DEREGULATING THE NORWEGIAN RAILWAY

A Survey of Empirical Experiences Abroad

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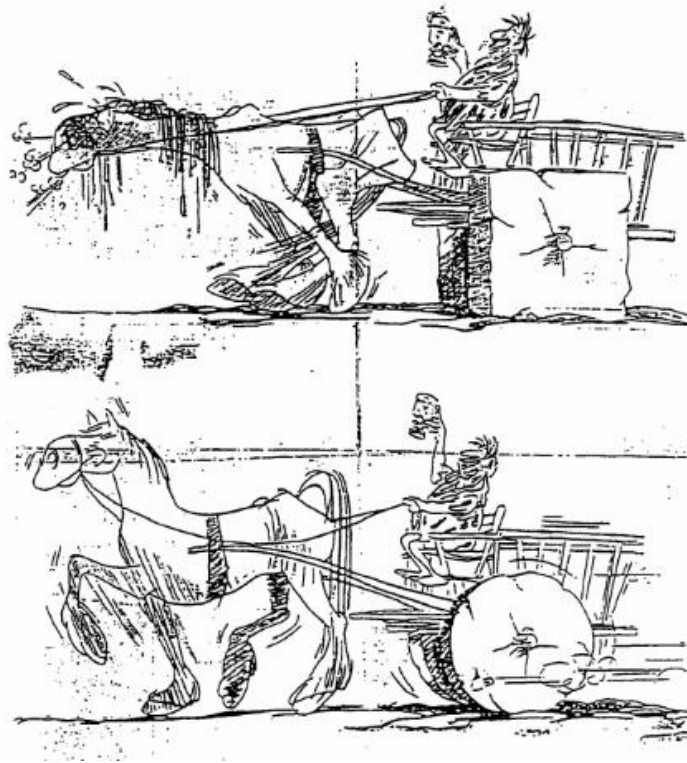Master of Science Thesis in Economics and Business Administration

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There is nothing wrong with change
If it is in the right direction
-Winston Churchill

Executive Summary

Portraying implications of deregulation, this thesis presents an extensive review of deregulation in the European railway. It targets various decision variables concerning the introduction of competitive tendering in the rail industry. This thesis attempts to take a pragmatic stand offering an improved understanding vis-à-vis on decisions that have yet to be made, concentrating on possible competition forms, auction designs and contract designs. It offers learning points and trade-offs that can help improve decision-making. One key learning point is that the introduction of competitive tendering has typically increased efficiency. However, this is made more problematic if the operating companies are obliged to take over staff at current wages and conditions. Issues concerning opportunistic behaviour and the winner's curse appear to be present in many competitive tendering of rail franchises in Europe. Government's willingness to renegotiate contracts increases the propensity of opportunistic behaviour. Furthermore, the risk of the winner's curse is higher in initial rounds. Available information empowers sound assumptions, which can reduce this risk. Auctions are commonly used together with elements resembling Beauty Contests. As Beauty Contests are politically controversial and can lead to a less efficient supplier winning the franchise, the criteria and their weighting should be specified and made available to all potential bidders. A final key finding in this thesis is that management contracts are harmful for efficiency. Certain decisions represent trade-offs, where the regulator does best by evaluating the options based on the primary objectives he want to accomplish. Competition in the market can be used supplementary to competitive tendering, but it may come at the price of higher unit costs for each operator. The chance of the winner's curse is reduced by allowing firms to observe each other's behaviour; however, this increases the chances of collusion between the firms. The number of criteria specified before an auction need to be evaluated against ensuring an acceptable standard on the one hand, and on the other, avoid micro-management. Net contracts encourage mostly improved commercial effort, whereas gross contracts result in improved productive effort. Contract duration need to be balanced between desires to keep costs low, competition high and encourage investment. Finally, contract size is determined by the want to exploit scale economies on the one hand, and on the other to allow for more competition. The various findings outlined imply that aligned decisions may enable fulfilment of the government's primary objectives of the deregulation.

Preface

I have chosen to include a quote from Churchill at the beginning of my thesis. It is a powerful quote, which like many of his statements is not only true, but also addresses the related concerns and includes a tint of wit. Managers, shareholders, CEOs, academics etc. can easily speak about the importance of change. It is an unspoken agreement that we all view change as something good – if you show resistance to change, you can easily be stigmatized as a reactionary person. Nonetheless, chance has never been be synonymous with good. Change *can* be good. Churchill reminds us of that critical distinction. The future deregulation of NSB has provoked some resistance, and will probably provoke more when it becomes a reality. One question many might ask is whether the deregulation is a good idea or not. I have come to realise that deregulation is just a catalyst for change. Deregulation, the direction Churchill spoke of, cannot guarantee whether the outcome will be better or worse than status quo in this case. My research review demonstrates that the success of deregulation is not determined by the European governments' decisions to initiate deregulations through public-private partnerships. Instead, it is determined by how the authorities use the tools available when they tender the railway service. For me, this implies that the critical decisions lies ahead, and not behind us. The authority must assess what variables to use when tendering rail services. The advantage that the Norwegian government holds is that there is a vast amount of theoretical and empirical research out there in the world already. Every human being knows that learning from past mistakes is a powerful mechanism for making improved decisions in the future. Hence, let Norway use previous mistakes and previous victories to make sound decisions. This thesis aspires to analyse some of the more relevant empirical experience out there, and use theory to understand the underlying drivers better. As such, I hope that it can help to make more sound decisions, both through providing key learning points and by presenting key trade-offs that the decision-makers will have to evaluate. I would like to extend my gratitude to Lasse Lien, who has been an indispensable and inspiring discussion partner. He has helped me to find method in the chaotic and hardly surmountable mountain of empirical research. I am also indebted to my mum, for once again being another of my thought-provoking discussion partners.

Bergen, 21st of December, 2015   Caroline Røstadli

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1. Introduction

Substantial reforms in the railway sector have characterised several of European countries in the last 20 to 25 years. The railway sector had hitherto been characterised by a steady decline in market share in the overall transportation sector. Concurrently, subsidy transfers required to operate the railway services were climbing.

Sweden was the first country to initiate reforms in the 1980s. Infrastructure and operations were separated and competitive tendering was introduced on some routes. In Britain, infrastructure and operations were separated in the 1990s. Contrary to Sweden, all routes were competitively tendered. The previous state-owned British Rail (BR) was initially prohibited from taking part in the auctioning of the franchises and eventually ceased to exist. Germany chose a different path altogether with Deutsche Bahn AG (DB) being established as a holding company, with separate passenger, freight and infrastructure subsidiaries. New operators were allowed to access the rail market through either open access or franchising (Nash, 2008).

Simultaneously, the European Union recognised a need to reform the railway industry in order to deliver cost efficient, high quality, market-oriented services. The European Community adopted Council Directive 91/440 on the development of the Community's railways. The purpose was to increase efficiency in parallel to making the various railway industries apt to serve the needs of the Single Market. The Directive stipulated the necessity for accounting the management of railway infrastructure separately from operations of railway transport services. Serving as a minimum reform, there is no requirement for any Member State to split infrastructure and operation into two or more separate business entities. Notwithstanding, many European countries opted to do so (Profillidis, 2001).

In 1996, the holding company NSB was divided into Jernbaneverket, a railroad infrastructure entity, and NSB BA, an operating entity. This marked the latest fundamental change in the organisational structure of the Norwegian railway. To this day, both Jernbaneverket and NSB BA are state-owned corporations.

To date, Gjøviksbanen is the only experience with competitive tendering in Norway. NSB Gjøviksbanen AS won the right to operate the service in 2005. In 2014, the Conservative government commenced a railway reform "På rett spor" ("On the right track") to eradicate NSB's existing monopoly on routes in Norway, and to restructure the Norwegian rail system's

operations and lines of responsibility. A new train system directorate will be granted the future responsibility for procuring train services, streamlining the ticketing system and planning routes. NSB will remain state-owned; notwithstanding, it will have to compete with other suppliers of rail services. A new state-owned infrastructure authority will assume the responsibility of train line expansions, railroad real estate, maintenance and operations of current infrastructure (På rett spor: Reform av jernbanesektoren, 2015).

1.1 Justifying the Review

Experiences in competitive tendering and deregulation of the railway industry have accumulated over the years. Norway can benefit greatly from these experiences, if made available in a comprehensive manner. The vast amount of assorted models, however, makes collecting and interpreting a demanding task. No unique model has been singled out as the correct way to advance railway efficiencies or ensure superior customer services. Scholars disagree or find conflicting results on same or similar case studies, which make the already complex picture even more perplexing. It is greatly beneficial to break apart the research already completed to study the various components in the deregulation of the European rail industries. The practical and contemporary aspect put aside, there are numerous justifications to investigate the theoretical and empirical experience of deregulation in Europe.

In economics, politics and the wider society, there are few issues as heavily disputed as the degree to which the state should intervene in markets. A broad consensus has emerged that neither a pure free market economy nor a fully state controlled economy promote optimal efficiency. The focus has been redirected from polarized arguments toward a more sophisticated debate, questioning to which degree the state should intervene, in what industries, when and by what means.

The rail industry makes a remarkably curious case study. Neither the government nor the private sector seemed to be particularly successful at operating rail services. On the one hand, the railway appeared to have been operated at a less than optimal efficiency level in Europe, with rising costs and declining market share. As such, having a state-owned monopoly operator became increasingly unpopular. *A widely held belief amongst governments and scholars was that the private sector would be able to exploit resources more effectively and be more equipped to address customer needs.* On the other hand, rail markets are particularly

prone to market failures. Firstly, the rail industry is heavily dependent on state funding. Secondly, the huge investment costs associated with owning infrastructure, real estate and rolling stock lead to operators reaping significant market power.

If neither the state nor the private sector is anywhere near optimal owners and operators of the railway, multifaceted issues need to be appraised, resolved and balanced. How should the railway industry be regulated to ensure both control and stimulation of the market forces to drive innovation and efficiencies without compromising passenger safety and/or the service level? Striking a balance between the market and regulation to minimise both regulatory and market failures is of relevance to all industries. The rail industry, however, highlight some key challenges with both the free market and state interventions.

Competitive and contestable market theories are also particularly relevant to study in the railroad setting. In contrast to many other markets, the rail industry is characterised by a majority of tracks that allow for only one operator at any given time. In Norway, it is predominantly impossible to achieve competition side-by-side due to infrastructure restrictions. As of 2011, under 6% of the tracks where double to allow more train capacity at any given time (Jernbaneverket, 2011). Network externalities and huge scale economics related to infrastructure, real estate etc. favour one operator, whilst competitive market theory may favour many operators or at least the opportunity for any operator to establish itself profitably in the market.

Most commonly, public-private partnerships through competitive tendering of passenger and possibly freight operations were introduced to advance efficiencies. In light of this, some additional concerns arise that proves the rail industry once again an interesting subject to study.

