WHY HAVE MOST ROAD INFRASTRUCTURE PPP PROJECTS FAILED IN GERMANY?

Professor Dr. Dr. h.c. Andreas Knorr, German University of Administrative Sciences Speyer, Freiherr-vom-Stein-Straße 2, 67346 Speyer, Germany, knorr@uni-speyer.de

Professor Dr. Alexander Eisenkopf, Zeppelin University, Am Seemooser Horn 20, 88045 Friedrichshafen, Germany, aeisenkopf@zeppelin-university.de

ABSTRACT

Road infrastructure PPPs in interstate motorway projects do not have a very long political tradition in Germany; nor do road user charges. Historically, construction and maintenance of the entire network were provided for and fully funded by the Federal government. Only in 1994 was legislation passed to allow more private-sector participation in this area, partly in reaction to increasing deficits in public budgets which, in turn, had resulted in a continuous degradation of the interstate motorway system in terms of both infrastructure quality and capacity (especially after the massive increase in transit traffic to and from Central and Eastern Europe after the fall of the Berlin Wall in 1989). As a result, two alternative PPP variants have emerged: The so-called A-Modell (Type A-PPPs) is used to increase the capacity of some congested motorway sections by adding more lanes. Construction and maintenance costs for all Type A-projects are financed out of a specific road user charge for heavy trucks using the German motorway system (passenger vehicles remain exempt). The F-Modell (Type F-PPPs), by contrast, was developed to overcome local infrastructure bottlenecks on the interstate highway system such as bridges and tunnels, and is essentially financed by user charges.
So far just a handful of PPP road infrastructure projects of both types are open for traffic. While the two operational Type F-PPPs have turned out to be commercial disasters, with no follow-up projects in the pipeline, the two operational Type A-PPPs (four more are in the process of realization) have overall performed better, though their appeal for private investors remains modest as well. In this paper, we therefore strive to identify the underlying economic and political causes which led to the commercial failure of most road infrastructure PPP projects in Germany. Based on a detailed overview of the key legal, technical and commercial aspects of both PPP-variants we will then identify their respective conceptual shortcomings. An assessment of the future potential for road infrastructure PPPs in Germany will wrap up our analysis.

Keywords: Road infrastructure planning and funding, public private partnerships

INTRODUCTION

Public Private Partnerships (PPP) in road infrastructure do not have a very long tradition in Germany. There are two alternative variants. The A-Modell is used to increase the capacity of congested motorways. The F-Modell was developed for bottlenecks such as bridges and tunnels. It was only implemented twice so far, and both projects – a tunnel in the city of Lübeck and another in the city of Rostock – both flopped commercially. In this paper, we aim to identify the underlying causes which led to their commercial failure. We will first provide a detailed overview of the F-Modell. This includes an analysis of its substantial conceptual shortcomings which, in our view, doomed the two projects from the very beginning. We will then perform the same analysis for the Type A-PPPs. Based on our findings we will eventually assess the future potential for road infrastructure PPPs in Germany.

BACKGROUNDER: ROAD INFRASTRUCTURE PROVISION IN GERMANY

2.1 The Political and Legal Framework

Germany is no unitary state but a highly decentralized political entity. In short, the country is organized into three layers of government: the Federal level, the 16 Länder (states) and the 12,312 local municipalities, 2,077 of which are cities. Only in a few fields have policy competences been exclusively assigned to a specific branch of government. By contrast, it is estimated that around 70 per cent of all legislation must be jointly passed by the Bundestag – the German parliament – and the Bundesrat (Federal Council, the Länders' chamber). Transport infrastructure policy is a case in point (Institut für Mobilitätsforschung, 2007, 84ff.). According to article 90 (1) of the German Constitution, the Federal government is the legal owner of all Federal trunk roads, i.e. of Autobahnen and Bundesstraßen. Therefore, the responsibility for funding rests exclusively with the Federal government. However, their administration – including the competence for planning and completion –, rests with the respective state governments by proxy which, as a result, benefit in two ways if a road infrastructure project is classified as federal: Its construction, operation and maintenance do not affect their own state budget; for this reason they have a strong incentive to try and substitute federal roads for state roads as they would still reap all the economic and political benefits (accessibility as well as local jobs in the road maintenance and administration bureaucracies) while having to bear essentially none of the related costs.

In fact, the 16 German states do exert substantial influence during the entire planning process concerning Federal road projects (and any other Federal transport infrastructures, such as waterways and the rail network, as well), however (for details see Gerbes 2007, 46ff.; Beckers 2005, 15ff.). Formally, the responsibility for transport infrastructure planning at the Federal level resides with the Bundesministerium für Verkehr, Bau und Stadtentwicklung (BMVBS; Federal

Ministry of Transport, Building and Urban Affairs). Since the 1970ies, the Bundesverkehrswegeplan (Federal Transport Infrastructure Plan) has provided a ranking of all Federal transport infrastructure projects, based on a thorough cost-benefit analysis (complemented by an environmental impact assessment and an assessment of potential regional development effects). It is updated at irregular intervals and on average less than once in a decade. As a rule of thumb only projects with an expected benefit-cost ratio > 3.0 will be realized. However, almost all projects which get included in Federal Transport Infrastructure Plan have not been added by the Federal government; instead they are normally proposed by state governments.

