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**Highways in Europe - between
public and private provision**

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Abstract: This paper discusses different options for institutional arrangements providing network infrastructure on the basis of the ‘transaction cost economic’ approach using the example of highway infrastructure. Drawing on lessons learned from highway provision in three European countries (Italy, Poland and Spain), five models of highway provision are discussed: public authorities, public enterprises, user clubs, private partnerships or a regulated private market. Three options to regulate the private market are presented: a rate-of-return regulation, a price-cap-regulation and franchise bidding. The main factor that makes private construction and provision expensive are the risk premiums of private companies that are incorporated for political risks. It is argued that the optimal model of highway provision depends on each country-specific situation. This is mainly influenced by the regulatory experience within the country on one hand and by the stage of highway development on the other.

Highways in Europe – between public and private provision

I. Introduction

Highway provision is considered a crucial prerequisite for economic and social development. The still growing division of labour in the manufacturing cycle of a product produces a demand for means of transport that still exceeds general economic growth rates. This demand boosts the needs for transport in air, via ship, on the road and on the rail. Growing distances between sites of production put a burden on the highway network since highways are the backbone of international road traffic. Besides freight transport, highways are also still the major capacity of passenger transport in Europe and are seen as integral to a coalescing Europe. Only an optimal provision of highway availability, quality and costs guarantees the future fulfilment of the named requirements.

Roads, and therefore highways, are regarded as infrastructure. There is no infrastructure theory, not even a consensus on the definition of the term infrastructure. Since there is a common debate on infrastructure there must be though some common notion on what the term infrastructure could describe. One common procedure is to list different sectors such as energy or water to describe what is meant by infrastructure. Even if there might be a intuitive correlation between sectors and the term infrastructure, sector affiliation is not a clear criterion for it¹. Two notions are found in most discussions around the topic. Firstly, infrastructure requires high investments while the infrastructure cannot be put to an alternative use. Secondly, the theory of public goods plays a major role in most debates on infrastructure even though infrastructure can be a public, a common-pool, a tolls or even a private good. In this line appears the notion of potential market failure caused by sunk costs and/or the potential free riding of users in many cases. The danger of market failure has called upon the state to take action by either producing the good himself or by at least

regulating a defunct market. Political and economic reasons for state activities are manifold in regards to infrastructure. This reasoning becomes even more sophisticated in the case of network infrastructure.

Network infrastructure can be found in the transport, energy, telecom, water and sewage sectors. Network infrastructure providers benefit from net effects that result from the combination of site infrastructures. Often even a minimal network has to be in place before any acceptable cost-benefit ratio can be reached. The mentioned sunk costs lead on the other side to very high costs for any market entry, especially in the case of network infrastructure. If no other infrastructure provider is willing to make an investment in a parallel network, we speak of a natural monopoly². Among practitioners and academics it is widely discussed what an optimal institutional arrangement for network infrastructure could look like.

This paper will discuss different options for institutional arrangements providing network infrastructure on the basis of the transaction cost economic approach using the example of highway infrastructure. Firstly, the transaction cost economic is briefly presented to give a theoretical background to the analysis. The paper will then analyse the lessons learnt from highway provision in three European countries. Drawing on this analysis, institutional arrangements for highway provision are discussed in a final chapter³.

¹ The debate, if educational institutions are part of infrastructure, further underline the problems of using sector affiliations.

² This view was challenged by the contestable market theory that argues that already the potential entry of a competitor prevents monopoly pricing (Baumol 1982). The contestable market theory cannot be applied for those markets where sunk costs and bundling advantages come hand in hand. Real competition without regulation might be developed in theory but does not correspond with reality.