Risk allocation between the public and private sector can be challenging to determine. The rail industry effectively exemplifies this, as much of the risk, delegated or retained by the government, is outside both parties control. Passengers' growth has much to do with population growth and socio-economic changes such as urbanisation. The government must choose how to allocate risk to incentivise compliance with the contract, which is proven difficult, when so little risks are inside the rail operators' control. The risk allocation needs to be assessed jointly with other aspects of auction theory and contract theory, and empirical experience within these fields.

Issues such as winner's curse, collusion and moral hazard[1] are problems often evaluated in relation to public-private partnerships in general and in the rail industry in particular. There is still a need to evaluate the consequences pragmatically and comprehensively, so that the experiences can be used to improve decision-making in the deregulation of the Norwegian railway.

1.2 Problem Formulation

The government's intention with the reform is to make the railway a strategic component in solving the overall transportation issues Norway is expected to face in the years to come. The railway will remain a state responsibility, with the intent that exposure to competition will increase customer focus. Furthermore, an objective is that the industry should be increasingly characterised by long-term goals that drive the development of the railway. Additionally, the rail industry should continue to be a safe solution for customers and employees. The government aim to achieve a strong coordination between the public and private sector, granting firms operational autonomy, though ensuring that they are appropriately regulated. In short, the government aims to increase overall social welfare by exposing the industry to competition and allowing operators more autonomy, yet retaining the overall responsibility for the railway (På rett spor: Reform av jernbanesektoren, 2015).

There are certain elements in the reform that are already determined. There will be competitive tendering of train operating franchises, though it remains to investigate if this should be supplemented by in-market competition through open access operators. Furthermore, what the infrastructure authority and the rail directorate are responsible for are settled. NSB, the current state monopolist, will continue to compete with other firms for franchises.

This thesis takes a pragmatic stand in the debate, and does not elaborate extensively on matters that are already concluded. Nevertheless, elements that are settled might be raised in order to enlighten other unresolved issues.

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[1] Winner's curse accounts for how the winning bid may often be an overly optimistic bid that results in losses or near zero profit for the operator. Collusion explains how firms agreeing, explicitly or implicitly to bid less aggressively on franchises. Moral hazard rationalises for example why firms might bid strategically, submitting low bids but then renegotiating a more favourable contract later.

Firstly, given that the majority, or all, of the competition will be through the franchising of contracts, a crucial aspect to address is how competitive tendering of rail services has improved efficiency. Secondly, the thesis must investigate how the auctioning processes can be designed to ensure that the right operators are selected. Thirdly, the issue of contract design needs to be addressed to understand how operators can be correctly incentivised to operate efficiently. Finally, the thesis will debate whether competition *in* the market should supplement competition *for* the market. Together, these decision variables will undoubtedly influence the outcome of the railway franchising. The objective of the thesis will be to address the following two questions:

I. *What have been the outcomes of the deregulation of the railway industry in relevant European countries, concerning auction characteristics, contract design and competition form?*

II. *How can the Rail Directorate make use of the above mentioned experience to shape the auctioning process and design contracts to increase customer value and/or improve cost efficiencies and to develop competition for (and possibly in) the market?*

1.3 Metodology and Thesis Structure

The thesis will consist of a theoretical and empirical evaluation of the various decision variables determined by the thesis questions and the overall objective of the thesis. As such, the thesis will be a qualitative collection and evaluation of various studies on the European railway industries. Consequently, the thesis makes use of secondary and tertiary data only. The analysis will aim to decompose the various elements to understand the impact of the various decision variables. The primary value of this thesis is to understand how various variables influence the outcome of the deregulation and the competitive tendering of franchises with respect to cost efficiencies and/or quality of services offered to the public. The thesis uses a strategic, rather than a normative approach as such.

There are vast amounts of research articles on the topic of rail privatisation, to some extent with assorted opinions, findings and conclusions. To navigate through the labyrinth of research, the thesis will commence with a theoretical outline of the various decision variables and a basic understanding of how markets and state intervention sometimes work flawlessly,

but fail profoundly at other times. The theoretical literature review and the empirical findings will be bridged by theory relating directly to the rail industry. With a thorough theoretical foundation, the thesis will proceed to untangle the nest of research.

Nonetheless, there are some limitations to what research is included in this thesis. The empirical review will include findings from a number of European countries, with particularly attention to the UK and Sweden. These countries where the first to introduce competitive tendering, offering years of experience and data academics have analysed. Both countries have chosen to separate the owner of the infrastructure company from the different operating franchises, which for examples Germany has not. In Germany, DB still owns the infrastructure as well as operates various routes. The Norwegian government has decided that the state should retain the responsibilities of the infrastructure. The majority of U.S. railroads are centred on freight, which differs from European railways in general that traditionally involve both passenger and freight operations.

The UK and Sweden have chosen to some degree different solutions. Sweden still has a dominant operator, SJ, whereas BR was not initially permitted to bid for franchises, and ceased to exist. In Sweden, the contracts have usually been gross contracts, whereas the UK has utilised net contracts. This allows for observations of various results with respect to different aspects of auction and contract design.

Finally, the thesis will summarize the key findings from the review. Most elements in the franchising process will have advantages and disadvantages, and there is no universal, optimal model for the deregulation of the rail industry. The conclusions will be divided into key learning point and key trade-offs. The trade-offs illustrate that the regulating authority will have to decide what outcomes are a priority in any given period. Some ambiguousness will remain nonetheless, as there are circumstances that influence the decision variables that are not reviewed in this thesis, mainly due to the lack of research on the topic.

2. Theory

2.1 Market Failure and Regulatory Failure

2.1.1 Perfect competition as a benchmark for "successful" markets

A perfectly competitive market is an apposite mechanism to achieve economic efficiency: For any given level of effort (cost), the largest possible benefit is obtained. Hence, a relevant starting point to understand any government intervention (or objections to such) would be to understand the perfect competition model and the underlying market mechanisms. This is because perfect competition upholds economic efficiency. Economic efficiency can be broken down to two broad areas: Efficiency in production and efficiency in allocation. Productive efficiency involves the minimization of unit costs of production and the utilisation of economics of scale and scope. Allocative efficiency, on the other hand, concerns the quantity produced and consumed. When the cost of producing the last unit equals the value of that unit to the last consumer, the good is allocated efficiently (Duff, 1997).

Goods and resources are limited relative to human needs and desires. Competition is one of several ways to distribute scarce resources. The idea behind perfect competition is that goods will be rationed based on peoples' willingness and ability to pay for these. The model is based on a set of assumptions that appears, and in many cases have been proven unrealistic or outright wrong. There are countless of examples where markets fail, in which case welfare economics advocate government intervention to improve and correct for the free market's shortcomings (Duff, 1997).

Perfect competition assumes that the economy consists of many independent producers and consumers. The reasoning behind this assumption is that no single actor is sufficiently powerful to influence market outcomes by their own actions. In other words, every participant in the market is a price-taker. Therefore, the perfect competition model assumes that neither producers nor consumers have market power. If a producer would have had market power, she could choose to hold back supplies in order to increase prices and hence increase profit. In scenarios, the market equilibria would not have achieved economic efficiency. There would

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be consumers in the market willing to pay for the good or service at a price above the average cost of producing it, though they would not be given such an opportunity. Put differently, the producers would be able to sell the goods or services at a price above or equal to the average costs, however, they would not be willing to sell it. This is not an economically efficient outcome as it breaches at minimum the conditions for allocative efficiency. Therefore, the absence of market power is a vital assumption to the perfect competition model.

Furthermore, the model assumes that all individuals and firms are rational and driven by self-interest. Individual consumers seek to maximise their level of utility, and each individual's utility is independent of others, whilst firms seek to maximise profit. Seeking to maximise profit, firms will strive to produce at the lowest cost. As the average cost of production falls, the price falls, and more consumers will be able to obtain the product. When costs are at the lowest possible level, i.e. when there is no feasible way to reduce costs any further, economic efficiency is achieved.

Additionally, the model assumes that there is a market-clearing price in each market. This occurs when the quantity of supply equals that of the quantity in demand. Put differently, the prices in perfect competition balance the conflicting forces of supply and demand. Excess supply will drive prices down, whereas excess demand will raise prices. This can only work when firms enter and exit the market freely, which is assumed to be the case in perfect competition. If demand exceeds supply, prices are driven up, which leaves room for excess profit. Firms that are currently not in the market will be incentivised by the excess profit to enter the market, which will increase the supply and drive prices down until demand equals supply. The goods sold in the market are assumed homogeneous so that consumers are indifferent between the goods given that the price is the same.

Finally, the model assumes perfect information (and knowledge), and no government interventions (Duff, 1997). Perfect information implies that anything that impact consumers or producers' decision process is known and understood. Otherwise, the party with the better information has a competitive advantage, and can use this. Hence, asymmetric information is harmful for efficiency, and can lead to adverse selection and/or moral hazard. The difference between the two is that adverse selection occurs when there is a lack of symmetric information prior to a deal between two parties, whereas with moral hazard the behaviour of one party changes after a deal is finalised. The thesis will explore the issues of adverse selection and moral hazard in auction and contract design theory.

There are few to none examples of a perfectly competitive market. Markets fail, for various reasons, and in such cases, welfare economists favour government interventions. The following section describes some of the reasons why markets fail.

2.1.2 Why markets fail; the need for regulation

The perfect competition model has been heavily criticized for having little to no empirical justifications. At best, it seems farfetched to believe that all assumptions baked in the perfect competition model are satisfied. Governments are considered by many to be essential in order to correct market failures, through taxes, subsidies and regulations (Stiglitz, 2009).

Some goods differ from "regular" goods by their non-excludability and non-rivalry. These public goods introduce the problem of free-riding: Individuals can consume a public good that others have paid for. Because of their non-excludability, public goods are impossible to exclude from individuals once made available. One example that approximates the properties of a public good is a lighthouse. Once it is provided, it will be impossible to exclude other boats from benefiting from the lighthouse, and within reason, it will be no rivalry of consumption. The market mechanisms fail to assign sufficient resources to provide the public goods, relative to social utility, and hence it is usually the governments' role to allocate resources for those goods and services (Cornes & Sandler, 1986).

Public goods are special cases of a market failure. Market failures, in general, arise when the price mechanism is unable to take account of the full social costs and benefits of production and consumption. Externalities are defined as third party spill-over effects from the production and/or consumption of goods and services. When the externality is not included in the cost of production (and hence reflected in the price), it causes a market failure. This occurs independently of whether the externality brings about socially desirable effects or causes damages. Free-riding, as discussed above, is a special case of an externality. Once produced, it provides positive spill-over effects to third parties that can benefit from those without any effort. When externalities are present, a mismatch occurs between the socially optimal level of consumption, and private consumption (Cornes & Sandler, 1986).