What is more, remarkably stable quota arrangement exists between the Federal government and the state government regarding their respective share in Federal transport infrastructure spending. With the same six political parties (CDU, CSU, SPD, FDP, Bündnis90/Die Grünen, Die Linke), holding almost all seat both in de Federal parliament and all 16 state parliaments, although in very different coalitions, the rationale behind this is informal and highly intransparent practice to prevent the Federal government to "punish" any state government with a different ruling coalition. In a nutshell, the share reflects a state's share in Germany's total population instead of the states' real investment needs based on, e.g., BCA ratios.

Finally, any downgrade of a federal transportation infrastructure to a state infrastructure – e.g. of a federal interstate highway linking two states into two state highways, if much of the traffic is local rather than interstate – cannot be implemented without the consent of the affected states. Due to the negative fiscal impact of such a devolution on the states' budgets, the very few cases where such a transfer in "ownership" has indeed happened, were typically accompanied by informal deals between the federal and the state governments on "adequate" compensation.

As regards the funding mechanism, until very recently, all road infrastructure projects in Germany have been financed out of general and, though to a much lesser degree, road transport-specific tax revenues (i.e. the vehicle tax and the gasoline tax – as part of the broader energy tax –, both of which are federal taxes). While in the post-World War II reconstruction period, the focus of the federal government's transportation infrastructure spending was clearly on the railroads, the Straßenbaufinanzierungsgesetz (Financing of Highway Construction Act) of 1960 provided the legal basis to earmark fifty per cent of the road-transport specific tax revenue was earmarked for road infrastructure investment – an oddity in the German tax system which otherwise strictly adheres to the non-affectation principle. As a result, a nationwide network of federal and state roads was quickly established with the primary objective to reduce the number of road accidents and fatalities which reflected from rapid motorization causing massive stress on existing road infrastructures. However, over the years, the earmarks were substantially lessened, and a result, net investment in roads has been lower than depreciations (with the modernity of the road infrastructure defined as the ratio of net vs. gross fixed assets) has gradually declined from eighty per cent (1980) to only 69 per cent today (ADAC 2007). Obviously, the main political motivation behind the drive to attract more PPPs is to stop and even reverse this trend.

Finally, the Fernstraßenbauprivatfinanzierungsgesetz – the Private Financing of Highway Construction Act – of 1994 created the legal prerequisites for levying tolls for the use specific road

infrastructures (essentially bridges, tunnels, mountain passes) under certain circumstances, paving the way for Type F-PPP projects. Moreover, on January 1st, 2005, an electronic toll system was introduced for all trucks with a gross vehicle weight over 12 tons for the use of the German motorway system and – to prevent dodging – a number of parallel running interstate highways. While the idea to extend the toll system to also cover passenger vehicles is regularly floated, no concrete plans to do so are currently on the political agenda.

THE POLITICAL RATIONALE BEHIND ROAD INFRASTRUCTURE PPP IN GERMANY

While PPPs are a rather common investment model in most industrialized countries, especially in the Anglo-Saxon world, Germany remains a clear 'latecomer' and 'underperformer' by international standards; a recent study by PricewaterhouseCoopers (2005, 37) reveals that PPP projects only account for roughly 0.075 per cent of GDP as opposed slightly more than 0.6 per cent in the UK and 1.2 per cent in Portugal. Politically, there were four main reasons behind the recent attempt to promote private sector participation with respect to road infrastructure projects in Germany (Beckers/Hirschhausen, 2005):

- the unabated rise of road transport demand, combined with increasing shortage of available public funding, especially due to the enormous fiscal burden of reunification, has given rise to ever more widespread infrastructure bottlenecks and/or a creeping degradation of road quality standards;
- the wish to correct a fundamental flaw of the traditional tax-based provision of road infrastructure: the lack of market-based scarcity signals to guide investment decisions;
- the (asserted) efficiency gains due to private sector involvement; and finally
- the, at least in some political quarters, ideologically motivated will to reduce the size and scope of the public sector.

THE COMPLEX ECONOMICS OF PUBLIC PRIVATE PARTNERSHIPS

Due to shrinking tax revenues, or raising governmental expenditures (i.a. for social security), or a combination of both, more and more state and, most of all, local governments face severe budgetary restraints (this paragraph draws heavily on Knorr/Schomaker 2012). Accordingly, there is a global trend for governments to try to improve their fiscal stance, especially on the expenditure side. At the same time, on the grounds of demographic change as well as resulting from economic growth, the pressure on public goods, particularly on existing infrastructures, is raising. The situation is even more exigent in the less developed parts of the world. Still raising urbanization rates, high rates of population growth and rising standards of living have for years

increased the stress on public services and infrastructure to the point where demand greatly exceeds supply.

Private investment, or as a broader concept, private sector involvement can be assumed to be one potential solution for the problems outlined above. This investment can take place indifferent guises – as full or in-part privatization, or as joint projects in the form of public private partnerships (PPP) between the public administration and private enterprises, especially international companies. As privatization may not be the first best solution from an economic theory perspective, however, as long as public goods – i.e. market failure – are concerned or if the privatization process might result in merely swapping a state-run for a private monopoly, alternative forms kinds of public private partnerships exist which may ensure adequate control rights for the public sector over the crucial aspects of service provision. Many of these "new" partnership models are still lacking a precise definition (Budäus/Grüb 2007). Therefore, in this paper, we use the term public private partnerships for a whole portfolio of different partnership models which range from full ownership by the public sector to material privatisation (Grimsey/Lewis 2005). The prevalent definitions of PPP typically focus either on the players involved or on procedural aspects of these partnerships. Linder (1999) broadly defines the term PPP as "rubric for describing cooperative ventures between the state and private business". Quite similar, but focussing on infrastructures only, Grimsey and Lewis (2005) see PPPs as "arrangements whereby private parties participate in, or provide support for, the provision of infrastructure, and a PPP project results in a contract for a private entity to deliver public infrastructure-based services". Ziekow (2003), by contrast, defines PPP more broadly as the "cross-sectoral junction of rationalities relevant for action". Ziekow's definition can be seen as the most convincing because he refers to the, probably, most important factor in the decision whether or not to pursue a PPP: the (economic) interest of both partners.