³ Tolls and tariff schemes are not in the centre of the analysis. Tolls play an important role in connecting the efficient behaviour of infrastructure provider to raising revenue levels. Though, it has to be taken into account that the state as “infrastructure producer” might also charge tolls or private companies constructing, maintaining and managing infrastructure might also be rewarded in form of shadow tolls. The introduction of tolls is more a question about distributive politics since it generally burdens heavy users and disburdens taxpayers. The more distinct the tax progression in a country is, the stronger the redistributive effects of a toll introduction. If it is argued that the current tax system is an “all-inclusive-system” then those people who pay less taxes are put in a less favourable position. The redistributive factor of toll introduction is highlighted by the elaborated, pink coalition plan in the Netherlands in 2002 that calculated, shortly before it was voted out of office (which is why the plan was never implemented) that a small majority of the population would profit financially from highway toll introduction. It was recognized that toll acceptance might depend on positive financial effects for the majority of the population. Only after a political discourse on these redistributive issues the discussion about the efficiency improvement by linking usage and payment begins.

II. Theoretical background

Within the transaction cost economic approach it is explained why specific transactions are handled more or less efficiently in specific institutional arrangements. The transaction cost economic approach forms part of neoinstitutional economics. The centrepiece of neoinstitutional economics is the analysis of institutions such as property rights, contracts, hierarchies and markets. Neoinstitutional economics aims to explain structures, behavioural effects, efficiencies and changes of institutions and therefore combines economic theory and organizational theory⁴. Every transaction within an organization as well as on the market causes transaction costs. The aim of the transaction cost economic approach is to determine if a specific transaction is better coordinated on a market or in a hierarchy (Williamson 1985). Transferring this continuum to an actor's perspective leads to the make or buy question. The transaction cost economic approach is based on the central assumption that transactions occur under the condition of uncertainty. Simplified transactions that occur in an uncertain environment should be coordinated in a hierarchy and transactions that occur in a certain environment should be coordinated on a market.

Applying the transaction cost economic approach to the state puts the state in the actor's role (Mayntz 2001)⁵. Using the transaction cost economic approach in practical analysis, structures and processes can be broken down into an infinite number of make or buy decisions on the basis of the efficiency criterion by either minimising costs or maximising output. In case of network infrastructure it is the right combination of hierarchy and market respectively of vertical integration and contracts. Different combinations will subsequently be analysed.

⁴ Even if it follows microeconomic concepts in regards to decisions of individuals that are influenced by institutions, it denies the neoclassical basic fundament that prices are set on markets without incurring any costs (Granovetter 1985).

⁵ The state as such cannot be neglected, since even in the most fragmented form already existent and present, it is an empirical phenomenon. Therefore, the economic notion of a transactional sphere free of institutions and thus free of any state is a theoretically interesting hypothesis but not a framework for political analysis.

III. International Experience

Many European countries already look back to many years of toll financed highway provision, such as Italy, France or Spain. After the end of the Cold War, in Central and Eastern Europe, several countries took steps to introduce new measurements for the provision of highways such as toll roads. Among these countries are Hungary or Poland (Humborg 2004).

1. Italy

In 1924, Italy opened the first toll-financed highway section close to Milano, about 50 km in length. Large parts of the Italian highway network were built in the 60ies and 70ies. From 1970 to 2000, the Italian highway network grew from 3.900 to 6.500 km. With exceptions in Southern Italy and on Sicily they are all managed on the basis of concessions.

The state owned enterprise Azienda Nazionale Autonoma Strade (ANAS) is the regulatory body and provides the concessions. Furthermore ANAS manages 15% of the highway network itself. Until 1994, ANAS was constituted as a public authority subordinate to the Ministry of Public Works. It is run as a public enterprise with an executive committee, with a supervisory board and its own budget (Bukold et al. 1996).