The perfect competition model assumes that both buyers and sellers are price takers; nevertheless, there are markets where firms hold market power. This can arrive from exclusive control over inputs, patents and copyrights, economics of scale, and network economics. These

elements raise the barriers to enter, so that entry (and exit) from the market is made difficult, contradicting assumptions made in the perfect competition model. When potential entrants are inhibited from entering the market, producers can make excess profit without being concerned about attracting new competitors (Duff, 1997).

Firms with market power tend to exploit this to increase prices (and hence profit) by restricting output. They are no longer price takers, but price givers. Fewer consumers will be able and willing to buy the goods and services than in a socially optimal equilibrium, making the market inefficient in allocation (Duff, 1997).

Firms can have varying degrees of market power. In some markets, there are only a few suppliers, possibly only one or two, whereas in some markets, there might be only one big producer with small "fringe" competitors. It might also be that the products are sufficiently differentiated, so that the different products are not perfect substitutes. In such cases, the producers know that their customers "lose" some utility from switching producers, thus the market is characterised by differentiated prices (Duff, 1997).

Collusion is one way for firms to exploit the collective market power they have, where two or more firms agree to restrict output. In horizontal price-fixing, producers agree to constrict supply and thereby raise price (Leslie, 1993). Explicit collusion, i.e. firms directly (explicitly) discuss prices with each other, is illegal in most jurisdiction. Hence, antitrust laws exist to prevent firms that engage in such cartel activities. Nonetheless, collusion can also be implicit, i.e. that firms reach implicit agreements to restrict output and hence raise prices and profits (Fonseca & Normann, 2012).

Alternatively, in the case of competitive tendering, firms may agree not to actively bid (or to submit low bids) on certain contracts. In 1999, Germany sold ten blocks of spectrum by simultaneous ascending auction. This means that no block could be sold until all parties had stopped submitting bids for any of the objects. In such an auction, all participants could observe each other's behaviour. It was determined that any new bid on a block had to surpass the preceding bid by at least 10 per cent. There were only two credible bidders, Mannesmann and T-Mobile. Mannesmann's opening bids for the ten blocks were 18.18 million deutschmarks (DM) per megahertz (MHz) on the first five blocks and 20 million DM per MHz on the last five. Effectively, that signalled to T-Mobile to bid 20 million DM per MHz on blocks one to five (i.e. approximately 10% higher than the current bid by Mannesmann), and

not continue to bid for the final five blocks (Jehiel & Moldovanu, 2003). A manager at T-Mobile said that "No, there were no agreements with Mannesmann. But Mannesmann's first bid was a clear offer."[2]

Tacit collusion is more frequent in certain markets and auction forms. If firms are relatively confident that the threat of entry is absent, collusion becomes an attractive alternative. They know that even if firms are attracted by the excess profit in the market, entry is difficult. On the other hand, a significant obstacle to collusive behaviour is undetected or "secret" price-cutting amongst the colluding firms. Firms generally benefit from selling more, at the expense of other cartel members reducing their quantity. The problem arises as each firm benefits from increasing its own supply, given that the other firms continue to restrict their output. Hence, tacit collusion is more probable when there are measures to monitor behaviour in the market and it is possible to retaliate deviating members (Stigler, 1964). This will be discussed in further detail in section 2.3.

In some cases, there is only one supplier with no close substitutes, i.e. a monopoly supplier. This is the polar case to perfect competition. Monopolies enjoy great market power, and have the ability to set prices by restricting supply. They are generally considered undesirable, due to the effects on efficiency and business incentives. The ability to obtain substantial profits solely by being the exclusive provider may reduce incentives to increase efficiency and improve operations. Even though cost reducing initiatives, or innovations that increases consumers' willingness to pay, would increase profit, the already comfortable profit reduces the sense of urgency to act (Posner, 1968).

There are cases of natural monopolies, in which the characteristics of the industry makes it economically beneficial to have one, and not more, firms. A market where one operating firm reaches the minimal average cost at an output level that is large enough to satisfy the entire market, at a profitable price, is indeed a market for a natural monopolist. If more firms would enter the market, each must produce at a higher average cost level (Isaac & Smith, 1984).

A sustainable equilibrium occurs when the quantity supplied and the market prices discourage entry to the industry. Still, the monopolist would be able to protect itself from entry even in a

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[2] Frankfurter Allgemeine Zeitung, October 29, 1999, p.13

non-sustainable equilibrium solution, by changing its prices whenever and however needed, at any moment, in response to threats of entry (Baumol, Bailey & Willig, 1977).

Natural monopolies are often related to economies of scale. Large economies of scale are a common characteristic of natural monopolies. In such cases, an incumbent serving the entire market benefit to such a degree from lower average unit costs that entry is unprofitable (Isaac & Smith, 1984). Even if it would have been profitable, it increases the average costs for the incumbent and the new entrant, as neither could exploit the scale economies as completely as they could being alone in the market.

Thus, even if both chose to operate and could have done so profitably, the condition for efficiency in production would be breached. Often sighted examples of natural monopolies include public utilities, such as water services and electricity.

Baumol (1977) found that "scale economies are neither necessary nor sufficient for monopoly to be the least costly form of productive organization" (p. 807). Essentially, a natural monopoly implies strict subadditivity of the cost function, which is not accurately equated with scale economies. Strict subadditivity means that the cost of the sum of any output vector is less than the sum of costs when producing these outputs separately. Put differently, the average costs will fall as output increases. Still, natural monopolies often arise when there are significant scales economics present. In order to address the thesis questions, it is sufficient to understand how economies of scale could potentially lead to a natural monopoly solution.

Government intervene in markets to overcome market failures such as those elaborated in this section. Governments can chose to correct for market failures by using "market based" interventions, i.e. taxes and subsidies, or through direct regulations. Both types of government interventions will be elaborated in the following paragraphs.

Market based interventions are types of regulation that attempts to steer behaviour through market signals, as opposed to explicit regulations. These instruments aim to drive firms or individuals to act in a manner that is in their own self-interest, simultaneously as it drives behaviour that is socially desirable (Stiglitz, 2009).

If successfully designed and implemented, market based intervention through taxation or subsidies ensure that the desired level of output is produced by the firms at the lowest overall cost for society. This can be utilized as a method of 'forcing' producers to clean up production,

thus reducing pollution. Firms able to reduce emissions at the lowest possible costs will have the highest incentives to do so, whereas if this would be costly, firms could rather pay the additional tax (Stavins, 2003). Similarly, governments can provide subsidies to producers that enable them to deliver goods and services. The difference between the two lies in the nature of the incentives, i.e. whether the government uses a carrot (rewards "good" behaviour) or a stick (punishes "poor" behaviour). The other difference is the impact it has on government revenues and expenditures. Taxes will necessarily mean a new government revenue stream, whereas a subsidy will be an additional cost to the public budget.

Regulation (non-market based) can be separated into three different forms: information requirements, proscriptions and mandates. Proscriptions are restrictions; things firms may not do, whereas mandates are requirements, things firms must do (Stiglitz, 2009). All three will be elaborated in further detail below.

Markets cannot thrive when information is distorted and imperfect, which was discussed in section 2.1.1. The objective of information requirements is to amend the resource allocation through improved information. However, there are some complex issues associated with the design of disclosure requirements. The information can be misinterpreted by uninformed individuals or firms that read the information disclosed. One example is the Miles per Gallon Illusion (MGP Illusion) researched by Larrick and Soll (2008). Because of the non-linear relationship between miles per gallon and gas consumption, consumers underestimate the effects of replacing least efficient cars, and overestimate the benefits of fuel saving of most efficient cars. A graphical illustration of the relationship can be found in appendix 6.1. Understandably, requirements are only effective if they ensure that the relevant information is communicated and that the information is conveyed in ways that are understood by consumers.

Although disclosure requirements may appear less invasive than other regulatory measures, it faces the issue that disclosure in itself does not necessarily address all relevant market failures. On the one hand, stakeholders (suppliers, regulators, customers etc) do not always know how to interpret the information, which was identified as an issue in the paragraph above. On the other hand, some firms may disclose wrong information to stakeholder or take advantage of stakeholders that remain uninformed. The recent Volkswagen (VW) case illustrates how the car manufacturer "cheated" mandated US emissions testing, by installing a software that would turn on the full emission controls only during the testing procedure. Once discovered,

it made major headlines as it violated both government jurisdiction[3] and consumer trust. Appendix 6.2. shows some examples of the press articles released in regards of the recent scandal. This thesis will later explore in detail how comparative tenders, i.e. auctions that include qualitative aspects, are vulnerable to information manipulation.

The problems related to information disclosure demonstrate why proscriptions and mandates are other important regulatory measures. Proscriptions are the most direct restrictions on behaviour. An example relates to the previous discussion concerning collusion: Firms are not allowed to collude when determining prices. A common challenge concerning proscriptions on behaviour is that the regulator cannot perfectly monitor behaviour. However, regulators can observe where there might be distorted incentives. For example, preferably regulators would like to prohibit firms from anti-competitive practices; however, if restrictions are imposed directly at certain anti-competitive practices, the monopolies will just be incentivised to find new ways to act anti-competitively. It is arguably more effective to impose restrictions that influence incentives, i.e. structural remedies, such as limiting the scope of patents or dividing the monopoly or oligopoly firms. Therefore, regulators often focus on factors that affect behaviours, rather than the behaviours themselves (Stiglitz, 2009).

Finally, mandates are used to accomplish public purposes without using public expenditure. A government can for example chose to introduce health mandates, demanding all firms to offer health insurance to their employees. It is possible to view mandates as a hidden form of taxation (Stiglitz, 2009). As such, critics claim that direct, explicit taxes are preferred to this form of indirect and implicit taxation. Implicit taxation is more challenging to comprehend and ignores specific characteristics tied to the individual firm or consumer (Stiglitz, 2009; Pauly, 1994). Furthermore, some firms may incur more costs to fulfil a mandate (or a proscription) than what is desired from the regulators point of view.

In the previous section, the issues concerning market power, and in particular monopolies, were elaborated. Governments can intervene in a number of ways to prevent monopolies from exploiting their market power. On the one hand, the government can choose to regulate the monopolist's price or profit. This relates to the previous discussion regarding regulation. In

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[3] It should be noted that VW arguably both cheated information requirements and mandates to increase overall fuel efficiencies in their car fleet.

this case, it is used to ensure that monopoly power is kept to a minimum, in terms of restricting the power the monopolist has to determine prices. On the other hand, government can choose to nationalise the monopoly or subject the market to franchising (Duff, 1997). The latter will be elaborated in more detail in section 2.2. At this point, it suffices to establish that franchising in this context refers to granting a firm the right to supply a market with a good or a service. The purpose is to create competition for the market, rather than within the market (Demsetz, 1968). Nationalisation refers to the state taking ownership of the assets, following an "arm's length" approach as a guiding principle of control (Duff, 1997).

