

# The Danish State Guarantee Model for Infrastructure Investment



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**Working Group Paper** 

2018

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Cite as: Holm, K. and T. Horstmann Nieslen (2018), "The Danish State Guarantee Model for Infrastructure Investment", *Working Group Paper*, OECD Publishing, Paris.

### Foreword

Transport infrastructure is a major enabler of economic development. In the drive to refurbish or build more, governments worldwide have turned to the private capital market to help finance it. The primary narrative behind this push is that there huge stocks of private capital available, while public financing capabilities are said to be limited and insufficient.

The almost exclusive vehicle of private investment in transport (and social) infrastructure are Public-Private Partnerships (PPPs). In the context of PPPs, two important aspects have received little attention.

First, sufficient attention has not been given to the role of suppliers. The focus of, governments and Intergovernmental Organisations has been on resolving the challenges to private investment from the viewpoint of investors; a key part is reducing uncertainty they face and enabling them to price risk more efficiently (establishing infrastructure as an asset class).

Yet looking at the investors only gives an incomplete view of the total cost of the risk transferred from the public to the private sphere. In PPPs investors transfer some of the major risks they are not comfortable bearing (e.g. construction risk) to design, construction, maintenance, and operations contractors.

As investors, suppliers too face uncertainties and can't price risk efficiently. In such a case, the base cost of the initial investment (and of subsequent services) will be much higher than they could be, and not just the cost of their financing.

Uncertainty arises from the difficulties to accurately estimate the cost of construction, maintenance, operations, and financing. But it also stems from "unknown unknowns" (the so called Knightian uncertainty), for instance changes in weather patterns or paradigmatic technological shifts the timing and impact of which are unclear but will influence what infrastructure is needed and where.

So what can policy makers do to reduce the cost of inefficient risk pricing of suppliers? Where does this put PPPs? How can public decision makers reconcile long-term uncertainty with private investment in infrastructure? Who should bear long-term uncertainty in projects, the public or the private sector?

These were some of the guiding questions for a Working Group of 33 international experts convened by the International Transport Forum (ITF) In September 2016. The group, which assembled renowned practitioners and academics from areas including private infrastructure finance, incentive regulation, civil engineering, project management and transport policy, examined how to address the problem of uncertainty in contracts with a view to mobilise more private investment in transport infrastructure. As uncertainty matters for all contracts, not only those in the context of private investment in (transport) infrastructure, the Working Group's findings are relevant for public procurement in general.

The synthesis report of the Working Group was published in June 2018. The report is complemented by a series of 19 topical papers that provide a more in-depth analysis of the issues. A full list of all Working Group papers is available in Appendix 1.

## Acknowledgements

The authors are grateful for valuable comments from the members of the ITF Working Group on Private Investment in Transport Infrastructure and from Dejan Makovsek and Stephen Alchin in particular.

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## **Executive summary**

#### What we did

This paper analyses the Danish (and partly Swedish) experiences with the so-called state guarantee model (SGM). In the field of transport infrastructure megaprojects, the model dates back to 1987 when the Store Bælt (Great Belt) project was decided by the Danish parliament. The model was replicated together with Sweden in the Øresund project, in the Copenhagen Metro project and will be used in the planned Femernbelt project as well.

The basic concept of the SGM is quite simple: A special purpose vehicle (SPV) is established for each project, and all construction costs are financed by the SPV and backed by a strong government guarantee. The costs are recovered (i.e. the debt is repaid) by toll income, collected by the SPV and payed by the users of the specific infrastructure.

In the context of this report, the SGM can be seen as an alternative to privately-financed, toll-funded infrastructure (a public-private partnership [PPP] with demand risk). This paper describes the experiences with the model, based on up to 20 years of operation, and identifies the model's pros and the cons.

#### What we found

The SGM is a financing tool which can be relevant for fully or partially toll-funded projects. As such it is a potential alternative to both the traditional tax-funded public procurement model and to the PPP model with demand risk. Compared to the public procurement model, the main advantage of the SGM is that the costs of the project are paid by the users of the project (i.e. those that are actually benefiting from the investment) and not by all taxpayers in the country. The model also allows more efficient project management than normally found in a public procurement project.

Compared to PPPs, the SGM's main advantage is that its financing costs are substantially lower. This is partly explained by the fact the state ultimately bears the risks (especially the demand risks) in the project. But as described elsewhere in this report, private investors in transport infrastructure also require an uncertainty premium, which makes the total financing costs too high compared to the real risk transfer from the state to the private sector (the risk-pricing failures of private financing). On a risk-adjusted basis, the financing costs in the SGM are therefore lower than in the PPP model. Furthermore, the SGM can lead to efficiency gains by transferring knowledge and experience from one project to another.