The concession period, the toll tariffs and the amount of public subsidies are stipulated in the concession contract. The maximum concession period is 30 years. After the end of the concession period, the highways again become the responsibility of the state. Projects are supposed to be sustainable on their own but the state has the option to finance either 30% of the investment costs or to offer an annual subsidy of up to 4%. A continuous source for contractual problems are the toll tariffs. They differ quite remarkably between different concessionaires. If traffic developments remain below forecasts the contracts are regularly renegotiated. At the end of the 70ies many concessionaires were struggling with financial troubles due to overestimated traffic forecasts and unfavourable developments on the capital

market. The state took over the liability by means of a Central Guarantee Fund for Debts, and parts of the toll income are paid into the fund. Between 1978 and 1981, twelve concessionaires had to call upon the fund.

The majority of the 24 concessionaires are under the auspices of public authorities. Autostrade plays by far the most important role. Autostrade manages about 3.600 km of the more than 6.500 km of Italian highways. In 1999 the formerly state-owned enterprise was privatised, which resulted in revenues of about 8 bn Euro for the Italian state. Investors, led by Benetton, control the group. Around 48% of the shares are currently free floating. In 2002, Autostrade⁶ was granted the concession to introduce a toll system for trucks in Austria and started operating the system in 2004.

Using private organizational structures, Italy built up a highway network in a reasonable amount of time. The privatisation of Autostrade has undoubtedly led to an increasing efficiency in the group's structure and processes.

The quality of the Italian highway network in regards to the number of exits, the track width and the crash-barriers is comparatively poor. Investments in new infrastructure is always connected to toll fee increases. Bankruptcy is close to impossible because of the Central Guarantee Fund.

An important reason for the qualitatively unsatisfactory state of the highways is lack of regulation. ANAS is considered as an overwhelming bureaucracy and manages their own highways insufficiently. The political influence on the regulatory body is high. Even if in 1998 well-defined tendering and award procedures were adopted, the concessions for Autostrade, the most important highway entity, were prolonged for twenty years without a transparent tendering procedure (OECD 2001: 233). The case of Italy underlines the importance of a competent, independent and efficient regulating body.

⁶ Autostrade is also operating and maintaining the Dulles Greenway Toll Road in Virginia, USA.

2. Spain

In Spain, highway construction started relatively late in comparison to Italy and France. In 1970, only 176 km of highway existed, while in 2000, 8.200 km were in use. After Germany and France, Spain has the third largest highway network in Europe: 2.200 km of the more than 8.200 km are toll roads. For the speedy erection and extension of the network, concessions to eleven private and PPP concessionaires were granted in the 60ies and 70ies. These concessionaires financed the construction work by loans and served the debts by toll revenues. At least 45 percent of the loans of the highway companies had to be taken up on foreign capital markets so as not to overburden the Spanish capital market. The state hedged the foreign exchange loans by a complete assumption of liability and exchange rate warranties.

Concessions were granted in form of a public decision by the Council of Ministers to the winner after a competition like procedure. The toll tariffs and their gradual progression were agreed upon between ministry and highway company for some years in advance. The tariff progression is limited to 95% of the general price index development. The maximum concession duration amounts to 50 years. After the end of the concession period the highways are transferred to the state.

In 1982, any planning for further concessions was halted due to the low traffic turnout on the existing network, which led to financial problems for most concessionaries. In 1984 three highway companies had to be nationalized and were subordinated to the 100%-state owned holding ENA (Empresa Nacional de Autopistas). From 1984 to 1994 the Spanish government promoted their own construction programme of highways of a lower standard. In 1990, five of the eleven highway companies were profitable. Shareholders of the other eight highway companies that were not subordinated to ENA were Spanish banks, the state, local authorities and construction companies.

Abertis, the market leader among the Spanish highway companies emerged from the highway company Acesa after the acquisition of Aucat in 2001, the acquisition of Iberpistas in 2002 and the merger with Aurea in 2003. Abertis has more than 1.500 km under management and has already expanded into airport management. After the Italian Autostrade and the French ASF, Abertis is the third largest highway company in Europe. In 2006, French Abertis and Italian Autostrade have agreed on a merger between the companies with Autostrade's integration into Abertis, forming the largest highway company worldwide.