Regardless of the specific form it may take in practice, any PPP-type contractual agreement between a private company and the public sector – whether at the state or at the municipal level – is typically characterized by a risk-sharing arrangement with the private partner taking over (at least some) financial responsibility. The duration of PPP projects varies between one and thirty years, with mere service and management contracts being of relatively short-term duration, while PPP designs which include the construction of an asset and which are refinanced by user fees are usually based on longer contract durations so as to ensure full cost recovery for the private partner. The commercial risk of failure is mainly borne by the public sector in (short-term) projects which do not affect the ownership of the asset (which remains with the public sector). In PPP where a direct contact between the private company and the customer/user exists (i.e. concessions and Build-Operate-Transfer/Build-Own-Operate/Build-Own-Operate-Transfer PPP variants), the private partner has to shoulder the main portion of the commercial risk, e.g. deficits in payments, because of the high upfront costs he must refinance over extended periods of time.

It is noteworthy in this context, however, that so far hardly any academically rigorous, and most of all, independent, empirical analyses of their real benefits – not even as a meta-analysis -, have been conducted for PPP in Germany and much of Europe. By contrast, the vast majority of cost-benefit analyses of PPP have been conducted and published by private-sector entities such as consultancies, banks and corporations who have a vested commercial interest in their promotion. There is is unsurprising, that most of these partisan studies have completely ignored complications such as the often high transactions costs of PPPs and/or the welfare losses which are the result of opportunistic behaviour on both sides due to the incomplete nature of long-term PPP contracts (Mühlenkamp, 2006). Anecdotal evidence for Germany does indeed suggest that these problems are not just of academic nature but very real. For example, the 27,000 pages long contract between the German Federal government and Toll Collect consortium which built and operates Germany toll system for heavy goods vehicles, does not include a dispute settlement mechanism, let alone penalties in case of bad performance (such as the revenue losses for the government which resulted from the two year delay with respect to the contractual deadline before the system was finally operational). Massive cost overruns in excess of several hundred per cent and year-long delays currently also plague some other large-scale PPP in Germany, such as Stuttgart 21, an underground railway station, the new international airport of Berlin, and the Elbe Philharmonic Hall in Hamburg. To summarize, the jury is still out – at least for Germany – whether PPP – are indeed a more cost-effective solution compared to both alternatives: pure public or pure private provision.

THE F-MODELL – AN OVERVIEW

Road infrastructure PPPs were illegal under German law until September 1994 when the Federal German government enacted the Fernstraßenbauprivatfinanzierungsgesetz – the Private Financing of Highway Construction Act. For the first time ever, this new law formally permitted the transfer of the right to levy road user charges to private investors. Type F-PPP projects are its only practical applications so far. The F-Modell was politically designed for, and is currently restricted to, PPP projects for so-called Sonderbauten – special structures, i.e. bridges, tunnels, and mountain passes. Essentially a variant of a standard BOT-model, it boasts the following features (Beckers, 2005, 158ff.; Gawel, 2005, 175):

- Carrying out a F-Modell-PPP requires the prior approval of both the Federal government and the affected Länder government, i.e. suitable projects are selected jointly. In practical terms, the Federal government is formally represented in the process by a specialist unit of the BMVBS, which, in turn, is supported by the Verkehrsinfrastrukturfinanzierungsgesellschaft (Transport Infrastructure Financing Agency).
- The selection process begins with a feasibility study. The objective is to assess the business case of every single proposed F-Modell-PPP beforehand by comparing the estimated project costs with the assumed revenue streams as a function of different toll levels and structures. In case of a positive assessment – i.e. the proposed project is deemed fit

for realisation as a F-Modell by the government – this analysis also provides the basis for the calculation of the required Federal launch financing and the future toll level.

- A concession may be granted to the future private operator at either of the two following stages: during or after the formal planning approval procedure. The first option is referred to as the so-called Ideenwettbewerb ("idea competition") and provides the concessionaire with the – albeit risky – opportunity to influence the final technical design of the project. Under option two – the so-called conventional planning approach – the concession is not awarded until after the approval procedure's conclusion, depriving the concessionaire of any (legal) influence over the technical aspects of the project.
- Formally, the PPP contract is signed between the private party and the respective Länder government (or the local authority). It obliges the designated private party to build or expand the road infrastructure in question, to maintain and to operate it over a period of 30 years, and to transfer it back to the public authorities in a pre-defined condition then.
- At this stage, the principal role of the Federal government remains to provide the launch financing for the project, which normally is limited to 20 per cent of the construction costs; in other words, the private party must raise 80 per cent of the funding required for the construction of the infrastructure.
- However, the administration of every F-Modell-PPP – subject to a managerial prerogative which rests with the Federal government – remains under the responsibility of the Länder government or of the municipality where it is located.
- Most importantly, the toll – which accrues directly to the concessionaire – must be approved beforehand by the Länder government. It is noteworthy in this context that the toll approval process does not follow the internationally accepted economic principles of price regulation. Instead, and as required under the provisions of the Fernstraßenbauprivatfinanzierungsgesetz, it follows the traditional cameralistic accountancy principles still in use in Germany's public sector.