Regarding the question of having a project's financing on or off the public budget, the SGM is subject to the same rules as the PPP model. In both cases a market test is performed in which the main criterion is whether or not the project generates income that cover a minimum of half of the costs.

The main disadvantage of the SGM is the lack of incentives for efficiency, which is often associated with private ownership and risk-taking.

#### What we recommend

#### Consider the SGM as an alternative to PPP financing with transfer of demand risk

The SGM has proven to be effective, especially in countries with a stable political environment, and is an efficient financing tool.

#### Identify and disclose the risk of a project

Each project is unique and the use of the SGM should therefore be based on thorough investigations and a strict due-diligence process. It is important that the model is not seen as easy money. Risks should be identified and disclosed during the decision-making process, for instance, in parliament

#### Compensate for the lack of private-sector incentives

To the extent possible, the lack of private-sector incentives should be compensated by a comprehensive governance model, including clearly defined financial goals for the special financing vehicle for which the board of the company is held responsible.

## Introduction

This report provides a detailed description of the Danish state guarantee model (SGM), which over the past two decades has been successfully used for financing large-scale transport infrastructure projects in Denmark, such as the fixed links across the Storebælt and the Øresund. It will also be used for the Femernbelt project. It specifies the working principles and relevant factors of the SGM and includes references to the experiences Denmark has had with the Storebælt and Øresund projects.

The project's self-financing capacity is the key element in the SGM: it means that even if certain parameters in the project should change for the worse – e.g. lower initial traffic volume or higher interest rates than anticipated in the original financial calculations – this does not require new policy decisions or mean the risk of ongoing capital injection by the owner. Such variations during the actual operation of the project can instead be absorbed in the form of adjustments to the repayment period, as long as the project does not reach a point where the net profit is not able to cover the interest payment on the debt.

## **Description of different organisational models**

Before the SGM is described in detail, it is necessary to clearly distinguish it from other organisational models for funding and financing transport infrastructure. The table below therefore lists four models:

Model types	Financing method		
Funding	Public	Private	
Tax payment	Finance act model	Public-Private Partnership model (availability payment)	
User payment	SGM	Concession Public-Private Partnership model (incl. demand risk)	

Table 1. Overview of four pure financing models for transport infrastructure

The SGM is therefore only a model used when funding comes from user payment, which separates it from budget constraints from the government's annual finance act.

The reason for this simplified division should be viewed in light of the debate, which often mixes the models together and the issue of funding and financing, and therefore dilutes their concepts. For example, you often see a mix of Public Private Partnership (PPP) and user payment, but as the table shows, they are actually not identical in their pure forms.

Another reason to keep the models separate is the ability to assess the characteristics of each. This is only possible if they are kept in their pure forms.

A brief description of each organisational form follows, after which the SGM will be analysed in detail. The description is based on the Danish context but can be applied to other countries with high credit ratings.

#### The finance act model

In this model, the state offers the project as a turnkey contract following the adoption of a construction act for the specific project in the Danish parliament. The construction costs are raised in the annual finance acts and settled with the contractor through milestones during the construction phase. After completion, the state is the owner of the facility, with responsibility for its operation. In practice, however, this can be undertaken by a private partner through fixed-term operational contracts. The pure finance act model is illustrated in Figure 3, where a project run by the Danish Road Directorate (a state agency operating under the Ministry of Transport) is used as an example.

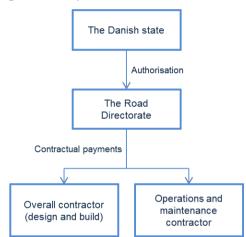


Figure 1. The pure finance act model

The main advantage of this model is that it is relatively simple, with the costs of contract preparation, etc., being low as a consequence when compared to most PPP models. The model also offers the opportunity for economies of scale with regard to the operation of other publicly-owned roads.

The fundamental challenge for the finance act model is the fact that the mega-infrastructure projects are both large in scale and span a great number of years, often exceeding a decade. In general, a decision to proceed with such projects puts constraints on public funds available for infrastructure for many years and thus influences and limits the public prioritisation of public money over several election periods. This can lead to either stop-go decisions for projects or to political inability to cope with project changes along the way.

A potential disadvantage of this model can be that there can be a distinction between contracts for the construction works and the subsequent operations and maintenance phase. Thus, there is no incentive for the contractor to view the project in the context of its entire life cycle. However, it is possible to resolve this issue if the contract covers both construction and the early years of operation. This is the case in Copenhagen's metro project, for example. The Danish Road Directorate has developed the traditional procurement method and are trying to strengthen the life-cycle perspective through a different approach to contracting.

Whether this approach has produced better results remains to be evaluated. Another major disadvantage is that maintenance of all public infrastructure is subject to the budget constraints in the finance act, and this can lead to suboptimal maintenance as this is often a less prioritised area for politicians than investing in new infrastructure. As ITF statistics show, during the recent financial crisis most countries significantly cut back spending on maintaining transport infrastructure.