Governments use nationalisation to meet economic, social and political objectives. For example, a government may nationalise health services to protect public interest and provide a universal service that should be irrespective of income. In the years following Second World War, a whole series of industries and public utilities were transferred to public ownership in the UK – coal and civil aviation in 1946, the railways in 1947, gas in 1948 and in 1949, the steel industry was transferred to public ownership. In 1979, the elected Conservative government, fronted by Margaret Thatcher, reversed the earlier nationalisation (Baijal, 2000). The UK exemplified a trend of nationalisation and later privatisation that occurred in several of countries. Since the Thatcher government embarked on privatisation in the 1980s, privatisation programs have significantly reduced the role of state-owned companies in many European countries (Megginson & Netter, 2001). This change in the status-quo was caused by a growing concern that nationalisation failed to achieve economic efficiency.

2.1.3 Regulation failure; the need for free markets?

Regulations are viewed by the traditional welfare economics as means to alleviate market failure; nevertheless, some economic models claim that government regulation has its own failures. There are three main views on regulatory failures: the first argue that regulations are captured by regulated bodies, the second is similar, and points to regulations being in the interest of regulators, whereas the third focus on the cost of regulation. The two first argues that the beneficiaries of regulation are the regulators or the regulated bodies, not the taxpayers and users. The third focuses on the cost of regulation (Stigler, 1971; Majone, 1994; James, 2000)

The regulatory "capture" theory claim that the interests of the regulated bodies are what causes the regulation to develop and grow (Stigler, 1971). Advocates for the regulatory "capture"

theory claim that firms will lobby for regulation to effectively shut potential entrants out of the market. This would enable firms to increase the prices, protected from the threat of new entry. Another key concern arises from incumbent firms that supply government services on management contracts. These firms do not own residual revenues; thus, their focus is shifted from profit-maximization to increasing their share of the national budget. The result is a larger than necessary budget through for example maximizing output produced in order to get a higher budget allowance. This could also be the result of bureaucrats maximising slack, where the budgets are pushed up and output falls to maximise the resources available to pursue individual goals (James, 2000). In either case, regulations create economic inefficiencies.

The second theory introduces a rather more complex principal-agent model. The focus is mainly on ambitious officials seeking to introduce new policies to make a name for themselves (Majone, 1994).

The third theory views regulatory failure from a cost-based perspective. This view argues that the resources that should be used to pursue public interest goal, are rather spent on running the regulatory system (James, 2000).

Neoliberalism has a different focus on regulatory failure altogether. It emphasises the importance of individual liberty, a minimal role for the state in society and the "free" market. The role of the state is central to maintaining and defending a free society, through law enforcement. Beyond that, neoliberalism questions the state, because neoliberalists also view it as the greatest potential threat to the freedom it protects. They favour the free market as the mean to organise economic and social affairs; and hence favour privatisation as opposed to nationalisation (Shaw, 2000).

Vickers and Yarrow (1991) claimed that privatisation of former state-owned enterprises and services can be divided into three different categories of privatisation. The first is privatisation of competitive firms; the second is the privatisation of monopolies and the third is to contract out publicly financed services. All three have the potential to generate government revenues, if they are successfully sold to the private sector.

A key distinction between the two first categories is that the authorities typically retain some rights of control, through regulation, in the second case concerning the privatisation of monopolies. The authorities choose to do so, to prevent the company exploiting its market power, i.e. to continue to correct for the market failure created by having a monopoly operator.

The difference between public and private enterprises is arguably more a matter of degree in industries where government interventions remain extensive.

The latter type of privatisation is the core focus of this thesis, and concerns franchising agreements between the authority and operating parties[4]. This refers to firms having been granted rights to supply markets with goods or services that may or may not generate revenue. As competition may be undesirable in such instances due to for example scale economies, the authority can advance efficiency through competition for the market. In the following section, this will be elaborated and debated in further detail.

2.2 Competition *for* the Market

The thesis has so far explored the advantages, and pitfalls, of competition in the market. Although perfect competition can be beneficial, there are many cases in which the conditions to achieve economic efficiency are not satisfied. In particular, the thesis has explored the conditions in which market power is present. Competition for the market is one solution when competition in the market is not feasible or likely to prosper.

2.2.1 Competition for the market as a response to market failure

As already stated, a natural monopoly will be a case where competition in the market is not economically desirable; however leaving it by itself could result in firms exploiting its monopoly power. Authorities may solve this through introducing concessions, with the aim of providing competition for the market through competitive bidding for contracts. The aim is that the competitive bidding will offer many of the same benefits as in perfect competition (OECD, 2007). In addition, this could prove a valuable source for government revenues.

The alternative to introducing concessions is to privatise the previously owned state monopoly. The private sector promotes efficiency, as they are predominantly concerned with nurturing profits. As such, even a privately owned enterprise would be expected to advance efficiencies more than the same enterprise would achieve under state-ownership. Private firms

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[4] This concerns both private and public operators.

are able to more proficiently respond to customer demand, have stronger incentives to increase quality and to deliver on costumer's wants (Beesle & Littlechild, 1992; OECD, 2007).

Nevertheless, reaping the benefits of competition can be difficult when privatising previously state-owned monopolies. The state-owned monopolies have usually been in place to correct market failures. Hence, privatising can come at the expense of customer welfare. If the private firms face little competition due to for instant high entry barriers, then cost-reducing measure can come at the expense of quality, as customer have little choice. By introducing concessions one hopes to be able to control the downsides of privatisation, whilst obtaining the benefits of competition and the efficiency gains that comes with it.

Demsetz (1968) advocated formal auctions as practical mechanisms to control monopoly power. He reasoned that:

> If one bidder can do the job at less than two or more, because each would then have a smaller output rate, then the bidder with the lowest bid for the entire job will be awarded the contract, whether the good be cement, electricity, stamp vending machines or whatever, but the lowest bid price need not be a monopoly price. (p. 57)

There are two compelling economic arguments to why competition for the market should be able to achieve lower payments (or higher profit) for any given service level. Firstly, firms will be incentives to enter lower subsidy bids when competing to win the contract. In the case of competition for profitable contracts, firms will be incentivised to submit higher bids. Secondly, the bidding process helps the authority select the most efficient supplier (Lalivea & Schmutzler, 2008).

2.2.2 Why competitive tenderings fail; the continued need for regulation

These bidding markets have been criticised for violating several assumptions that need to be present in order to defend the creation or maintenance of highly concentrated markets. By failing to satisfy the assumptions, the justification collapses and these markets bear similar traits to those created by market power in "regular" markets (Klemperer, 2007).

When describing the characteristics of an ideal or "true" bidding market, it can be useful to explore the European Commission's definition of a bidding market. They describe it as a

market where "tenders take place infrequently, while the value of each individual contract is usually very significant. Contracts are typically awarded to a single successful bidder (so-called "winner-takes-it-all" principle)" (European Commission, 2000).

Klemperer (2007) investigated the definition of the European Commission and explored the separate assumptions either implicitly or explicitly stated in the abovementioned definition. First, the final part of the European Commission definition explains how there are no even trade-offs between price offered and quantity sold. Put differently, either the firm offers a price at which it gets all the market, or the firm offers a price at which it loses, and thus gets none of the market. Furthermore, as there is only one winner, and since each contract is "very significant" each bidding process is characterised an element of "bet your company". Although not explicitly stated in the definition[5], one implicit assumption is that competition begins afresh, with no lock-ins, so that previous contests do not determine the outcome of a new bidding process. Almost as an implicit assumption of the previous one, entry barriers are low, so that new suppliers can enter the market without difficulty.

With these assumptions satisfied, competition for the market would solve the issues that could arise with concentrated markets. It would be sufficient to have two firms competing in the bidding process, as it would fit a Bertrand price-setting competition, where consumers accept the lowest price offered. Assuming constant marginal costs and no capacity constraints, this would yield an equivalent equilibrium to perfect competition. Previously earned market shares would not entail future victory nor market power (Klemperer, 2007).

Using reason, Klemperer (2007) proves that bidding markets, in general, do not differ much from 'regular' markets, and that hence, anti-trust problems can arise just as easily in these markets. He argues that auctions are rarely a one-unit auction where one winner "takes it all". Even in the rail industry, where this is arguably the case, the bidder can seldom predict the required level to win the bid, either because the firm is unaware of the competing firms' costs, or because the product or service offered is differentiated. Regardless, the result is that the firm will face a trade-off between price and expected quantity sold (Klemperer, 2007).

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[5] However stated elsewhere by the European Commission, that "in bidding markets, market shares may not be informative"

There are many cases where competition does not start afresh with each contracting period. Furthermore, there may be significant lock-ins associated with entry. Winning for instant in one jurisdiction can potentially provide advantages in similar contests. There are also several of cases, particular in certain industries such as consulting, architectural and construction, where the process of bidding for contracts involve less significant, "bet your company" type of competition (Klemperer, 2007).

The definition also struggles with a coherent internal logic. If the bidding process only results in one winner and each contract is a significant part of the business, then it follows that the winner will gain substantial experience and achieves economies of scale. This contradicts the assumption that there is no lock-ins so that competition starts anew. Additionally, if the bidding market fails the condition that competition beings afresh, with no sunk costs, then presumably it also fails the assumption that entry is easy (Klemperer, 2007).

Indeed, Williamson (1976) argues that the current holder of the franchise contract enjoy a substantial incumbency advantages over non-winners. Therefore, he claims that no real competition can take place at contract renewal. The advantages exist in form of on-the-job experience, i.e. information, which is not available to other potential bidders. Partly, it is also attributed to the challenges to determine unambiguous rules for valuing assets that may be transferred.

When the assumptions do not hold, concentrated markets are harmful irrespective of whether they are "regular" markets or bidding markets. The challenges concerning market failure, and in particular market power, may not necessarily be less sever in bidding markets (Klemperer, 2007). However, in the case of public tendering, some of the profit is captured by the public.

2.2.3 Contestable markets as opposed to perfect markets

Interestingly, Demsetz' (1968) arguments for auctions to control natural monopolies are part of what the literature now calls "contestable markets" theory. The "contestable markets" theory claims that Demsetz conditions for controlling natural monopolies are not contingent on auction mechanisms, but rather depend on the threat of entry. The theory is developed by Baumol, Panzar and Willig (1982) and the basic concept is that the mere threat of entry disciplines the monopolist's behaviour almost as effectively as if there had been competition in the market.

A fundamental assumption is that entry is entirely free, and exit is costless. Freedom of entry, however, neither implies that it is costless nor easy; the essence is that the entrants suffer no disadvantages compared to the incumbent regarding production techniques or perceived product quality. Finally, the entrants must be able to evaluate the profitability of entry based on the incumbent's pre-entry prices. Baumol et al. (1982) argue that absolute freedom of exit is one condition that guarantees freedom of entry. Risk of entry is eliminated if all capital is saleable or reusable without loss over and above normal user cost and depreciation.

Contestable markets hence share an important attribute with perfect competition: Free entry and exit. The vital feature that ensures market contestability is its vulnerability to hit-and-run entry. A potential entrant can make use of even brief profit opportunities, by moving into the market and before the environment change, collect the gains and depart (Baumol et al., 1982).