At the time of the conception of the F-Modell in the 1990ies, the BMVBS drafted a list of 32 potentially promising project. By the end of 2005, it had shrunk to a mere 10 projects (Gawel (2005, 174). Only 2 of them – both of them tunnels – have actually been completed and have been fully operational for some time: the Warnowquerung (i.e. the Warnow river crossing) near Rostock and the Herrentunnel – a Trave river crossing – in Lübeck. A third F-Modell-project – the Strelasundquerung, a 4 kilometer-long suspension bridge which was proposed to link the island of Rügen, one of Germany's most popular seaside resorts on the Baltic Sea, with the mainland – failed to attract any viable private sector bid during the tendering stage. As a result, the bidding process was halted on April 29th, 2004. The bridge was built nevertheless but entirely financed the traditional way by the Federal government (with the European Union providing some additional funds). Finally, a fourth project, the Hochmoselquerung – a bridge across the river Mosel – near the cities of Bernkastel and Wittlich – is currently on hold after the planning approval procedure was declared nil and void by a local court on environmental

grounds. Obviously, the F-Modell strikingly failed to produce the anticipated results – both at the political level and as a business model. Why this is so shall be the subject of the next two chapters of this paper which will provide detailed case studies of the two show-case projects which were realised: the Warnowquerung and the Herrentunnel.

TWO CASE STUDIES: WARNOWQUERUNG AND HERREN-TUNNEL

5.1 The Warnowquerung in Rostock

5.1.1 Project Background

The Warnowquerung – a 730 meters long tunnel – was the Federal Republic of Germany's first tolled road infrastructure based on the Fernstraßenbauprivatfinanzierungsgesetz. It opened for traffic on September 12th, 2003 and links, as part of Bundesstraße B 103, the east and the west bank of the river Warnow, which divides the port city of Rostock. While the residential areas including the inner city are clustered in the western parts of the city, most industrial zones including the seaport are located on the eastern bank. The peculiar geography of Rostock required long rides – up to 30 kilometers – or a time-consuming ferry crossing (which was ended after the tunnel's completion) to travel between either part of town before the tunnel was available. Moreover, transit traffic of up to 60,000 vehicles per day on Bundesstraße B 105 clogged Rostock's inner city and caused long delays (Brantsch, 2004, 15).

It is therefore unsurprising that the idea for a tunnel solution was floated as early as the 1960ies in former East Germany. Even after reunification, it was repeatedly put on hold for lack of Federal funding as it was never classified as a priority project in the Bundesverkehrswegeplan due to an estimated benefit-cost-ratio of only 2.2 (Beckers, 2005, 161).

Briefly after the entry into force of the Fernstraßenbauprivatfinanzierungsgesetz, Rostock's local government, the city council, opted for the realisation of the tunnel project as a F-Modell and kicked of an "idea competition" to select the concessionaire. All bidders were provided by the city with a – legally non-binding – traffic estimate which forecast 30,000 vehicle movements on every weekday and 15,000 daily on weekends (Beckers, 2005, 161). On July 25th, 1996, the contract was signed with the successful bidder, a consortium led by the French construction company Bouyges Traveaux Public S.A. Ground was broken on December 1st, 1999. Bouygues which hold a 30 per cent share in the consortium today, and ETI Macquairie from Australia – which joined in the late 1990ies, acquiring a 70 per cent share – together contributed 20 per cent of the € 219 million construction costs as equity. 68 per cent were financed as a loan by a banking consortium led by Deutsche Bank, NordLB and Kreditanstalt für Wiederaufbau (and guaranteed by the European Investment Bank). The remaining 12 per cent were state aids from the EU's TEN programme (€ 8 million) on the one hand and from the Land Mecklenburg Vorpommern and the city of Rostock on the other hand. After the expiry of the concession the tunnel will be transferred for free to the city of Rostock.

5.1.2 Commercial performance

From the very beginning, actual traffic figures trailed forecast demand by a substantial percentage (see Table 1 at the end of the paper).

According to an estimate made by the CEO of Warnowquerung GmbH, the tunnel operating company owned jointly owned by Bouyges and Macquairie, before of the official opening, the number of daily users required to recoup the investment costs, would be 20,000 cars per days at the minimum (Hamburger Abendblatt, 2003). based on the original toll levels. Depending on the season – with summer charges being higher – and type of payment these were initially set at € 1.50 (€ 2.50 in summer) per crossing for passenger cars and at € 9 (€ 17.50 during the summer season) for lorries. As Table 1 above revealed, even today – almost 5 years after the opening – the actual number of users stills falls around 50 per cent short of the profitability threshold. Worse still, traffic growth rates are on the decrease, and absolute traffic figures seem to have hit their peak, too.

The most important forecasting error was the way too optimistic demand estimate for lorries whose number failed to exceed 2 per cent of all users in the first months after the opening (Hamburger Abendblatt, 2004). In fact, most trucking companies continue to direct their drivers to by-pass the tunnel and make a detour of about 10-15 kilometres on free public roads instead of paying a € 17.50 toll per ride during the summer peak season. As early as December 2004, the then 14 banks which had financed 68 per cent of the investment costs, publicly warned of the imminent bankruptcy of the tunnel operating company if traffic volumes were to remain at the unexpectedly low levels. After two years of negotiations, in June 2006 the city of Rostock agreed to prolong the concession by 20 years to a total of 50 years to enable the concessionaire to recoup its investment over a longer period of time (Deutscher Bundestag, 2007). In other words, the tunnel will become toll-free only in 2056. In addition, the Warnowquerung GmbH was permitted to rebalance its toll structure by substantially increasing charges for passenger cars while lowering tolls for trucks as of January 1st, 2007. Another increase for passenger car tolls and the discounted toll for those users who agreed to direct debit authorisation was implemented in March 2008.