#### The state guarantee model

The SGM was used for the development of the fixed links across Storebaelt and Øresund and will also be used for the upcoming Femernbelt link. It is characterised by transferring the responsibility for Design, Build, Finance, Maintain and Operate (DBFMO) in the PPP model contract to a 100% state-owned company, with its own board of directors and management.

Financing is based on the company raising loans in financial markets or from the state and can also be equity supported by the state (this has only been applied for a smaller Danish project). The state guarantees the loans through a guarantee commission. With the Danish state's high credit rating, favourable loan terms are obtained. Toll charges are collected, which, after covering operating and maintenance costs, are used to pay interest and loan instalments. The model is illustrated in Figure 2.

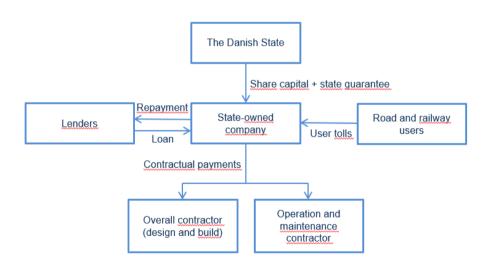


Figure 2. The state guarantee model

The main benefits of the SGM, when compared to the traditional finance act model, is that it allows both full and partial user payment. This means the project is less of a burden on public finances, and it has a self-reliant organisational structure, where the company operates without asking parliament for permission on specific projects. Furthermore, concentration and retention of knowledge and experience with these large scale projects are highly valuable assets.

As with the finance act model, the SGM is relatively simple, and the costs of legal preparation of financial contracts, etc., are thus quite modest. For an infrastructure project with high capital costs and a long timeframe, financing costs are important for the economics of the project. The SGM secures the lowest possible finance costs, which are only marginally higher than the state's own finance costs, which, in turn, are significantly lower than for private financing.

#### Storebaelt Fixed Link

- 100% Danish project
- Debt at opening (1998): EUR 4.9 bln
- Annual turnover: EUR 480 mln
- Expected final repayment in 2033

#### Figure 3. Project characteristics

#### Øresund Fixed Link

- Joint-owned and guaranteed with Sweden
- Debt at opening (in 2000): EUR 2.6 bln
- Annual turnover: EUR 240 mln
- Expected final repayment in 2034

#### Femernbelt Fixed Link

- 100% Danish project except German hinterland
- Construction Act passed by Danish Parliament April 2015
- Final Danish approval March 2016
- Expected debt at expected opening (2028) EUR 7.1 bln
- Expected final repayment in 2064

The state continues to bear the residual risk in the project. If it turns out that the project does not live up to expectations and that revenue from user payment is not sufficient to repay the debt, the state will ultimately have to cover the resulting shortfall.

An advantage of the SGM is that the state can maintain control of a number of strategic decisions in the project, such as the tender strategy and fixing toll charges. Meanwhile, the company can act more freely than a government agency (e.g. in relation to the state authorisation procedures). This is currently not the case for concessions. However, Vasallo (2018) is proposing a solution for separating the cost-recovery function of user charges form their role in the efficient use of infrastructure. The experience from the Storebælt and Øresund projects shows that an independent project company with its own financing is better placed to optimise operations and maintenance, including reinvestments, than is the case with a government body that is dependent on appropriations in the annual finance acts.

Compared with a PPP concession, with a fixed contractual period the SGM provides the opportunity of looking at the full life of the asset, where a private operator with a fixed contract period will have an incentive to look at the value of the asset only in the length of the contract. And for large complex infrastructure constructions, the life cycle is most often beyond this contract period. As an example of this, the Danish fixed links have developed an innovative way of prolonging the expected life of the assets by corrosion protection of the cables with dehumidification techniques. A private operator will not have the same incentive to continuously optimise for a lifespan beyond the contract period.

A possible disadvantage when compared with PPP models can be the division of contracts between construction on the one hand and operations and maintenance on the other. In the same way, as with the finance act model, however, it is possible to alleviate this problem if a contract is entered into that covers both construction and the early years of operation as will be the case on the Femernbelt project. Furthermore, the model offers good opportunities to integrate construction and operation. For example, the design phase can take account of operational considerations, including experience drawn from equivalent facilities already in operation. In the case of Denmark, the Storebælt, Øresund and future Femernbelt, links are owned by the same group (Sund & Belt Holding), which in turn is owned by the Ministry of Transport.

Another possible disadvantage is the possibility of political interference in the SPV, which could lead to less than optimal solutions and a difficult work environment. As the SPV is 100% state-owned, it would be possible for the government to put pressure on the company.