There are three identified welfare properties of contestable markets. Firstly, a contestable market cannot offer abnormal profit (in the long-run). If there is any economic profit, i.e. abnormal profit, it represents an earnings opportunity for entrants, as they are able to hit and, if required, run. Thus even in a monopoly equilibrium, there will be zero economic profit in a contestable market. The same argument constitutes the fundament of the second welfare characteristic: A contestable market achieves efficiency in production. Similar to abnormal profit, inefficiencies equals an incitement for entrants to move in and exploit these. Thirdly, no product is sold at a price less than its marginal cost in the long-run equilibrium. The final characteristic implies that in perfectly contestable markets, cross-subsidy is impossible. In other words, predatory pricing cannot be used as a weapon of *unfair* competition (Baumol et al., 1982).

Contestable market theory offers an (near to) ideal benchmark of wider applicability than perfect competition. Still, it offers efficiency in production and a market where firms with market power have no way of using that to obtain abnormal profit. Regrettably, it is questionable whether even this broader benchmark applies to any real markets.

2.3 Auction Design

Competitive tendering of franchises to supply a market with goods or services involves some form of an auction. It is essential to understand that there is no such thing as one right auction design, and that certain trade-offs need to be made. Hence, the government needs to take the

perspective of what is the ideal outcome, and with this given, what is essential for them and what can be traded-off to achieve this. A successful auction design requires tailoring to the specific details of the context, as well as reflecting the wider economic picture (Klemperer, 2002).

Just as competition is an appropriate mechanism to ensure economic efficiency, auctions too are used to ensure efficiency: in equilibrium, the winning firm will be the bidder with the highest value of the object. This follows as the winning bid will normally be the highest bid, at least in a price auction, which should be placed, logically, by the firm that has the highest valuation (Goeree, Maasland, Onderstal, & Turner, 2005). Therefore, auctions can be a good way to raise revenues. However, auctions do only produce efficient outcomes given certain assumptions, as with perfect competition.

There are critical decisions that will or may influence the outcome of auctions, which will be elaborated in the following sections. Furthermore, it is not granted that the objective of an auction will be to increase revenues; sometimes it will be other objectives, and the various decisions need to be founded on the specific objectives.

2.3.1 Price auctions vs. Beauty Contests

One critical distinction is between auctions on the one hand and Beauty Contests, also known as comparative tenders, on the other. Auctions are allocation mechanisms in which a pre-defined algorithm can establish which firm will offer the best bid. In a Beauty Contest, the auctioneer sets a number of criteria that will be used to evaluate the different bids (Binmore & Klemperer, 2002).

A Beauty Contest can be either weighted or unweighted. An unweighted contest would imply that the firms are unaware of how the bids were to be evaluated. In a weighted contest, however, the participating firms know in advance what criteria they are to be assessed on, and what the various weights would be on the different criteria. Nevertheless, a Beauty Contests would always involve some ambiguousness. Even though maximum scores on criteria are known, it is hard to assess how to score bidders (objectively) on a given criterion (Janssen, 2004).

Inherently, Beauty Contests are used because auctioneers want to allow some autonomy in assessing the bids; otherwise, a price auction would be more accurate. Put differently, Beauty

Contests embrace, to some extent, the flexibility that follows subjectivity. Therefore, the key difference between auctions and Beauty Contests is that the latter always encompasses an element that cannot definitely be quantified (Dykstra & Windt, 2004).

In literature, auctions usually come out as the preferred allocation mechanism to Beauty Contests. Binmore and Klemperer (2002) compared auctions with Beauty Contests, and found that auctions outperformed Beauty Contests on a number of aspects. Auctions, when properly designed, were more likely to allocate resources to the firm that could use the object most valuably. They argued that a price auction would urge managers to put their "money where their mouths are" (p. 76) when placing the bids. This would be more reliable than if auctioneers, e.g. government bureaucrats, would be responsible for assessing the merits of the bids.

Designing a Beauty Contest would also be more time-consuming and less transparent than an auction. Transparency requires objective evaluating criteria, which by definition is impossible in Beauty Contests. The issue is that it is difficult to quantify, accurately, qualitative aspects and give appropriate weighting to these. A lack of objective assessment criteria and weighting makes it unviable to construct objective comparisons of various bids. That particular shortcoming can lead to (perceived) favouritism and corruption. Binmore and Klemperer (2002) indicate that whereas the Spanish and Swedish 3G spectrum Beauty Contests resulted in lawsuits and substantial and lasting political debate, losing bidders in the UK complimented the government on its auction process. The transparency issue is made more complex by the fact that *perceived* favouritism and corruption are enough to discourage possible entrants, even if the process is in reality fair.

Cartelier (2003) argue that the challenge of Beauty Contests has less to do with the evaluation and comparison of the bids itself as the fact that the assessment process opens for information manipulation. Because Beauty Contests lack a fully objective algorithm to assess the bids, the complexity of the assessment process can be exploited to benefit the bidding firm. Although it is questionable whether it is right to claim that the evaluation and comparison offers little trouble in a Beauty Contest, the argument still addresses a critical issue. That is, Beauty Contests are vulnerable to manipulation by the firm, with or without corruption and favouritism on the auctioneer side.

Furthermore, as long as the objective is to raise government income, Beauty Contests will fall short of auctions in stimulating price competition and ensuring that the highest bidder wins (Binmore & Klemperer, 2002).

That is not to say that prices cannot still be one criterion in a Beauty Contest. One advantages of including price, as one criteria in Beauty Contests, is the information it reveals: it would be an indication of how much money the auctioneer would be willing to give up, in the event that the object is not awarded to the bidder with the highest price offer (Janssen, 2004).

To ensure efficiency, a price auction needs to be designed in a way that all potential parties are offered equal information and a fair playing field. In other words, the differences in the bids should only be caused by differences in the valuation of the objects – nothing else. In a pure common value auction, this would imply that if designed correctly, all parties bid the same, correct, value for the object. This is nevertheless difficult to achieve. A key challenge is that there will be a difference in information between the incumbent and new entrants. This creates arguably unfair advantages to the incumbent (Janssen, 2004). To battle this, information needs to be made available to potential bidders. However, it is questionable how cooperative the incumbent would be to supply the regulators with crucial information when it is in the incumbent's best interest to keep competitors uninformed.

If the auctioneer wishes to encourage qualitative aspects that are not easily identified and quantified to fit a pre-determined algorithm, then a price auction risk falling short of a Beauty Contest. An auction does not credit any initiatives that are not quantified and included in the algorithm, unless the initiatives also affect aspects that are part of the algorithm, e.g. the overall price offering or subsidy requirement (Janssen, 2004).

Auctions also introduce the risk of the winner's curse, which is discussed in more detail in the following section. The winner's curse explains why winning bids may be based upon judgmental failures and overly optimistic forecasts about revenues and costs (Alexandersson & Hultén, 2006A).

Whether a Beauty Contest or an auction is chosen, consumer interest is in neither of the cases directly represented. In either case, the process can be designed to include consumer interests. The auctioneer can decide to design the process so that firms bid in terms of the price they set in the market. This can be included when the concession concerns operations in well-established markets, where services and technology progress rather slowly (Janssen, 2004).

2.3.2 Ascending, descending or sealed-bid auction

Other distinct choices to be made are whether that auction should be ascending or descending and whether the price paid by the winner should be based on the price bid, or the second best price offer. Ascending auctions are the "standard" auctions, where the bidding price starts low and competing bidders raise the price. The winner will be the remaining firm when no other firm wishes to bid, and the price paid by the firm is the final price offered. A Dutch auction is similar, with the key difference being that instead of starting low, prices decrease until a bidder claims the object. In sealed-bid auctions, the firms submit bids that are sealed, i.e. unknown to the other participants. In first-price sealed-bid auctions, the bidder that places the highest bid obtains the object at the price he bid. Second-price sealed-bid auctions are similar, and differ only by the fact that the winning firm obtains the object at the price equal to the second highest bid (Milgrom & Weber, 1982).

A descending (Dutch) auction and first-price, sealed-bid auctions are strategically equivalent, which imply that the equilibria must be equal for the two auction formats. The descending auction requires that the auctioneer commence by naming a very high price, and lower it until a party claims the object. Therefore, the bidder indicates at which level he will claim the object; and the winner will be the one who has the highest valuation. The winner will pay the price equal to that amount. This coincides with the way the winner and price is determined in a sealed-bid, first-price auction. The ascending and the second-price, sealed-bid auction are also strategically equivalent, i.e. have corresponding outcome equilibria. In both the auctions, there is a unique dominant-strategy equilibrium: The winner will be the one with the highest valuation, though the price paid will be the value of the object to the bidder with the second highest value. An ascending auction terminates when no firm is willing to challenge the winner's final bid, even if the winner has a higher valuation than the current offer. In a sealed-bid second-price auction, the winner submits a bid equal the valuation of the object, but pays the second highest price (Milgrom & Weber, 1982).

The outcomes of the four auction forms are Pareto optimal; the winner is the bidder who has the highest valuation of the object, which follows from the aforementioned arguments on the equilibrium solutions. Moreover, the four auction forms should lead to identical expected revenues. Hence, the auctioneer should be indifferent between the four different auctioning formats, in theory (Milgrom & Weber, 1982).

However, there are critical pitfalls associate with all formats, which will be explored in the following sections. The discussion will centre on the risk of collusion, the winner's curse and entry deterrence and predation.

Participants in an auction either could explicitly or tacitly collude to avoid high prices. This would reduce the potential income, or increase the subsidy paid, for the government. Theory suggests that collusion can in particular represent a challenge in ascending auctions and second-price, sealed-bid auctions. In ascending auctions, the bidder can use the early stages to signal who should win which contract. They could then tacitly agree to stop bidding, as continued bidding would only have increased the price or reduced the subsidy. Additionally, ascending auctions give room for retaliation and a mechanism to punish deviators, both implicitly (as threats) and explicitly (Klemperer, 2007).

Robinson (1985) argued that second-price sealed-auctions were more likely to facilitate collusive behaviour; however, this was under the assumption that the designated winner was the buyer with the highest valuation. In this scenario, the firm with the highest valuation places a bid equal to his own valuation. Since the other participants know that the only way they can win the auction is by placing a higher bid, which would have exceeded their own valuation, they have no incentive to overbid the designated winner. The winner can hence ask the other members to bid a price close to the seller's reservation price or refrain from participating in the process altogether. The winner can be confident in such cases that the competing firms have few incentives to do otherwise.

The difference, which increases the likelihood of collusion in second-price sealed-bid auctions as opposed to first-price sealed-bid auctions, can be explained by the variation in control over relevant parameters. In a first-price auction, the members of a cartel can only control the price offered by the designated winner. If the price bid by the designated winner falls below the valuation of any other member, there is a profitable incentive for that or those members to deviate. In a second-price auction, the cartel has two relevant parameters: the price offered by the designated winner, and the highest price bid by the other members. As the designated winner, the firm with the highest valuation commits itself to place a bid equal to its valuation; and hence it deprives the other members of any incentive to deviate. The other firms will then place bids at a pre-agreed price. If however, the designated winner should be one that has a lower valuation than other members of the cartel have, there will be an incentive again for those to profitable deviate (Ungern-Sternberg, 1998).