In Spain, a large highway network emerged in a relatively short period of time. The financial commitment of the state by means of acquisition, restructuring and debt relief for the three unprofitable highway companies, as well as the state assuming liabilities and absorbing exchange rate risks was enormous. In recent years though, the highway companies were able to financially consolidate, due to economic and thus connected traffic growth.

3. Poland

Poland possesses a road network of 247.000 km, of which only about 400 km are highways. By 2010, 1.750 km are supposed to be built and modernized.

The projects with priority are the A1 that connects Gdansk in the north and Katowice in the south via Łódź, the A2 coming from Berlin starting behind the Polish/German boarder leading via Poznan and Warsaw towards the Belorus boarder and the A4, coming from Dresden starting behind the Polish/German boarder via Wroclaw, Katowice and Cracow towards the Ukrainian boarder (Kapsa/Roe 2005).

In 1994, a first highway construction programme was rolled out. According to the BOT-model highway sections were to be erected, managed and maintained by private consortia who would refinance their investments by tolls. After 20 to 30 years, these sections would be transferred to the state. The institutional responsibility for the procurement procedures was handed over to a newly founded agency for highway erection. The Polish state covered for 10

to 15% of the expenses to erect the infrastructure. Furthermore the state reserved the right to approve toll tariffs.

As part of this programme, the A4 from Katowice to Cracow was fundamentally modernized and sections of the A2 between the Polish/German boarder and Poznan were newly erected. Though, the full highway construction programme failed since the ambitious goals were not met. Reasons for failure were on one hand the large size of the projects and on the other hand the missing commitment of the Polish government in regards to assuming financial risks. The capital market in Poland lacked liquidity to fulfil the extraordinary financial needs of the project companies. The government was not willing to grant warranties in case of failure to fulfil the often very optimistic traffic forecasts. Furthermore, several changes in the position of the transport minister did not help to stabilize the investment conditions.

After the change of government in 2001 the new government reprioritized highway erection. The Polish parliament passed a new highway law that stipulated a greater financial commitment of the state. The financial support comprised to a large degree loans and benefits from European and international financial institutions such as EIB and IWF. The agency for highway erection was merged with the Directorate-General for public roads that is responsible for all other supralocal roads to form the Directorate-General for national roads and motorways (GDDKiA).

The new momentum saw a setback when in 2005, the Toll Motorway Act was adopted introducing vignettes for all heavy vehicles of the weight of at least 3.5t for the use of all supralocal roads. The revenues were generated by the state. To comply with European law heavy vehicles were exempt from any tolls. This regulation not only conflicted with existing contracts regarding the privately erected and financed highway sections but also led to noticeable increases of highway usage by heavy vehicles causing increasing maintenance costs for the highway operators. For compensation shadow tolls were introduced. With the

new government following the elections in 2005 the tone and relationship between government and the private investors have declined.

The Directorate-General, that oversees nine regional directorates, is responsible for the procurement of highway sections. The planning of the design and lay-out of a highway falls within the responsibility of the *voidvodships* in co-operation with the ministry for infrastructure. Due to complex expropriation procedures and real estate raiders, highway erection proceeded only sluggishly.

4. Result

In all three countries analyzed, the state played and plays a dominant role, either by approving the toll tariffs or by financially supporting concessionaires to a large extent. A common feature is the overestimation of traffic usage. In Spain state holdings play an important role to guarantee financial transfers from the state and/or between stronger and weaker concessionaires. In Italy and Spain, still most concessionaires are under the auspices of public authorities. The private concessionaires have developed into large corporate companies with an international focus that have considerable know-how in regards to highway management at their disposal. The risks for a highway market entry were high, especially in the early years in Italy and Spain. If the companies survive the first years, they had a good chance of sustaining and consolidating their position. The consolidation often took place by means of warranties, assumptions of liability, bonds and subsidies by the state or by concessions of the state regarding prolonging of concession periods. Even in those countries with a long tradition of private involvement in erecting highways, management and maintaining, the state still plays a dominant role today.