#### Box 1. Main characteristics of the SGM

- Paid for by users
- State guarantee on all loans
- Low financing cost
- Organised through a private company entity comparable to the SPV in a PPP setup
- Full-state ownership of the company entity
- Full-state control and insight

## Detailed description of the state guarantee model

#### The company

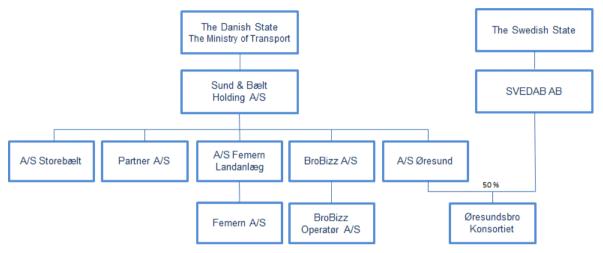
The particular company that will be responsible for designing, constructing, financing, owning and operating the project is fundamental to the model. In Denmark, this company is established under the authority of a special construction act that is adopted in the Danish parliament (*Folketing*) and is specific to the project. The company is set up as a private entity and limited company but owned wholly by the Danish state. The act is specific to the project and sets out a clear framework and restrictions on the company. Thus, it is only authorised to undertake the specific task, which ensures maximum control of the company.

The company is run by a board of directors and a management board under the auspices of common corporate legal standards. However, the Danish Minister of Transport has certain special instructional powers that go beyond ordinary shareholder powers. This ensures that certain strategic decisions (for example, regarding tolls) must be made or be approved by the minister of transport, who also appoints the company's board. Tolls will primarily be determined based on the requirement for repayment of the debt (see below). In addition, social considerations will play a role in setting the tolls.

The company's finances are separate from the state's budget and authorisation procedure (i.e. the finance act). Thus, it is the board's responsibility to ensure appropriate and efficient use of its resources (see Minister of Transport's special powers above). The company's audit is carried out by a regular private audit company. Denmark's National Audit Office, however, also has the opportunity to examine all aspects of the company's business. The project company is thus under double oversight and must report frequently and transparently to its public owners. Public control in this model is therefore strong. At the same time, the company has freedom to act and optimise in the same way a private project company would.

A state-owned project company does not necessarily have an incentive to optimise the economics and ensure a robust risk assessment of the project. This, however, can largely be compensated for by an appropriate governance structure and an efficient organisational setup. In Denmark, the state has implemented an active ownership policy, which sets a clear framework for state ownership in companies. Financial targets have been set for all companies to give specific goals for long-run value creation and support the supervision of the individual company. The goals will be regularly adjusted and updated and an annual monitoring is implemented.

A majority of the infrastructure projects organised using the Danish SGM are part of the Sund and Bælt Holding. This is illustrated in Figure 4. The holding company is owned wholly by the Danish state (ministry of transport). In turn, it has full ownership of a number of subsidiaries, including Femern Landanlæg A/S and Femern A/S, plus the companies responsible for the Danish landworks for the Femernbelt tunnel and the tunnel itself.





Each project company has its own board of directors, its own accounts and double oversight from its private auditor as well as the state auditor. There is an intentional overlapping in general management and the board of directors to ensure knowledge is shared between companies. Furthermore, money cannot be transferred between projects without a specific political decision to do so.

The organisational description above applies to fully Danish-owned companies. The situation is slightly different with regard to Øresundsbro Konsortiet, which owns and operates the fixed link across Øresund and is owned equally by the Danish and Swedish states (the Danish A/S Øresund subsidiary of the Sund & Bælt Holding, which therefore represents 50% of the Øresundsbro Konsortiet, owns the Øresund Danish land works). The two governments appoint four directors each to the board of directors, granting it all powers of direction, including regarding tariffs.

#### **Construction and financing**

The above construction act sets out the project's design in outline (such as a combined road and rail link with two railway tracks and two/two motorway lanes) and establishes certain general requirements, e.g. for environmental and safety considerations

Within this framework, the project company is responsible for implementing the project design, environmental and regulatory approvals, tender of construction contracts and performance of the client role during the construction process, etc. A crucial element in this process is the tender strategy, which includes the need to establish the allocation of risk between the contractor and client (the company). Due to the size and the complexity of the projects, innovation in design, solutions and processes has

always been a top priority for all the fixed links. On the Femern project, Design and Build and competitive dialogue are used in the tendering process, with the expectation that this will drive innovation, harness the skills in the private construction sector and replicate some of the advantages of the PPP model.

Because of the size of the projects and the company's publicly supported financing, the tender process is in accordance with the EU's public procurement directives.

The cost of all these activities is financed through borrowing. Normally, companies have some equity capital, invested by the state when the company is formed. In the case of Danish companies, however, this constitutes less than 1% of the total capital requirement (this is the case of the Øresundsbro Konsortiet). The balance is loan financing through the capital markets, which of course is only possible because of the state guarantees.