5.2 The Herrentunnel in Lübeck

5.2. Project Background

Before the opening of the Herrentunnel, the only road crossing the Trave River to link Lübeck and the neighbouring port city of Travemünde on the Baltic Sea was the Herrenbrücke, a bascule bridge. The bridge, an integral part of Bundesstraßen B75 and B104, was used by 38,000 vehicles per day on average, but has to be closed for road traffic several times a day to accommodate passing ships, resulting in frequent traffic jams.

In 1995, the local authorities had found the bridge – which was opened in 1964 – to be in state of dilapidation. However, the Federal government as the owner refused to fund the more costly replacement tunnel proposed by the city, but accepted to finance a replacement bridge instead. To overcome the stalemate, the Federal government and the city of Lübeck agreed on a compromise which permitted Lübeck to realize the tunnel solution while the Federal government pledged to commit as much money to this project as the construction of a new bridge would have cost (Beckers, 2005, 163). As was the case with respect to the Warnowquerung, the city of Lübeck, in 1998, also opted for an "idea competition" to determine the concessionaire. On March 12th, 1999, the contract was signed with the successful bidders: the German construction companies HOCHTIEF PPP Solutions GmbH and Bilfinger Berger BOT GmbH, which jointly set up (and fully own) the tunnel operating company Herrentunnel Lübeck GmbH & Co. KG.

After the completion of the formal planning approval procedure in February 2001, construction began in mid-October 2001. The tunnel, which is 830 meters long, while the concession road has a total length of 2.215 meters, opened for traffic on August 26th, 2005. After September 2006, the old Herrenbrücke – the bridge replaced by the tunnel – was demolished. Total investment costs for the tunnel were € 179 million, € 89 million of which were shouldered by the Federal government as a lost grant, 34 per cent of the sum was financed by a private banking consortium on commercial terms and 11 per cent were raised by the concessionaires. The operating concession is valid until 2035 when the utilisation rights will be transferred to the city of Lübeck (HOCHTIEF PPP Solutions, 2005).

5.3. Commercial Performance

Commercially, the Herrentunnel turned out to be a similar 'white elephant' as previously the Warnowquerung. After a bad start – the toll could not be collected in the first weeks after the opening due to technical problems with the on-board units used by many frequent users – demand remained substantially lower than forecast. By May 2006, only 22,000 cars were counted on average a daily basis, 10 per cent of which were trucks (Kieler Nachrichten, 2006). This is down from the 38,000 cars that had crossed the Herrenbrücke before and about one third less than at least 30,000 forecast by the concessionaire (Hamburger Abendblatt, 2006a and 2006b). Instead, the number of cars on toll-free by-passes such the Autobahnen A 1 and A 226 – a detour of 5 kilometers – rose by 16,000 (Hamburger Abendblatt, 2006b). Meanwhile, Bilfinger Berger opted for a complete write-off of its investment, while HOCHTIEF PPP Solutions was content with a write-off of two thirds of its share. Moreover, in an attempt to reduce losses, the toll – initially set at € 0.90 per passenger vehicle instead of the originally announced € 0.51 – was increased twice, on October 1st, 2006 (with a consequential drop in demand to the tune of 1,000 cars a day) (Lübecker Nachrichten, 2007), and on January 1st, 2008. It now stands at € 1.20 (and at € 9.50 for heavy vehicles); discounts are available for the Quick-box electronic toll collection option. Finally, at the request of the concessionaires an extension of the concession from 30 to 50 years is currently on the negotiation table.

5.4. Critical Assessment – Why Did the F-Modell Fail?

The potential advantages of the F-Modell over the traditional tax-based public provision of road infrastructures are obvious. Not only is it the first step of the transition towards a user-pays system which should allow for more efficient infrastructure allocation decisions. Moreover, it has the potential to partly alleviate – though not nearly completely solve – the problem of chronic underinvestment in much-needed road infrastructures in Germany due to the bad shape of public finances in general (including the extraordinary fiscal burdens caused by reunification) and the lack of a legal requirement to fully reinvest the revenues generated by road-transport related taxes into the maintenance and expansion of the road network in particular. Finally, more widespread use of the F-Modell might, at least on paper due to the strong incentives for private investors to recoup the costs of their investment as quickly as possible, also speed up the completion of eligible road infrastructure projects.

Unfortunately, the practical lessons learned from the two operational F-Modell-PPPs and the fact that most other proposed projects simply failed to attract any private sector interest at all – especially after the first to show-case projects quickly turned out to be 'white elephants' rather than attractive investment opportunities –, gives rise to a pessimistic overall assessment of their merits, for the following reasons:

To begin with, it remains doubtful that any meaningful cost savings compared to the traditional approach could be realised. On the hand, due to their lower ratings, the private investors had to raise the necessary capital at higher interest rates than the government could have. On the other hand, contrary to what was expected beforehand, project implementation from the design stage until the official opening took nearly as long as for comparable strictly public infrastructure projects.