It has to be taken into account that private concessionaires gained less experience concerning the management of existing highways. The motivation for the state was usually the rather

quick and easy financing of new highways and not the efficient organisation of highway provision in general.

The experience from Italy, Spain and Poland shows that the following requirements should be fulfilled to guarantee an optimal provision of highway infrastructure:

- realistic traffic forecasts
- identification of those parts of the highway network that can be erected, managed and maintained on a profitable basis and those parts that will still need public subsidies
- independent and competent regulatory body for the procurement, awarding and controlling of concessions
- procurement of financially and geographically manageable parts of the network
- definition of transparent adjustment procedures for toll tariffs and
- prohibition of parallel untolled public highways.

IV. Analysis

1. The misguided focus of the debate

Most current debates in the first world on the optimal provision of highway infrastructure start with a phantom: the concept of a country that completely lacks highway infrastructure. As it was shown in the previous chapter with the case of Poland, obviously in some countries the highway network is not as far developed as in Germany, Italy, France or Spain, but most western-European countries have already completed their highway infrastructure network. Perhaps some broadenings, extensions and connections are missing or relevant gaps have to be filled but generally speaking, the highway networks are complete. There are several reasons why the debate focuses on the construction of new highways and the neglect of the existing infrastructure network. Five reasons can be identified:

- The nature of economic science is such that the theoretical starting point is the individual. Institutions are only in a second step considered. Every structure makes the economic theory

less pure and more complex. Similarly, in broad terms, the economic starting point is the ideal market, whereas the starting point of a political scientific approach is the state that always exists, in whatever fragmented form. As much as this might be interesting to play around with a pure theoretical starting point, it has little to do with reality. Therefore, from a pure theoretical perspective, it seems more promising to discuss highway networks before a blank background.

- The project to construct a new highway section and the subsequent management and maintenance can from a project managerial perspective be less problematic to carve out. There are usually no properties or former rights that have to be taken into account by the concessionaire himself. These questions have already been solved by the state before he puts a specific section out for tender.

- From a historical perspective most concessionaires today evolved from construction companies. Therefore their core competence lies rather in the construction than in the management of highways; they have more an engineering than a business company culture.

- As it was shown in the previous chapter, most highway projects still rely to a large degree on the funding and the framework that is set by the political-administrative system. Their main interest is to reduce budgets for highway provision. On the part of the politicians, long term planning usually does not exceed four or five years, as they are interested to have less governmental expenses in one term of office. No accounting standards and missing depreciation models in governmental budgets lead to the sub optimal interest to reduce expenses on a year-by-year basis or at least on a government term's basis. Taking the enormous expenses for highway construction into account politicians are concentrating on reducing them since the reduction of maintenance expenses seem to be more complicated to implement. If a highway is managed by a private company which regains the expenses by tolls rather than enormous costs in the construction years period, this interest of politicians is fulfilled.

- Potential concessionaires have their own interest. The large firms want the full cake, rather than having to apply for each slice. Their interest is the full responsibility for planning, construction, maintenance and management of a highway section. Since much costs are incurred in the planning and construction phases, they want the public to call for new highways. The management of an existing highway network is financially less promising, also since the cost models are here more transparent and better to monitor than in the planning and construction phase. Construction firms finance lobbyists and academic institutions with the clear goal to shift the debate towards new highway infrastructure.

If it is acknowledged that most highway networks are complete, the debate shifts towards the optimal provision of highway infrastructure, relieving the state from having to deal with the complex issue of planning processes (especially connected to expropriation issues), but neglects the depreciation for land acquisition expenses and construction costs.