The borrowing is typically undertaken by the company issuing bonds, which are purchased by pension funds or other investors. Both the Danish companies and Øresundsbro Konsortiet have special programmes for bond issues, often referred to as the EMTN (Euro Medium Term Note) programme. Apart from short-term drawings on credit facilities, bank loans are not usually taken out. Banks have, however, an important role arranging the bond issues and as counterparty in the accompanying financial contracts.

#### **Guarantees and loan terms**

As mentioned, the state guarantees the company's borrowing, including any refinancing of previously raised loans. The state also guarantees the companies' other financial contracts used in connection with the financial management, such as swaps. Finally, the state guarantees non-financial obligations without further notification (e.g. fulfilment of the signed construction contracts).

Loans are raised as the liquidity need arises during the construction phase. There is a range of maturities in order to avoid too high a concentration of refinancing needs in certain years. The company's total debt comprises, therefore, a large number of loans with varying maturities and associated financial contracts.

The guarantees referred to are legally strong. They are, of course, irrevocable and ensure investors/lenders receive payment of all interest and instalments, etc., which arise from the company's original obligation. It should be noted that investors/lenders cannot put the company into receivership or liquidation and thereby trigger an accelerated repayment of the debt.

The guarantees are issued by the Danish state and for the Øresundsbro Konsortiet the Danish and Swedish states. This means the companies have the same credit rating as the state, which in Denmark's and Sweden's cases is an AAA rating from the international rating agencies. Companies can therefore obtain virtually the same loan terms as the state itself. Since the companies' bonds are less liquid than government bonds, however, a small liquidity premium accrues to the investor.

The Danish companies pay a guarantee premium of 15 basis points per annum to the state. Øresundsbro Konsortiet pays no guarantee premium.

#### On budget, off budget

According to Eurostat rules ESA (2010), all debt in the general government sector is on the budget. The general government sector is defined within these rules as being all government units and all non-market non-profit organisations controlled by government units. Whether a state-owned company is part of the

general government is decided by the market/non-market test. Only non-market producers are part of the general government sector. Market producers are part of the corporate sector, and the debt in these companies should be off budget.

ESA 2010 states the distinction between market and non-market producers depends on whether or not prices charged for sales of goods and services are economically significant (see ESA 2010). In practice, this would be assessed through whether the sales of the producer cover a majority of the production costs. In distinguishing market and other non-market producers, a quantitative market/non-market test (50% criterion) is used, comparing sales and production costs. The sales should cover at least 50% of the costs over a sustained multi-year period.

According to the 50% criterion, in Denmark each project is not considered a part of the general government, and the debt is off budget. That said, most loans in Danish companies are provided by the Danish state, and this type of loan is automatically on the budget, as opposed to having the companies issuing in their own name, with the state guarantee.

#### **Operational phase**

When the fixed link opens to commercial traffic, the project moves to the operational phase. However, the original project company still owns it and remains responsible for operation and maintenance, although many of the actual tasks can be outsourced to private companies. Again, the EU procurement directives apply, which in practice means that a number of major operational tasks are put to tender under them.

The company's revenues are comprised of user payments for passage across the fixed link. The abovementioned construction act will usually regulate this. With the Storebælt link, it is the minister of transport who sets tolls on the recommendation of the company, while the toll rates on the Øresund link are left to the discretion of the board of directors. The main reason behind the difference is the fact that the Øresund link is between two states and would always require the two states to agree on the tolls. To avoid this, it is up to the board, whose members are appointed by Denmark and Sweden, to decide.

Toll setting will primarily be driven by the need to ensure an appropriate repayment of the company's debt. In this context, consideration of price elasticity and possible competition from alternative routes, with or without user payment, will be central. In any case, the company will of course comply with the EU's and the Denmark's competition rules.

Revenues from user payment are used primarily for operation, maintenance and reinvestment in the fixed link. The company is responsible for organising a strategy for these tasks, which ensures the lowest possible cost in the long term. This will have already begun during the construction phase, with the design of the actual facility attending to these issues in order to ensure the lowest possible cost over the project's life (life-cycle cost).

Revenues from user payment will additionally cover the interest costs of the debt, which will have accumulated during the construction phase. During the project's first year of operation, it will not be unusual for it to be impossible to cover the entire interest cost. This means the debt increases over the early years of operation. The SGM typically takes this into account by allowing a certain level of net borrowing during the operational phase.

When cash flow from user payment exceeds the total of operating, maintenance and reinvestment costs, as well as interest expenses, the debt is amortised. As previously mentioned, in practice the debt

comprises many individual loans, so that there is some refinancing each year. This refinancing is adjusted to the free cash flow, so the total debt decreases in line with this.

