientific discussion in infrastructure economics. Sometimes the selection of articles seems a little bit arbitrary, and some of the papers could have been shortened substantially. Also, it is regrettable that the discussants' remarks were not reprinted. As a minor matter, proof reading was not as accurate as it could have been. Some readers may miss important topics like Cost-Benefit-Analysis, New Economic Geography, or Wider Economic Benefits. Nevertheless, I found this book a lot more interesting than other conference volumes which I have read and also a welcome and instructive break from the sometimes ideological and simplistic arguments that dominate current policy discussions, especially in infrastructure economics.

References:

J. Bröcker (2013): *Wider economic benefits from communication-cost reductions: an endogenous growth approach*, Environment and Planning B, 40 (2013), 971-986.

A. Grübler (1990): *The rise and fall of infrastructures: dynamics of evolution and technology change in transport*, Heidelberg, Physica-Verlag.

F. Voigt (1965): *Verkehr*, 2 Volumes, Berlin, Duncker und Humblot.