2. Models to organize the provision of highway infrastructure

To determine the optimal arrangement for the provision of highway infrastructure several models -from a pure public one to nearly pure private - are conceivable. For simplification purposes the different options are clustered in five models and are briefly discussed here:

- Organizing highway provision in form of a public authority does not support any efficiency orientation, since financial flexibility and human resource incentivization are subject to huge restraints. The budget does not follow accounting standards but pure cameralistic principles. Transparency, planning and controlling options are lacking especially in regards to infrastructure, characterized by discrete cost levels over the years from a pure expense perspective. Regarding human resources, the introduction of limited contracts and performance incentives might lead to performance improvements but experience shows that real performance drivers are lacking. Since the provision is organized within the administration no regulation is required.

- Organizing highway provision in form of a public enterprise scores higher in effectiveness when compared to the public authority option, especially in the case of financial flexibility and transparency and an incentivization of the employees is aspired. Many employees in public enterprises identify themselves rather with the private than with the public sector. The disadvantage of the public enterprise is the missing or conflicting regulation. If no regulatory body monitors the activities of public enterprises in the provision of highway infrastructure monopolistic behaviour is probable as soon as the enterprise has the right to receive fees or other forms of payment such as tolls. It is extremely difficult to prove in such cases monopolistic behaviour but there is reason to assume that enterprises in Italy and Spain profit and/or profited from this situation. If there is a regulatory body, a conflict of interests becomes apparent. The government is usually represented in both the regulatory body as well as in the supervisory boards of the public enterprises.

- A presently very popular way to organize public services are public private partnerships (PPP). PPP are used for a vast array of organization models and can be differentiated between a public private partnership in a wide and in a narrow sense. In a wide sense, PPP are characterized by some form of cooperation of public authorities or enterprises with private companies which is not further specified. This also includes vertical arrangements in which a public authority awards the implementation of services to private companies. PPP in the narrow sense refers only to horizontal arrangements where public authority or enterprise and private company together implement a service, usually in form of new entity that is partly privately and partly publicly owned. The main motivation for a PPP for the public sector is to acquire private knowledge and capital. The price the public sector pays is to open up opportunities for the private company with whom it chooses to cooperate in an often monopolistic environment. In the case of highway infrastructure, the private company within the PPP would have the opportunity to enforce higher prices than it would in a competitive situation. The above described dilemma in regards to public enterprises reappears in the case

of PPP on a lower level, namely within the supervisory board of the PPP. If an additional regulatory body monitors the activities of the PPP the situation is even more nebulous. To repel monopolistic behaviour while pursuing one's own economic interests is a dilemma that cannot be solved from an institution economic perspective.

- Installing a user club that organizes the provision of highway infrastructure is a concept that is academically developed but practically not tested so far. Since price regulation is carried out by the user club itself no regulatory body is necessary. The disadvantage of a user club as an organizational form is rather found in the construction of such a club itself. Two options are an obligatory membership for all highway users or a voluntary membership with guest tariffs for non-members. In the latter case discrimination towards guests that are very infrequent users of the highway network becomes possible. In case of obligatory membership the key to guarantee professional management and to avoid discrimination are effective internal controlling mechanisms. The larger the number of club members the more challenging effective internal controlling mechanisms become. It is questionable if an obligatory highway user club is therefore the most effective organizational model. The advantages of a club as an organizational model develop in case of small-number memberships and a local focus. If highway network clubs are only locally installed, the problem of discrimination against guests reappears.

- Organizing highway provision in the form of a private company is a quite pure organizational form. The investors seek a maximum on return, which applies the efficiency driver directly (Foster 1992). Since we are looking at an existing network, no interfering planning procedures that require the help of public authorities disturb the course of business. Though, also the organization in the form of a private company is not without restraints. As mentioned earlier, any private company might use its monopolistic position to seek higher tolls than they would in case of a competitive environment. Regulation is needed.