#### Self-financing

The project's self-financing capacity is the key element in the SGM. Revenues from user payment repay the debt, which occurs in connection with the construction phase of the project. In the Danish context, this is expressed by the fact the company will not receive government subsidies in addition to the value that lies in the guarantee. This self-financing capacity is reflected in the repayment period and is illustrated in Figure 5 below: it shows the breakdown of total revenue and expenses in the Øresund Fixed Link project, from the day of opening to when the debt is repaid. The left column shows the revenue and the right column shows the cost of the project. All amounts are calculated as the current value across the project's repayment period, so by definition the columns are the same size.

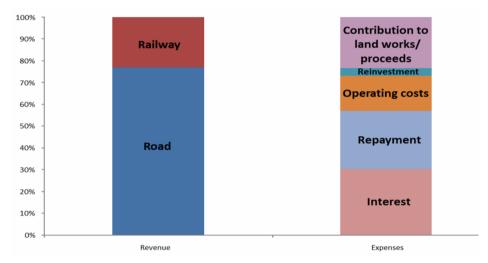


Figure 5. Øresund Fixed Link net present value of cash flow in the repayment period

#### **Repayment period**

The repayment period is the key to evaluating the project's financial strength. With regard to the adoption of the project, the expected repayment period is calculated based on anticipated costs for construction (including design, etc.), operation, maintenance and interest, as well as on the expected traffic revenue and EU support. Since factors such as construction cost, traffic revenues and interest costs are subject to uncertainty, there is also a certain level of uncertainty with respect to the repayment period.

This is why at the outset of the political decision-making process meticulous forecasts and sensitivity calculations are made to ensure new policy decisions will not be needed.

In order to use the SGM for a given project, it is essential the repayment period falls below the facility's useful economic life by a good margin. With Danish projects, the repayment period is typically 30-40 years, as opposed to facility lifetimes of over 100 years.

If any of the parameters change, the repayment period falls or elongates accordingly. Variations during the actual operation of the project are absorbed in the form of adjustments to the repayment period. Thus, they do not require new policy decisions or risk ongoing capital injection by the owner.

Experience shows that if the repayment period exceeds approximately 50 years, the risk in the project increases significantly. In other words, a given change in conditions (e.g. interest rates, expenses, traffic demand, etc.) will have an increasing impact on the repayment period as it increases. In order to evaluate the uncertainties in the project, a number of sensitivity analyses are conducted in which the effect of changes in one or more of the above parameters is highlighted. This may be supplemented by more advanced risk calculations.

The greatest single risk factor is typically traffic revenue, which is determined by the volume of traffic and the toll per vehicle. These elements depend on a wide range of social factors, such as economic growth, demographics, car ownership, fuel prices, competition from alternative routes and modes of transport.

#### Fixed link across Storebælt

Traffic volumes on the Storebælt link proved to be significantly higher than the forecasts prior to the adoption of the construction act. When the Storebælt link opened in 1998 (rail opened in 1997), the expected repayment period was 37 years. A decade later in 2008 the greater traffic level and lower interest rates resulted in a reduction in the repayment period to 25 years. Due to the company's strong performance, the Danish parliament has decided to let the company finance other infrastructure investments by way of dividend payments. The repayment period has expanded to 30 years because of this. Furthermore, as a result of the heavy traffic, the Danish parliament decided to make two toll reductions, one in 2006 and another one in January 2018.

The Storebælt fixed link is a success both in terms of its benefits to society due to improved infrastructure and more interaction between western and eastern Denmark and its strong financial performance. In 2014, an external ex-post analysis concluded that the socioeconomic gain from the Storebælt link over a 50-year period is as high as EUR 51 billion, equivalent to an annual return of 14%. The use of the SGM has meant the link could be built without tax revenues.

#### Fixed link across Øresund

After opening of the combined Øresund bridge and tunnel link between Copenhagen and Malmö, road traffic was initially below forecasts, but in the following years traffic rose strongly until 2008, when just over 7 million vehicles used the link. This level was maintained for several years, rising to 7.4 million vehicles in 2016. The train service has been a great success: in 2016 11.5 million passengers used it. On the Øresund tunnel and bridge, the estimated repayment period varied between 30 and 36 years after commencing operation. This was primarily due to changes in traffic expectations. On current assumptions, the debt of the consortium can be repaid by 2034, 34 years after the opening.

The Øresund fixed link has fulfilled its purpose, successfully bringing together the two large urban centres in Denmark and Sweden on either side of the Baltic strait. This has led the EU Commission to hail the project as a model for removing barriers between countries. This would not have been possible without the use of the SGM, since it is unlikely the two governments would have been able to agree to finance the link through tax revenues.