Another major challenge in auctions is the adverse selection bias that arises, also known as the winner's curse. Most auctions entail some element of common value, which is unknown to the participants. The bidding process will be characterised by participants trying to obtain an unbiased estimate of the value of the object. If there is little to no private value, the participating firms will attempt to estimate the unknown common value. In such cases, the winning bid will be the one that had the most optimistic estimate. This entails that on average the winning bid is estimated higher than the object's actual value (Wolfstetter, 1996). Bids will typically fall within a distribution, with bids exceeding and falling short of the actual value, though with a large number of observations where the true value would not be far from the average. However, the average bid does not win; it is the highest bid, by definition. Hence, the winner's curse refers purely to the statistical bias that arises from such a selection process. Consequentially, the winner may experience below normal, or possibly even negative, profit (Kagel, Levin, Battalio, & Meyer, 1989).

Literature favour open auction formats when the objective is to lower the possibility of winner's curse. In these auctions, bidders have the possibility to learn from the competing firms, and revise their own valuations as they observe the other firms bidding strategy. Indeed, in the ascending auctions, bidders can take note of the prices at which competitors drop out. As more information is revealed in open auction formats relative to sealed-bid auctions, it may reduce the chances of the winner's curse (Klemperer, 2007).

If certain adjustments are made, firms can avoid the winner's curse. One strategy for the firm is to deflate the expected value of the object before the auction. When buyers act according to this manner, a winner's curse can be prevented in the sense that bidders do no longer, on average pay more than the value of the object (Kagel et al., 1989). This can also present a challenge, if the aim of the auction is to increase government income. As uncertainty and the risk of the winner's curse are reduced, bidders can safely bid more aggressively, hence increasing the government's income (Cramton, 1998).

The winner's curse is more likely to be a challenge in a new market, as limited data makes the operator more prone to make faulty assumptions. Similarly, inexperienced bidders are more vulnerable to suffering the winner's curse. Learning will eventually increase the bidders' ability to make rightful assumptions about both private and common value. Hence, learning reduces the chances of the winner's curse (Adnett, 1998).

Another element, which affects the likelihood of the winner's curse, is the number of competitors. The winner's curse is an adverse selection bias, which implies that as the number of bids increases, the probability that the auctioneer will receive bids that are above the object value, increases. Nonetheless, Hong and Shum (2002) argue that firms often contemplate this, knowing that their chances of winning the bid is lower with more bidders, which results in more cautious bidding. They claim that winner's curse effect of increasing the number of bidders actually implies that firms bid less aggressively. Alexandersson and Hultén (2007) similarly found that there was a reduced deviation of bids when there were more than three bidders. On the other hand, theory would suggest that rational firms that are aware of the winner's curse should contemplate this regardless of the number of bidders and factor in a risk premium in the bids. Still, this thesis finds that the winner's curse seem to be an empirical reality in the rail sector, suggesting that in general firms do not factor in an appropriate risk premium.

Hong and Shum (2002) argue that there is another reason why bids tend to become more bullish with increased competition. They claim that bids become more bullish due to "the competition effect", not the winner's curse. The competition effect refers to the increased bullishness of the bids when the number of competition firms increases.

Public information does help to correct overly optimistic estimated of an objects worth: When the winner's curse is present, public information reduces revenue, as participants correct their bids. As such, public information reduces the change of the winner's curse. Intriguingly, public information tends to increase revenue when a winner's curse is absent. The participants may have lowered their bids to avoid the winner's curse, i.e. they factor in risk premiums. As public information reduces the risk, the risk premium needed is lowered, and the bids increase in value (Kagel & Levin, 2002).

Finally, the third area of concern of auction design is how it influences the ability for auctioneers to attract bidders. Just as with competition in the market, few participants in the bidding process can potentially be inefficient.

Ascending auctions often deter entry. The firm that has the highest value of the object will eventually be the winner, as it can top any opposition, even if it is outbid at an early stage. Other firms have little incentive to participate in the bidding, particularly if there is any cost associated with participating in the auction (Klemperer, 2002).

Sealed-bid auctions can hence be more desirable if one is aiming to promote competition to challenge incumbents and level the playing field. The merit of sealed-bid auctions is that the outcome is much less certain. Still, dominant firms are likely to win the auction. This is normally the objective with an auction: to allow the "stronger" bidder to win, because the "stronger" winner often is the right winner. Nevertheless, if there are reasons to believe that levelling the field will provide future benefits, then it may be beneficial to allow weaker bidders to win some objects/contracts.

The reason why dominant firms are less likely to win the auction in a sealed-bid auction, is because the "stronger" firms desires to extract some profit and get the object at less than its reservation price. Therefore, the "stronger" bidder may offer a bid below what the firm would be pushed to offer in an ascending auction. This opens the possibility of victory for the "weaker" bidders. (Klemperer, 2002).

2.4 Contract Design

2.4.1 Risk allocation in public-private partnerships

The thesis has so far discussed competition in markets, competitive tendering and auction forms. When the private operator, on the one hand, and the government, on the other, enters into a franchising agreement, they commence a public-private partnership. Van Ham and Koppenjan (2001) identified public-private partnerships as "co-operation of some durability between public and private actors in which they jointly develop products and services and share risks, costs and resources which are connected with these products or services." (p. 598)

Contracting partners in agreements in general, and between the public and private in particular, are characterised by the parties having different stakeholders, and therefore different objectives, risk perceptions and constraints. Governments seek to maximize total social benefits, whereas private operators seek to maximize profit. Adapting this to the more realistic assumptions of bounded rationality, the public would seek to improve the quality of service and the private operators would seek a reasonable return on investment (Ng & Loosemore, 2007).

Risk can be diversified by spreading it across many projects or many bearers. This allows for a high diversification of risk. On the one hand, the private sector can spread the operational and financial risks on numerous of projects and on the other, the government can spread the residual risk on many bearers. Generally, there are two principles that are used when allocating risks between the public and the private sector in any agreement. The first is that the risk should be allocated to the responsible party and the party that can control it, whereas the second suggest that a risk factor should be allocated based on which party is more able to bear the risk. Therefore, one can interpret it so that risks should initially be allocated based on who has the responsibility for it, and the residual risk, should be distributed based on who has the strongest ability to bear it (Engel, Fischer, & Galetovic, 1997).

Williamson (1976) questions the effectiveness of Demsetz' argument that competition for the market will achieve an efficient outcome under uncertainty, asymmetric information and transaction costs. These risks can occur in any relationship involving competitive tendering; however, the incidence of these might be higher in PPP projects. This is because the government still has the asset ownership, there is a complex risk sharing between the state and the private sector and the private party's involvement is usually longer and with a bigger stake involved than under traditional financing (Checherita, & Gifford, 2007).

A particular issue regarding risk and contract design relates to incomplete contracts and opportunistic behaviour. Williamson (1985) argued that (market) relationships are challenging when they require relation-specific investment, and occurs in a complex environment. If one firm incurs investment, the other party might exploit the dependent nature of the relationship to renegotiate the contract. The government risks opportunism related to renegotiation if the project does turn out to be less successful than expected by the franchise, due to their commitment to offer a given level of train services. Though a commitment from the government to let a failed franchise go bankrupt would prevent such opportunisms, it is hardly credible that the government would be willing to do so and/or that they would be able to withstand the pressure from labour groups (Engel et al., 1997).

Hart (2003) argues that the only source of incentives is asset ownership. He assumes that the operating party can perform two types of investment, one productive and one unproductive form. Both reduce the operating costs, though only the productive investment increases the social benefit additionally. If the operator cannot internalize the impact of his effort, neither through the increased value, nor on the reduced cost, the operator will implement a trivial

amount of either investment. Under a public private partnership Hart assumes that the builder internalize only the impact of the cost reduction and not the positive benefits. Hence, the operator will implement productive investment, but also too much of the unproductive. What can be drawn from these arguments is that the operator will incur more effort when he benefits directly.

2.4.2 Contract duration

Determining the contract length has its own implications, and hence it is an important parameter to consider. The following sections will discuss some aspects that affect contract design, which can be applied when determining the length of each contract.

The advantage of longer contracts is that it holds the benefit of amortizing the fixed auction costs over a longer period, so that the transaction costs of each auction is minimised. Ideally, contracts should maintain incentives for efficient adaptation, whilst minimizing the need for costly settlement and enforcement (Crocker & Masten, 1988). However, as this is often difficult, an alternative solution could be to develop shorter-term contracts, which entails more flexibility. Therefore, transaction costs and uncertainty are key determinants when considering contract length (Gray, 1978).

Furthermore, some argue that the length of a contract should be set so that the expected revenues collected are sufficient to recover the investment. If the sector is highly concentrated, there are arguments favouring both longer-term contracts and shorter-term contracts. On the one hand, concentrated markets favour a focus on reducing the frequency of interaction amongst competitors to reduce the chances of collusion or other anticompetitive agreements. On the other hand, introducing longer terms contracts increase market power and may increase the chances of collusion. Longer-term contracts protect the incumbent firm(s) from being replaced until the expiration of the contract and inhibit new entry. Therefore, the contracts need to be designed so that it encourages competitive behaviour from the incumbent(s) (Iossa, Spagnolo, & Vellez, 2007).

If collusive agreements can be effectively prevented, or is of less concern, it could be advisable to use a shorter-term contract in a highly concentrated market. Shorter-term contracts would serve as to expose the incumbent(s) to competition and the market forces. This could also lead to experimentation and innovation, as a new innovative firm can be given the opportunity to

replace a less efficient incumbent. Contract renewal can potentially be used to incentivise and reward current operators to abide by the contracting terms and to undertake additional non-contractible investments and quality-improving measures (Iossa et al., 2007).

3. Theoretical Concerns in the Rail Industry

The thesis has thus far discussed general theoretical considerations associated with market and regulatory failures, competition in and for the market and auction and content design. There is a vast amount of research on the topics specifically relating to the railway industry. Hence, the following sections will describe the theoretical concerns in the context of the railway industry.

3.1 Market Failure and Regulatory Failure

Up to the late 1980s, railways in Europe and worldwide have been organized as legal monopolies controlled by the state. Scale economics was for a long time presumed in the railway industry, justifying the monopoly provision of vertically integrated railway services (Shaw, 2000).

A train service between two cities required an outlay of track, formation, rolling stock, motive power and administration. As more services are run, the costs are spread over more units of output. The average costs fall until a point where the inputs are used so intensively that the track becomes congested and the management is exhausted, at which point diseconomies sets in. Hence, a key barrier to competition in the railway industry is the large, necessary fixed costs of production. Starkie (1984) suggested that railways normally operate on the falling side of their cost curves. Hence, the railway industry is characterised as a natural monopoly since "a single, vertically-integrated firm can fulfil market demand more cheaply than two" (Starkie, 1984, p. 16).