3. Regulatory options for private companies providing highway infrastructure

If private companies look after the provision of highway infrastructure competition between different companies is necessary to incentivize efficiency. Therefore a regulatory arrangement has to be chosen that allows different companies to compete. The larger the geographical areas, in which a specific company does business, the more they can profit from network effects. Smaller networks though lead to more transparency, less possibilities for companies to hide compensation payments and to the reduction of competition for traffic (Fishbein/Babbar 1996). Three regulatory options to administer prevention from monopolistic behaviour in highway infrastructure provision are as follows:

- The traditional regulation model is the cost-based rate-of-return regulation. It was used in the United States for a long time to break the market dominance of utility companies. The regulatory body analyses the cost structure of the company. In a second step a market- and risk-equivalent rate of return is determined and in a third step prices that allow such a rate of return are approved. The main disadvantages of the rate-of-return model are its backwards-orientation which does not reward efficiency improvements but allows gold plating behaviour (Averch/Johnson 1962) and secondly that the information gathering process for the regulatory body is intense and never satisfying as long as the regulatory body does not want to set up parallel controlling capacities.

- A forward-orientated regulation model is the price-cap-regulation. With a price-cap-regulation model the regulating body approves tariffs on the basis of inflation development (RPI) minus productivity development X which is determined by the regulating body. The advantage of the price-cap-regulation is the incentive scheme for companies to further improve efficiency. It also requires less information gathering for the regulating body. Price-cap-regulation is a common regulatory model in the United Kingdom today. The challenge for the price-cap-regulator is to deal with price schemes since companies would usually introduce lower prices for heavy users which would in effect discriminate infrequent users

that do not have a chance to adapt their behaviour because of the monopolistic supply situation. An important prerequisite for the price-cap-regulation is a realistic determination of the original price level since it will serve as a fundamental reference point for all later price adjustments. Especially if price-cap-regulation is introduced in markets where no regulation existed before⁷, the regulator might considerably underestimate the possibilities of efficiency improvements.

- Franchise bidding is the most common regulation model for the provision of highway infrastructure. It grants the winning company (from an auction process) the right to be the monopolistic services provider for a defined period of time. Since price level is defined ex ante and the future monopolistic provider bids for his monopolistic right in an auction process, discrimination is prevented. Time periods regarding highway infrastructure usually span from 15 to 30 years. Since not all possible future developments can be stipulated in a contract, mechanisms for adjustments such as price adjustments or concession extensions are agreed upon beforehand.

The most important part of the calculation of the potential concessionaires in the auction process is the assessment of different risks that might endanger cash flow or postpone the completion of construction in case of franchises for new highway infrastructure. Different forms of risks can be clustered: technical risks, supply risks, financial risks, organizational risks, revenue risks, force majeure risks and political risks. The first five forms of risks should be completely covered by the companies since they are all regular business risks. Each potential concessionaire will probably calculate a risk premium for each risk cluster. To cover force majeure risks companies might effect insurance. Companies cannot be held responsible for political risks , this lies with the state. Political risks include unpredictable planning procedures, expropriation delays, increases in fuel tax, reduced toll levels due to political pressure, approval of parallel roads or increasing environmental requirements. In reality,

⁷ In the early 90ies, this led in the United Kingdom to extremely high revenues for monopolistic companies that

revenue risks have been proved to be the most problematic risk, as Poland shows, next to political risks. Because of the long time span it is barely possible to develop reliable traffic and revenue forecasts. Sometimes on new highway sections, traffic remains 50% below forecasts (Forsgren et al. 1999).

Engel/Fischer/Galetovic (1997) suggest shifting traffic risks to the users using the Least-Present-Value-of-Revenue (LPVR) auction. The LPVR auction is a special form of franchise bidding. In a conventional franchise bidding process the concessionaire that offers the lowest price to the highway users wins. In a LPVR auction a discount rate is given and the concessionaire who offers the lowest present value of revenue wins the auction (Estache/Romero/Strong 2000). The time span of the concession is flexible so as soon as the discounted revenues reach the present value, the concession period ends. The main advantage of the LPVR model is the absorption of traffic demand variability. The disadvantage is that the incentive for quality improvements is also accordingly absorbed. The LPVR model is therefore advisable if huge initial investments have to be made and only vague traffic forecasts exist.