#### Political interference and control

In an SGM, a stable political environment pays a crucial role for the SPV to operate efficiently on a year-to-year basis. The legal framework is the most important building block for operating the company effectively and without political interference.

As one of the major advantages of the model is the ability for the government to maintain control over things such as setting toll charges, this can also be a disadvantage to the SPV, as it can interfere with running the company efficiently. In Denmark, the political system is quite stable, and all the major infrastructure projects have been adopted by a large majority in parliament. Consequently, governments changing has not affected the daily operations of the company.

There is a genuine interest in the projects, and due to the financial success of the Storebælt link, the parliament has twice decided to cut tolls, not because of economics or guidance from the SPV but rather because of socioeconomics. The first toll reduction (20%) in 2006 resulted in a 10% traffic increase, and eight years was added to the repayment period. The second reduction, which has just been decided, will further lower the tolls by 25% and is estimated to add three years to the repayment period. Furthermore, in 2009 the Danish parliament decided to let the SPV finance other infrastructure investments by way of annual dividend payments totalling EUR 1.2 billion in 2009 prices. This extends the repayment period a further five to six years, and in 2017 a little over EUR 300 million was added to this to finance a specific highway project.

These examples show the state stays in control and has the ability to adjust conditions for a socioeconomic benefit. And even though these decisions can be a lengthy process and can cause some challenges in the SPV, they are more of a change in the framework rather than interference in company management itself. All decisions have been made in co-operation with the SPV and with the overall financial stability of the project in mind. The Storebælt link is expected to be fully repaid by 2033, only 35 years after opening.

#### Other aspects of the state guarantee model

By having several SGM projects run by the same company or group of companies, knowledge and experiences regarding construction and, in particular, the operation and maintenance of large infrastructure assets can be transferred and used to improve efficiency.

The SGM is also a financing vehicle and therefore faces the same arguments as the PPP model. However, as a result of the lower financing cost of SGMs, more projects will be financially viable when compared to PPPs with demand risk. This increases the chance of a project with a positive return in terms of social costs and benefits. In practice, this can make a project that would otherwise not be carried through or would be delayed by several years viable. For example, the highly profitable Storebælt project in Denmark would not have been realised in the time it took without the SGM.

When it comes to public accounting, the SGM is subject to the same ruling as PPPs with demand risk. These rules (ESA 10) treat public investments with a high social benefit in the same way as public consumption when measuring public deficit and debt. Using the SGM or a PPP can be seen as an unjustified accounting exercise, but it can also be a rational way for political decision makers to promote good projects under existing accounting rules. Since these projects are funded by tolls, they are a not a real burden on taxpayers but instead are paid for by those who also enjoy the benefits, i.e. the users.

The SGM is primarily used in a domestic context, but due to the size and complexity of these projects foreign contractors and technical advisers are used to a large extent. This has undoubtedly had a positive effect on the local Danish economy. For example, Denmark has several engineering companies doing business in international infrastructure projects that far exceed those in its domestic market. This development has clearly been facilitated by the realisation of the large SGM projects.

The SGM can be seen as an attractive alternative to the PPP model, especially in highly developed countries that have a stable governance structure and a high credit rating.

## References

ESA (2010), European System of Accounts – ESA 2010, https://ec.europa.eu/eurostat/documents/3859598/5925693/KS-02-13-269-EN.PDF/44cd9d01-bc64-40e5-bd40-d17df0c69334.

## **Appendix 1. Research questions and outputs**

#### Introduction: Getting the basics right

What are the economic characteristics of infrastructure? What is infrastructure and what are operations? What are the models of private participation in infrastructure and through which significant private investment actually takes place?	Makovšek, D. (2018), "What is Private Investment in Transport Infrastructure and Why is it Difficult?", Working Group Paper, International Transport Forum, Paris (forthcoming).
Can private investment improve productive efficiency? Improve project selection? Close the infrastructure funding gap? Have other positive effects when it is private?	Makovšek, D. (2018), "The Role of Private Investment in Transport Infrastructure", Working Group Paper, International Transport Forum, Paris (forthcoming).
What have the private investment trends in transport infrastructure been over the last 20 years? How much of that was foreign private investment?	Mistura, F. (2018), "Quantifying Private and Foreign Investment in Transport Infrastructure", Working Group Paper, International Transport Forum, Paris (forthcoming).