More importantly, in order to increase the attractiveness of F-Modell-PPPs for the private sector, projects risks must be more evenly and fairly allocated between the public and the private parties. Due to the sunk cost characteristics of road infrastructure investments and the extraordinary long time span over which the – often substantial – investment costs must be recouped, the commercial viability requires, with a vengeance, the absence of incalculable political risks. In other words, private investors should be guaranteed some protection against (or compensation for) future political decisions which would have a massive negative impact on their investment. The tax-funded provision of competing toll-free infrastructures after the completion of the toll project – which actually happened in Lübeck and which effectively killed a third F-Modell-PPP, the Strelasundquerung, at a very early stage1 – is a case in point.

All parties involved massively overestimated future demand levels, resulting in actual traffic volumes falling way short of forecast ones – often by a factor of 100 per cent. Incredibly enough, the private investors failed to take into account some long-standing and well-documented demographic and socio-economic trends which would later turn out to have a strong negative impact on their investment. For example, the city of Rostock – like most other East German

[1] The Länder government demanded that the Rügendamm – the old link between the mainland and the island of Rügen – would remain open for traffic at no charge after the completion of the new (parallel) tolled suspension bridge. Predictably under these conditions, all potential private investors decided to drop out of the bidding process as a result.

cities – lost 20 per cent of its inhabitants during the first decade after reunification due to two-digit unemployment rates, and a further reduction by another 15 per cent by 2020 is likely (Klingholz/Kröhnert/Olst, 2004). Moreover, the number of users of the ferry link which was to be replaced by the tunnel, had shrunk from a peak of 3,500 vehicles per day to around 1,000 to 1,300 due to the expansion of the toll-free road network (Brantsch, 2004/05, 18).

In addition, in all cases the reluctance of potential users to pay for the use of a road was substantially higher than anticipated – though hard to explain rationally, given the fact that the additional costs of by-passing the toll road (time, extra fuel etc.) often exceeded the user charge. One possible psychological explanation might be that German motorists have grown accustomed to use the road network 'for free' – unaware that it has been financed by their taxes, including road transport-related specific taxes such as the car tax and the gasoline tax. Alternatively, there seems to exist a widespread feeling that due to already the high tax burden, any additional charge for using the road network is simply a rip-off without any benefits for the user and should therefore be avoided at any cost. It is open to debate whether the inclusion of passenger cars into the Autobahn toll system some time in the future, if it were combined with a compensatory reduction of the car and/or gasoline tax, might improve the acceptance of road users charges which would, in turn, brighten up the prospects of future F-Modell-PPPs as well.

- It is noteworthy in this context that the aforementioned acceptance problem is severely compounded by the specific legal rules which regulate the calculation of the toll (and the overall toll structure) the concessionaire is allowed to charge under the F-Modell (Kirchner, 2007, 3f.). As mentioned above, the formal procedure and legal requirements differ strikingly from the principles of price regulation in one crucial aspect: the toll is legally considered to be a user fee in the meaning of German administrative law (Gebührenrecht). This severely restricts the pricing strategies the concessionaire is legally allowed to pursue. To be more precise, the toll must include the actual cost of the service offered. Due to the high ratio of fixed to total costs which must be reflected by the calculation, short-run marginal cost pricing – e.g. in the guise of a toll-free passage during the late night period, when demand is extremely low – would run afoul of the law. By the same token, the concessionaire is not allowed to charge a below-cost introductory toll (i.e. to practice penetration pricing) after the opening of the facility in order to attract a large number of users and to familiarize them with the toll system. To conclude, the current legal requirements effectively prevent any meaningful price discrimination among different groups of users to exploit their varying willing to pay or differential pricing over the life-cycle of the investment with low tolls initially, followed by higher tolls during later periods.
- Finally, there is a potentially harmful conflict of interest between the Federal government on the one hand and the affected Länder government (and/or local government) on the other which may effectively thwart a F-Modell solution – which it did at least in the case of the failed Stelasundquerung. While under the traditional system the Federal government provides all the funding with most of the economic benefits accruing to locals, under the F-Modell it is the local politicians who have to 'sell' the switch-over from a (publicly perceived) free-of-charge road system to a toll system which primarily affects their local

electorate. For obvious reasons, local political and media support for a toll-based solution has so far been lacklustre at best in the case of most proposed F-Modell-PPPs (and, for that matter, A-Modell-PPPs as well) (Gawel, 2005, 181).

THE A-MODELL – AN OVERVIEW

The A-Modell refers to PPPs for the extension of congested existing motorways. As most German motorways boast two lanes in either direction, while some have already been upgraded to three, the objective is to add one lane (in either direction) to the standard two-lane Autobahnen and, occasionally, to add a fourth lane to three-lane motorways. Except for the different funding regime, Type A-PPPs are in principle pretty similar to the F-Modell. Based on a standard contract duration of 30 years, the private investor will build the additional lanes and then operate and maintain the respective stretch of the motorway and to return it in a contractually predefined condition to the federal government afterwards. Instead of levying a road user charge of its own, the private investor will – primarily, for the government provides some start-up funding during the construction period – recoup his investment by receiving a share of the HGV toll which is charged to all trucks using this very sector of the Autobahn.

The political objectives behind the A-Modell were (VFIG Verkehrswegefinanzierungesellschaft mbH 2012):

- To accelerate the extension of congested motorway section for which the federal government's budget could no appropriate funding;
- to realized efficiency gains by adopting – for the first time ever – a life-cycle approach to road infrastructure construction and by staging a tender to select the private investor (competition for the market);
- to secure and increase service quality throughout the contract period;
- to relief the government from service, maintenance and funding obligations;
- to partly establish user fees (through the HGV toll) as a major source of funding for federal road infrastructures alongside the traditional funding from the general budget.