Nevertheless, Beesley and LittleChild (1992) argued that privatisation even without competition would procure benefits in the railway industry. They claimed that private firms are able to respond more easily to demand by better access to capital, and have a stronger incentive to increase quality and deliver on customer's wants. Furthermore, they argued that there was in fact limited monopoly power due to close substitutes, such as road and air. A similar view prevailed amongst other academics, the railway industry and certain pressure groups, although Starkie (1984) suggest that for British Rail (BR), other transportation modes had little effect on BR's performance (Shaw, 2000).

Starkie (1984) did not dismiss the claim that the railway's true monopoly power has been reduced due to aviation and road transport. He merely claimed that it could not have effectively eliminated all market power, as the competition did not drive British Rail to full efficiency. The statement was built on the work of Stewart Joy (later BR's chief economist) and the Report of the Serpell Committee that both implied that British rail was run inefficiently (Starkie, 1984).

Although the infrastructure aspect of railway industries is a natural monopoly, it can be argued that train services operations are not (Starkie, 1984; Shaw, 2000; På rett spor: Reform av jernbanesektoren, 2015). While assessing whether the privatisation of the Norwegian Railway should or should not have involved a vertical separation is beyond the scope of this thesis, it is important to understand the underlying argument for which this has been done. Starkie (1984) suggested that by distinguishing the ownership of the infrastructure from the ownership of train operators, there was an opportunity for having on-track competition. The infrastructure system have often remained a state-owned, or otherwise regulated monopoly, with economic responsibility separated from the rail services operators, which then can be exposed to competition (Jensen, 1998). There are some identified issues with allowing on-track competition. The nature of the railway industry leads to suggest externalities and network benefits in the market. One externality arises because of the impact a delay to one service have on the running of other operators. Another identified externality occurs as trains are delayed due to infrastructure failure. Both the externalities arise because the market is characterised by interdependency of rail services. The network benefits enjoyed by the customers arise from having one unified network. Tickets can be 'inter-available' so that passengers can use it on any train between origin and destination, and tickets can be purchased from any station on the network (Shaw, 2000).

Another issue with on-track free market competition is that many railway lines are not commercially viable. Hence, a private provision would lead to an under-provision, unless subsidies are granted to the private operators. In Britain, the Serpell committee concluded in their report in 1983 that a major proportion of BR route miles would have to be closed for it to operate profitable (Shaw, 2000).

Finally, several of scale advantages in railway operations can still make it sub-optimal to introduce competition. The key categories are the economies of scale and economies of density. Return to scale concerns falling average costs as an operator *both expands its network*

and increases the number of trains, whereas return to density concerns the benefits from running *more trains on the existing network*. Economies of scope, on the other hand, would refer to the fall in average costs from operating both freight and passenger services (Alexandersson, 2010).

According to Preston (1996), there are significant economies of scale in network operations; furthermore, there is almost certainly an optimal size, and above that, there is diseconomies. Small European operators are characterised by increasing returns to scale, medium sized operators appear to experience constant return, and large operators seem affected by decreasing returns to scale. Nonetheless, nearly all railway operators experience increasing return to density. Furthermore, although there is some inconsistency in the findings, European and Japanese studies on railway suggest diseconomies of scope. Hence, passenger and freight services may possibly benefit from being operated by separate companies (Alexandersson, 2010; Preston, 1996).

Jensen (1998) argued that railway services have cost structures that are characterized partly by common costs for the whole business and for its subsets', partly by fixed traceable costs for various activities. On-rail competition would hence lead to duplicated activities at different levels in the system. Furthermore, Jensen advocated that there were significant economies of scale in the railway industry through network effects. An operator would be able to co-utilise imperfectly divisible resources between different lines, and different train products on the same line. New entrants operating on only one line with one train-operation would be unable to create positive network effects. Similarly, it would lead to slightly negative network effects for the existing operators.

3.2 Competition for vs. in the Market

European transportation reforms have usually involved the introduction of competitive tendering as a mean for public procurement of bus and railway services. Competitive tendering of railway services correspond to competition for the market also referred to as competition for the track. The bidders compete for the right to operate a certain line, and once procured, a firm is granted the right to operate temporary the specified services as a monopoly provider (Alexandersson, 2010).

In difference from ordinary markets, the procuring entity has a strong position as a buyer, similar to that of a monopolist. The end consumers on the other hand, must use the supplier selected by the procuring entity. The train operator will enjoy a monopoly-like situation, though with restrictions, usually in terms of the inability to influence ticket price and supply (Alexandersson, 2010).

Furthermore, as the operators are only competing for the market, rather than in the market, there is only competition at discreet points in time, with many years in between. The nature of the competitive tendering process therefore influences the possibilities for survival and growth of the bidding firms, and the competitive landscape, over time. Winning the right to operate a line is the only way to gain access to that line. Hence, a firm that loses a contract cannot use their acquired assets to operate a railway anymore. The firm is left with the choice of handing them over to the winning firm, or abandon them, permanently or to the next tendering process (which they might not win regardless). Consequently, losing a tender could ultimately result in the dismantling of an operator (Alexandersson, 2010).

The UK created and privatised three Rolling Stock leasing companies in order to tackle a substantial part of this issue. The leasing companies are in charge of rolling equipment. The train operators must sign contracts with the leasing companies to lease traction and rolling stock (Yvrande-Billon & Ménard, 2005). In Sweden, regional authorities jointly own a rolling stock leasing company, whist the state owns the rolling stock for franchised long distance services (Nash, 2008).

Relative to other competitive markets, the public procurement market seems to give incumbent firms substantial advantages in later public tenders. A firm that wins a contract in a tender becomes the only supplier for those lines for a substantial amount of time, which can usually be prolonged. Furthermore, once the contract is signed, there are often some possibilities for the winning supplier to renegotiate the contract. Hence, added on the fact that firms losing the contract might have been forced to exit the market altogether, incumbents hold an exceptional advantage (Alexandersson, 2010).

The equivalent to competition in the market, and the alternative to franchising the railway tracks, is known as the open access approach. This model allows several operators to apply for the right to use the same tracks, as far as there is capacity. This option is mainly used for the more deregulated freight services in Europe (Alexandersson, 2010).

As the vast majority of passenger km in Europe is delivered with some type of public service obligation, there is little to suggest that commercial rail passenger operations are anything but severely restricted. This may be the reason why there are only a few cases of open access operators in the passenger rail market. For instant, open access operators are only granted permission in Great Britain, if it generates a given amount of new traffic, rather than by diverting traffic from existing operators (Nash, 2008).

In the UK, two main challenges have been identified when introducing on-track competition: *"free-riding"* and "*cream-skimming*". The former concerns the fact that franchises pay fixed and variable track charges, whereas open access operators only pay the variable charges. Hence, the new entrants 'free-ride' on the current investment in the industry. The later concern the fact that open access operators challenge incumbents on profitable lines, which reduces their revenue streams. This would be reflected in the bidding price, which would result in less funding for the unprofitable but socially valued services (Competition & Markets Authority, 2015). Although these have specifically been identified for the UK, they represent issues that are relevant for more countries to consider when introducing on-track competition.

On-track competition result in transaction costs for exchange processes between customers and competing firms. Competing operators would need to differentiate horizontally to attract customers, which may lead to increased costs relative to a state-owned monopoly by developing and maintaining brand awareness, loyalty, customer alignment and various sales channels. Furthermore, transaction costs arise from the necessity for authorisation of operators, amplified supervision of safety and monitoring of competitive behaviour in order to prevent discrimination, solve disagreements and to look after customers' interest (Jensen, 1998).

Although quite a number of countries today have started to use competitive tender of rail service, there are still a few countries with no tendering procedure, where allocation is based on direct negotiation with (usually) one operator (see for example Nash & Rivera-Trujillo, 2004).

Competition in the market is at best, a supplement to competition for the market, due to the various issues discussed above.

3.3 Auction Design

In some passenger railway markets in Europe, firms commit to supplying services at a specified level of quality, either for a subsidy or against a payment, through competitive tendering. This is comparable to price auctions with a sealed-bid procedure. Nevertheless, as the price is not the only factor the bidders are evaluated against, but also some quality aspects, it bears some traits of a Beauty Contest (Alexandersson & Hultén, 2006B). Although price is the main decisive criteria, most regulators also recognised quality improvements, when they come at no or little additional costs (Shaw, 2000; Alexandersson & Hultén, 2006B).

The basis used to calculate the bid is the conditions stipulated by the procuring authority in their invitation to tender. It defines the type and amount of traffic to be produced, several of characteristics and requirements related to the rolling stock, maintenance, performance and quality. Requirements are generally defined at the minimum standard necessary, although it varies depending on the tendering process in the country (Alexandersson, 2010).

One can draw without much difficulty a parallel between planning a start-up from scratch and calculating a bid in a tender for operating train services (Alexandersson, 2010). When constructing the bids, the bidder must combine a set of inputs, based upon what type of traffic and how much is to be produced. It will prove nearly impossible to get the true prices of all the input factors in advance of production. The offered bid will include a defined price as well as a presentation of how the firm plans to perform the services. Finally, the firm will have to demonstrate that it has the capabilities and financial means to deliver the services (Shaw, 2000; Alexandersson, 2010).

The successful bidder may be more or less motivated to offer a service level or quality over and above the minimum requirements. One decisive factor for the level of motivation is whether it is gross or net cost contracts that are being tendered (Alexandersson, 2010). A gross cost contract would imply that the operator tender based on the costs required to operate the specified service and the contracting authorities retain the revenues. If the operator, though still basing the tender on the costs required to operate the service, is allowed to keep all the revenue from operating the specified service, it is a net cost contract (The Irish Competition Authority, 2012). In the latter, the revenues become an important, additional source of income for the operators that need to be accounted for in the bid. Operators committing to higher quality level may aspire to gain a more favourable evaluation from the regulator. Under a net

contract, such investments may additionally be motivated by increased ticket revenues (Alexandersson, 2010).

The tendering process could be viewed as a hybrid of a price auction and a Beauty Contest, as briefly mentioned earlier in this section. The process is also usually sealed and a one-unit auction, i.e. the bidders cannot observe or revise their bids based on competitors' behaviour. Price is nevertheless the most important criteria, and as the auction is similar to a sealed-bid auction, winners are "blind" to other operators' offers (Shaw, 2000; Alexandersson, 2010; Kain, 2009).

Consequently, it increases the risk of the winner's curse. Operators are keen to win, and therefore have an increased chance of making heroic assumptions about developments in revenues and costs compared to what they would have done in an open bid process. This enhances the risk that the winning operator will be unable to satisfy the conditions stipulated in the contract. (Kain, 2009).