#### Defining the challenge: How uncertainty in contracts matters

How does uncertainty affect risk pricing? Beyond investors, do suppliers in PPPs also have issues with risk pricing? How does its transfer to the private sector affect competition? What does uncertainty mean for the public vs. private cost of financing?	Makovšek, D. and Moszoro, M. (2018), "Risk pricing inefficiency in public– private partnerships", <i>Transport</i> <i>Reviews, 38</i> (3), 298-321.
<i>Is uncertainty also an issue in long-term services/operations contracts?</i>	Beck et al. (2018), "Uncertainty in Long-term Service Contracts: Franchising Rail Transport Operations", Working Group Paper, International Transport Forum, Paris (forthcoming).
What is the competition for large transport infrastructure projects in the EU Market? Is there a difference between traditional procurement and PPPs?	Roumboutsos, A. (2018)," Competition for Infrastructure Projects: Traditional Procurement and PPPs in Europe", Working Group Paper, International Transport Forum, Paris (forthcoming).

#### Addressing uncertainty for suppliers: the construction phase as example

Adversarial vs. collaborative procurement – is collaborative contracting the future?	Eriksson et al. (2018), "Collaborative Infrastructure Procurement in Sweden and the Netherlands", Working Group Paper, International Transport Forum, Paris (forthcoming).
What lessons in dealing with risk and uncertainty were learnt in Danish mega projects from Storebaelt to Femernbaelt?	Vincentsen, L. and Andersson, K. S. (2018), "Risk Allocation in Mega- Projects in Denmark", Working Group Paper, International Transport Forum, Paris (forthcoming).
What can governments do in the short run to reduce inefficient pricing of risk by construction contractors?	Kennedy et al. (2018), "Risk Pricing in Infrastructure Delivery: Making Procurement Less Costly", Working Group Paper, International Transport Forum, Paris (forthcoming).

# Addressing uncertainty in long-term contracts in the absence of continuous pressure for efficiency

What	is	the	public	sector	organisational	Holm, K.V. and Nielsen, T.H. (2018),
counter	factı	ial on	which p	rivate inv	estment should	"The Danish State Guarantee Model
seek to	impr	ove?				for Infrastructure Investment",
						Working Group Paper, International
						Transport Forum, Paris (forthcoming).

#### Partial fixes to the Private-Public Partnership approach

How would an organisational structure consisting of PPPs come close to a network-wide management approach? What benefits would it yield?	Vasallo, J. (2018), "Public-Private Partnerships in Transport: Unbundling Prices from User Charges", Working Group Paper, International Transport Forum, Paris (forthcoming).
Should the public or the private side bear the cost of long-term uncertainty? How could we design a PPP contract to avoid hold-up due to incomplete contracts?	Obsolescence of Transport

#### Long-term strategic approach

<i>How do the PPP and regulated utility model (RAB) compare in terms of efficiency incentives?</i>	Makovšek, D. and D. Veryard (2016), "The Regulatory Asset Base and Project Finance Models", International Transport Forum Discussion Papers, No. 2016/01, Paris.
What basic considerations underlie the choice between a PPP and RAB approach?	Hasselgren, B. (2018), "Risk allocation in Public-Private Partnerships and the Regulatory Asset Base Model", Working Group Paper, International Transport Forum, Paris (forthcoming).
Which are the preconditions a country would need to take to establish a RAB model on a motorway network? Is user-charging a must?	Alchin, S. (2018), "A Corporatised Delivery Model for the Australian Road Network", Working Group Paper, International Transport Forum, Paris (forthcoming).
From the investors' point of view, does a RAB need to be fully reliant on user-charging?	Francis, R. and Elliot, D. (2018), "Infrastructure Funding: Does it Matter Where the Money Comes From?", Working Group Paper, International Transport Forum, Paris (forthcoming).
Incentive regulation can also yield perverse incentives. Can the capex bias be managed?	Smith et al. (2018), "Capex Bias and Adverse Incentives in Incentive Regulation: Issues and Solutions", Working Group Paper, International Transport Forum, Paris (forthcoming).
<i>Does it make sense to pursue hybrid solutions between PPP and RAB?</i>	Zhivov, N. (2018), "The Thames Tideway Tunnel: A Hybrid Approach to Infrastructure Delivery", Working Group Paper, International Transport Forum, Paris (forthcoming).

#### Uncertainty and private investment mobilisation in transport infrastructure

What lessons can we draw from recent attempts to mobilise private investment in infrastructure in the aftermath of the global financial crisis?	Makovšek, D. (2018), "Mobilising Private Investment in Infrastructure: Investment De-Risking and Uncertainty", Working Group Paper, International Transport Forum, Paris (forthcoming).
Synthesis	ITF (2018), Private Investment in Transport Infrastructure: Dealing with Uncertainty in Contracts, Research Report, International Transport Forum, Paris

## The Danish State Guarantee Model for Infrastructure Investment

This paper describes the model of infrastructure delivery and management known as the Danish State Guarantee model. The Danish State Guarantee model provides an interesting alternative for the public sector to privately financed infrastructure. The paper is part of a series of 19 papers and a synthesis report produced by the International Transport Forum's Working Group on Private Investment in Transport Infrastructure.



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