Initially, twelve A-Modell PPP with an average length of around 40km were included as priority project into the current Federal Transport Infrastructure Plan which covers the 2003-2015 investment period; this also concludes stage I (identification of suitable projects) (Investitionsbank Schleswig-Holstein/Schüßler-Plan/Alfen Consult GmbH/Norton Rose 2008). Both the four pilot projects – motorway A8 (exit Augsburg-West – junction München-Allach); motorway A4 (state border Hesse/Thuringia – Gotha junction); motorway A5 (Malsch – Offenburg); motorway and A1 interchange Bremer Kreuz – Buchholz junction) – and two other A-Modell projects were opened for traffic. All were completed roughly on schedule and on budget. As for the remaining six A-Modell projects, one is in the contracting stage, while the remaining five have been "officially announced" (VFIG Verkehrswegefinanzierungesellschaft mbH 2012), with no visible progress for the past two years.
Due to the different character of A-Modell PPP compared to F-Modell PPP, no economic assessment can be made at this point, however. Suffice it to say, that the former provide much

stronger economic incentives for private contractors due to the fact the traffic volumes have remained rather stable and predictable even during the current economic crisis. An important reason for this due the Federal government continuously increasing the coverage of the toll for heavy goods vehicles to include an ever larger number of interstate highways which run parallel to motorways so as to prevent truckers form by-passing the toll altogether by using lower-level roads. Therefore, and in contrast to all F-Modell PPP, operators are guaranteed a captive market and, as a result, a substantially lower business risk. Finally, in terms of allocative efficiency, F-Modell type PPP are an important contribution to more firmly establishing the efficiency enhancing user-pays principle for road infrastructure utilization in Germany (which was ushered in with the introduction of the motorway-specific toll for heavy goods vehicles).

CONCLUSIONS AND OUTLOOK

In Germany, the track record of road infrastructure PPP projects of the F-Modell type so far has not only been disappointing, but outright dismal. Nevertheless, substantial private sector involvement will without any doubt be remain crucial to maintaining a high-quality road network and to overcome the rapidly rising number of infrastructure bottlenecks which to a great deal reflect shifting trade and production patterns and the resulting increasing in transit traffic after the 2005 Eastern enlargement of the EU. Under the current legal and institutional framework and given German motorists' persistent 'free-ride' mentality, it remains doubtful, however, that the role of the private sector will increase any time soon, with the possible exception of A-Modell PPP for some of the most heavily congested motorway sections.

REFERENCES

ADAC (2007). Zukunftssichere Infrastruktur, Munich.

Beckers, T. (2005). Die Realisierung von Projekten nach dem PPP-Ansatz bei Bundesfernstraßen. Ökonomische Grundlagen und eine Analyse des F-Modells, des A-Modells sowie des Funktionsbauvertrags, Ph.D. thesis, Technical University of Berlin, Germany (http://opus.kobv.de/tuberlin/volltexte/2005/1170/pdf/beckers_thorsten.pdf).

Beckers, T. and C. v. Hirschhausen (2003). Konzessionsmodelle für Fernstraßen in Deutschland: Eine ökonomische Analyse der Risikoallokation beim F- und A-Modell, Discussion Paper No. 388 of the German Institute für Economic Research (DIW), Berlin. (http://www.diw-berlin.de/documents/publikationen/73/41105/dp388.pdf).

Brantsch, A. (2004/05). Treffsicherheit von Verkehrs- und Erlösprognosen für bemautete Verkehrswege und -anlagen, Master Thesis, University of Applied Sciences Heilbronn, Germany. (http://home.arcor.de/abrant/daten/Verkehrsinfrastruktur.pdf).

Budäus, D.; Grüb, B. (2007). Anhaltspunkte und Hypothesenbildung für eine Theorie der Public Private Partnership, in: Bräunig, D.; Greiling, D. (eds.), Stand und Perspektiven der Öffentlichen Betriebswirtschaftslehre II, Berlin, 421-431.

Deutscher Bundestag (2007). Antwort der Bundesregierung auf eine Kleine Anfrage der Abgeordneten Peter Hettlich, Winfried Hermann, Dr. Anton Hofreiter, Irmgard Schewe-Gerigk und der Fraktion BÜNDNIS 90/DIE GRÜNEN, Drucksache 16/4356, Berlin, February 20th, 2007.

Gawel, E. (2005). Private Finanzierung von Fernstraßen – Erfahrungen und Probleme, in: Wirtschaftsdienst, 85, 173-181.

Hamburger Abendblatt (2003). Privattunnel-Premiere: Erst zahlen, dann fahren, September 3rd, 2003 (http://www.abendblatt.de/daten/2003/09/03/203592.html).

Gerdes, E. (2007). PPP-Ansätze für Fernstrassen. Deutschland, Österreich und Grossbritannien um Vergleich unter besonderer Berücksichtigung institutioneller und finanzwirtschaftlicher Rahmenbedingungen, PhD thesis, University of Hamburg, Department of Economics and Social Sciences, Germany (http://deposit.d-nb.de/cgi-bin/dokserv?Idn=987139053&dok_var=d1 &dok_ext=pdf&filename =987139053.pdf).

Grimsey, D.; Lewis, M. K. (2005). Introduction, in: Grimsey, D; Lewis, M.K. (eds.), The Economics of Public Private Partnerships: The International Library of Critical Writings in Economics 183, Cheltenham and Northampton, xiii-xl.

Hamburger Abendblatt (2004). Autofahrer meiden den ersten Privattunnel, March 11th, 2004 (http://www.abendblatt.de/daten/2004/03/11/272020.html).