Crocker/Masten (1996) analysed the advantages and disadvantages of the franchise bidding model and direct regulation models such as rate-of-return and price-cap-regulation. They conclude that in complex and uncertain environments a direct regulation is preferable to competitive bidding. Their main argument is that naturally imperfect contracts require renegotiations. In a complex and uncertain environment the need and scope for renegotiations will be higher and wider than in clear and certain environments. Direct regulation are in other terms continuous negotiations between regulating body and the companies acting in monopolistic environments. It could be a fruitful but never ending debate regarding whether or not the provision of highway infrastructure happens within a complex and uncertain environment or not. On one hand, terms that are set out in contracts for a time span of 20

initially discredited price-cap-regulation as a regulatory model in some cases.

years are rather uncertain, on the other hand, the technological developments regarding highway infrastructure have been slower than in the energy or especially the telecommunications sector. Choosing an actor's perspective helps to sort out the question about uncertainty and complexity. The experience of a state as an actor and his experience with regulation help to determine if direct regulation or competitive bidding is preferable.

V. Conclusion

The complex debate about the optimal provision of highway infrastructure draws the attention of economic as well as of political sciences. This paper briefly addressed the main lines of argumentation starting with the transaction cost economic approach. It then described the lessons learnt from experiences in three European countries. The subsequent analysis started with the complaint that the debate focuses on new highway infrastructure instead of the existing network. It then discussed several institutional options to provide highway infrastructure. In a final step different models to regulate private companies providing highway infrastructure were analysed.

- In nearly all western-European economies the highway networks are completed. Any discussion about the privatisation of highway infrastructure or the inclusion of private companies into highway infrastructure provision should take this into account. The model to be chosen for the existing network depends on the experience of the specific country with regulation. If no regulatory experience in this sector prevails a direct regulation should probably be the first option.

- If regulatory experience regarding highway infrastructure already prevails in a country with an existing highway infrastructure network, such as in Spain or Italy, the bidding auction is probably the most preferred model.

- If a country does not have any significant highway infrastructure, such as Poland, the LPVR model as a special form of the franchise bidding, should be applied.

- If a country has a significant highway infrastructure and decides to enlarge the network, the advantage of a model depends on whether it has regulatory experience. If it has no regulatory experience it should first concentrate on building up this regulatory experience in regards to the existing network and in the meantime construct its new highways by public administration or public enterprises.

- In the case of a country with an existing network and regulatory experience, new highway sections should be constructed according to the franchise bidding or the LPVR-model depending how reliable the traffic forecasts can be assessed.

The main factor that makes private construction and provision of highway expensive is the risk premiums the private companies incorporate in their calculation for political risks. These political risks arise out of unpredictable behaviour from the state, for example in a reduction of toll levels due to political pressure or other political risks that are mentioned above. Instead of outsourcing these risks into the private companies' calculations it could be cheaper for the taxpayer to keep the risks within the control of the state, meaning new highway infrastructure should rather be planned by the state or a state agency. Potential and probably real efficiency improvements by the private sector might be overcompensated by the huge political risks premiums of private companies. The effect of disburdening the budget in initial construction years might overburden the budget of the following years.

The transaction cost economic approach clearly points out that vertical integration as in case of public administrations or enterprises on one hand and contracting as in franchise bidding on the other hand very much depends on the key variable of uncertainty and complexity (Williamson 1996). Uncertainty and complexity are historically relative variables that depend on the experience of the specific actor. In case of infrastructure and in the case of this analysis the actor is the state. A learning state therefore requires new models of infrastructure service provision from time to time.

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