Hamburger Abendblatt (2006a). Herrentunnel: Maut wird teurer statt billiger, August 29th, 2006 (http://www.abendblatt.de/daten/2006/08/29/603768.html).

Hamburger Abendblatt (2006b). Lübecks Herrentunnel steckt in den roten Zahlen, May 29th, 2006 (http://www.abendblatt.de/daten/2006/05/29/567419html).

HOCHTIEF PPP Solutions (2005). Herrentunnel, Essen.

Institut für Mobilitätsforschung (2007). Verkehrsinfrastruktur-Benchmarking Europa. Verkehrsinfrastrukturausstattung und verkehrspolitische Rahmenbedingungen in ausgewählten europäischen Staaten, Berlin (http://www.ifmo.de/basif/pdf/publikationen/2007/Verkehrsinfrastruktur_Benchmarking_Europa.pdf).

Investitionsbank Schleswig-Holstein/Schüßler-Plan/Alfen Consult GmbH/Norton Rose (2008) Wirtschaftlichkeitsuntersuchung A-Modell. Leitfaden für Wirtschaftlichkeitsuntersuchungen für die Vergabe der Betreibermodelle nach dem A-Modell im Bundesautobahnbau. Enfassung, s.l., October 2008 (http://www.vifg.de/_downloads/service/081030_Leitfaden_-_WU_A-Modell.pdf).

Kirchner, S. (2007). Das Konzessionsmodell als Beispiel für Public Private Partnership-Projekte, Presentation at Deutsche Hochschule für Verwaltungswissenschaften Speyer, May 31st, 2007.

Klingholz, R. Kröhnert, S. and N. Olst (2004), Deutschland 2020 – die demographische Zukunft der Nation, Berlin.

Knorr, A.; Schomaker, R. (2012). Does good governance promote the inclusion of the private sector in the provision of public goods and services? Theory and empirical findings, Presentation 2012 International Congress of the International Institute of Administrative Sciences IIAS), Mérida (Mexiko), June 20th, 2012.

Lübecker Nachrichten (2007). Seit der Maut-Erhöhung fahren täglich 1000 Autos weniger durch den Herren-Tunnel, January 5th, 2007 (http://www.ln-online.de/artikel/2034334).

Macquarie Infrastructure Group (several years). ASX Release, Sydney. (http://www.macquarie.com.au/mig).

Mühlenkamp, H. (2006). Public Private Partnership aus der Sicht der Transaktionskostenökonomik und der Neuen Politischen Ökonomie, Kooperationsformen zwischen Staat und Markt, in: Budäus, D. (ed.), Baden-Baden, 29-48,

PricewaterhouseCoopers (2005). Delivering the PPP promise. A review of PPP issues and activity, s.l. (http://www.adislab.net/docs/PWC05.pdf).

Wirtschaftsrat (2000). Position Verkehrspolitik. Investitionen in die Verkehrsinfrastruktur für den Wirtschaftsstandort Bundesrepublik, trend – Zeitschrift für Soziale Marktwirtschaft, 82.

VFIG Verkehrswegefinanzierungsgesellschaft mbH (2012). A-Modell, Berlin (http://www.vifg.de/de/projekte/a-modell/index.php).

Ziekow, J. (2003). Verankerung verwaltungsverfahrensrechtlicher Kooperationsverhältnisse, in: J. Ziekow (ed.), Public Private Partnership – Projekte, Probleme, Perspektiven, Speyerer Forschungsberichte 229, Speyer, 25-78.

(All internet sources were last accessed February 15th, 2013)

Table 1: Warnowquerung - Average Number of Daily Users since Opening

Period	**Daily users (average)**	**Target-Performance Comparison (Break-even point: 20.000 cars/day)**
Sept 12th – Oct 31st 2003	6.471	**-13.529**
Dec 2003	6.151	**-13.849**
June 2004	7.878	**-12.122**
Dec 2004	7.928	**-12.072**
June 2005	9.122	**-10.878**
July – Sept 2005	9.750	**-10.250**
Oct – Dec 2005	9.190	**-10.810**
Jan – March 2006	8.447	**-11.553**
Apr – Jun 2006	10.160	**-9.840**
July – Sept 2006	11.082	**-8.918**
Oct – Dec 2006	9.742	**-10.258**
Jan – March 2007	9.167	**-10.833**
April – June 2007	10.662	**-9.338**
July – Sept 2007	11.372	**-8.628**
Oct – Dec 2007	9.897	**-10.103**
Jan – March 2008	9.549	**-10.451**
April – June 2008	10.408	**-9.592**
July – Sept 2008	11.461	**-8.539**
Oct – Dec 2008	10.659	**-9.341**
Jan – March 2009	9.253	**-10.747**
April – June 2009	10.631	**-9.369**
July – Sept 2009	11.538	**-8.462**
Oct – Dec 2009	9.617	**-10.383**
Jan – March 2010	8.509	**-11.491**
April – June 2010	12.009	**-7.991**
July – Sept 2010	13.213	**-6.787**
Oct – Dec 2010	10.890	**-9.110**
Jan – March 2011	9.729	**-10.271**
April – June 2011	12.186	**-7.814**
July – Sept 2011	12.878	**-7.122**
Oct – Dec 2011	10.274	**-9.726**
Jan – March 2012	9.352	**-10.648**
April – June 2012	10.700	**-9.300**
July – Sept 2012	11.572	**-8.428**
Oct – Dec 2012	9.493	**-10.507**

Source: Macquarie Infrastructure Group (several years).