Assessing whether the bidders have indeed submitted a bid that will make it subject to the winner's curse is challenging. In the auctioning of goods, a seller can quickly learn if the bidder has over-extended their credits. In the auctioning of passenger train services, on the other hand, the consequences of overoptimistic bidding may not be perceptible until well into the contracting period (Kain, 2009).

The short-term consequences may be interruption in delivery and transportation issues experienced by end consumers, which may result in negative socio-economic and environmental effects. As the confidence for the supply of goods and services diminishes, firms that initially contributed to healthy competition may choose to leave the industry altogether. Hence, bids that lead to losses, or low profitability, may impair future price competition and innovation in the train industry (Alexandersson, 2010).

In the context of tendering public assets, it may be critical to understand that the rates of overly optimistic bids are also related to the bidders' attitude towards risk. Amongst others, this includes the bidders' view on the government's willingness to bail them out, or renegotiate the contract, should the predictions be exceedingly bullish. This is related to moral hazard, i.e. the bidders comprehend that the government is willing to bail them out, and knows that this puts them in a favourable position to renegotiate the contract (Alexandersson & Hultén, 2007).

3.4 Contract Design

In regards to tendering of public rail services, there are particularly three relevant risks. That is revenue risk, cost risk and risk related to the ability of the franchisee to fulfil its obligations.

The commercial revenue risk entails components that the operators can and cannot influence. Economic growth seems to correlate strongly with passenger growth, which is clearly outside the control of the operators (Nash, 2008). Furthermore, the qualities of substitutes, i.e. roads, air routes etc., are also outside the control of the operator. Even so, the operator can invest in marketing and improve the quality and frequency of the service, both of which may influence the number of passengers, and hence revenue.

Similarly, costs have risk components that are inside and outside of the operators' control. The development of fuel prices and the development of wages in the overall society are outside of the control of the operator. Furthermore, the accesses to infrastructure and track access charges are risks that the operators face that are mostly outside of the operators' control. On the other hand, train operators can improve cost efficiencies through its organizational design, business model, innovation etc.

Whereas the two previous risks seem to include factors that the operator both can and cannot influence, the risk related to the ability of the franchisee to fulfil its obligations seems mostly to be under the control of the operators. This risk relates to the inability to deliver outside of what can be related to revenue and cost risks. The operators can control this by bidding according to their ability to deliver.

To address these issues, various contracts can be developed. One type is a net contract, were the operator accept both the commercial (on revenues) and the industrial (on cost) risks. The second type of regulatory schemes is gross contracts, where the industrial risk is born by the operator, whereas the government assumes the commercial risk. Finally, operators may be regulated by cost-plus contracts, where the operator assumes neither industrial risk nor commercial risk. These final contracts are commonly also referred to as management contracts (Beck, 2011; Gagnepain and Ivaldi, 2002)

Determining contract length in the railway industry introduces some challenges. On the one hand, as increased competition is usually the primarily reason for privatising railways, one would want to promote this by having shorter-term contracts. For instant, the UK Treasury

officials argued initially that franchises should be no longer than three to five years (Shaw, 2000).

Nevertheless, short-term contracts raise several challenges. It takes considerable time to build new company identities and re-brand a railway. Moreover, the auctioning costs will have to be spread over fewer years if the contracts have a short duration. Hence, short-term contracts might negate any associated benefits with competition (Shaw, 2000). Attracting private investments might be difficult if the contracts are too short (Shaw, 2000; Janssen, 2004). This is in part due to the time-scale required for such investment in the rail industry, and partly due to the interdependence between infrastructure and rolling stocks. The latter suggest that if any rail track authority is to consider an investment in the industry to accommodate new investments made in for example electric trains on the operating company's part, then it needs to know that these electric trains will run for a substantial period (Shaw, 2000).

Finally, short-term contracts do not address the residual value risk that firms face. The assets invested in are generally long-lived and highly specific. Particularly, this will be a concern in the first round of franchising, as the firms do not know if there will be an attractive second hand market. As such, firms would aim to amortise the rolling stocks during the course of its contract. A short-term contract would thus lead to either highly inflated prices or high subsidies demand for potential bidders to consider the option (Shaw, 2000).

4.   Empirical Findings

The theoretical review explored thus far, presents several of concerns. Whether operators can compete effectively for the market, how the contracts are tendered and what the contracts entail will influence whether deregulation can overcome regulatory failures without falling short of the various market failures presented earlier.

Given the government's decision to use competitive tendering, the empirical review will commence with analysing experiences concerning the franchising of rail operations. The thesis will then move to study the different aspects of auctioning and contract design. Finally, the thesis will investigate whether on-rail competition should *supplement* competitive tendering.

4.1 Experience with Competitive Tendering

Competition for the market assumes that the most efficient supplier is chosen, though in reality, this is not always the case. Competition for the market is vulnerable for strategic bidding through excessively high or low bids, collusion and the winner's curse, which will be discussed in more detail in the following chapters, but which nonetheless results to an inefficient solution. Bullish bids, through the winner's curse or strategic bidding, may lead to renegotiation of contracts, higher costs than anticipated for the government and possibly bankruptcy for the operator. Exceedingly high subsidy bids (through collusion) result in operators demanding more than what is needed to run the franchise.

Generally, there is evidence to suggest an improvement in efficiency when competitive tendering was introduced, relative to the benchmark case of the previous state monopolies. Both the UK and Sweden experienced a cost reduction of 20% (Alexandersson and Hultén, 2008; Smith & Wheat, 2009). Evidence furthermore suggested that cost efficiencies after the initial rounds of tendering seemed negligible in Sweden. Similar findings were observed in bus tendering in Sweden (Alexandersson and Pyddoke, 2003). This indicated that competition for the market was effective at increasing cost efficiencies, and that these efficiencies appeared to be effectively exploited already in the first tendering round.

The UK initially experienced cost savings, however soon the costs started to increase, implying that the initial cost savings where not sustainable. Smith and Wheat (2009) reported that the early improvement in productivity was driven by frontier shifts with only small

advances in average technical efficiency. By 2006, they argued that the cost level was more or less exactly where it started at privatisation. Cowie (2009) likewise reported declining productivity between 2001 and 2004, though by a smaller amount than Smith and Wheat. Overall, Cowie argued that productivity improved over the period 1998 to 2004 by approximately 10%. He concluded that there seemed to be a limit on the extent to which reduction in government subsidy could achieve efficiency through franchising.

The difference in the results presented by Smith and Wheat (2009) and Cowie (2009) may be due to the later having included track access charges as one of the inputs. These are arguable not related to TOC productivity performance. During the analysed period, there were considerable changes in the way the infrastructure operator was financed, which influenced the track access charges. Overall, it seem reasonable to conclude that the initial cost savings in the UK diminished over time, and that in total, the UK experienced little to no cost efficiencies after introducing competition for the market.

Cowie (2009) and Smith and Wheat (2009) are regrettably the only two studies that analyse the productivity development post-2000, with a sample that ends in 2006. However, a renewed optimism aroused from the rail value for money study regarding the cost efficiency development in the UK railway. One the one hand the report found a significant efficiency gap, with rail costs that should be 20-30% lower, but on the other hand, the report saw potential efficiency improvements of 30% as achievable by 2019 (Department for Transport and the Office of Rail Regulation, 2011).

Johnson and Nash (2012) argue that the failure to reduce costs in Britain were due to a number of factors. Specifically, they identified four reasons why Britain had failed to reduce costs. The first reason was the market power that was obtained by the unions caused by the fragmented rail system. The second concerned the lack of a dominant operator after British Rail ceased to exist. Thirdly, they identified the willingness of the various past governments in Britain to renegotiate unprofitable operators as a probable cause to the resulting cost inefficiencies. Finally, they claimed that this was also caused by the general disruption in the rail industry due to events associated with the bankruptcy of Railtrack, the privatised infrastructure manager. These will be elaborated in some further detail in the following paragraphs.

British Rail ceased to exist after the privatisation. In the initial tendering rounds, the company was prohibited from bidding for franchises (Shaw, 2000). To ensure a painless transition, the winners of the franchises were obliged to take on existing staff at current wages and conditions. Hence, franchises had incentives to compete for scarce skilled labour in terms of wages and conditions. They knew that once the franchise was re-let, competitors would face the same conditions as they did. Hence, the labour unions obtained power. In Germany and Sweden, competitors are free to recruit their own labour, and determine the wages and conditions. SJ and DB, the state-owned operators, continue to operate and bid for franchises. The threats of competition from lower cost operators may have restrained the labour unions in Germany and Sweden (Johnson & Nash, 2012).

The franchising authority had to renegotiate thirteen contracts with operators out of the twenty-five franchises. The majority were placed under cost-plus contracts, with higher subsidy. In these contracts, the level of subsidy was negotiated annually based on project costs; consequently, the operating companies placed under these contracts thus retained some cost risk. Four operators had their *original* franchise contract renegotiated for a short period, often two to three years, with a higher subsidy (Smith & Wheat, 2012).

Railtrack, the privatised infrastructure manager, was offered in a public floatation in 1996. The government had written off most the debt, set generous access fees and offered the company at £3.90 per share. Still, by 2001 it was forced into bankruptcy. The extreme patronage growth resulted in delays due to capacity constraints and the issue of safety sank Railtrack. In October 2000, four people were killed in what later has become one of the most cited examples to illustrate Railtrack's failure: The Hatfield accident. A train derailed near Hatfield due to a cracked rail that shattered into hundreds of pieces. Railtrack had known about the problem and failed to fix it. In 2001, it was sold to Network Rail, a newly formed non-profit company (Morris, 2006).

4.2 Auction Design

The auctions can be pure price auctions, a Beauty Contest or a hybrid. Auctioning in the rail industry appear more often to be that of a hybrid model, with price being a more or less the determining aspect, though having included some elements of a Beauty Contest (Alexandersson and Hultén, 2007). As such, ascending or descending multi-round auctions

are challenging to introduce, and the tendering processes are commonly based on sealed-bid (first price) auctions.

4.2.1 Choosing the most effective supplier

It is not given that the most efficient supplier is chosen in an auctioning process, as competitive tendering implies that the bidder who submits the perceived best bid win the contract, though whether it is indeed the most effective supplier depends on the government's ability to select objectively the best supplier. The exception would be a price auction, where the winner would solely be determined by an algorithm, possibly by selecting the highest bid (in most cases this would be asking for the lowest subsidy). However, as already argued in the theoretical discussion, an auction if it entails some element of common value increases the chances of the winner's curse.

The tendering process as a whole varies across time and country. This includes the extent to which the bids are evaluated based on price and quantitative aspects, relative to qualitative aspects. Kain (2007) described three different phases in the development of how franchising policies and design evolved in the UK, which will serve as a useful benchmark to explore some of the issues and compromises regarding Beauty Contests and price auctions.

Kain (2007) describes the first phase, from 1995 to 1998, as being characterised by short duration contracts, low specification and high-risk transfer. There was relatively little focus on quality and other aspects than the subsidy level (or transfer price) and the transferal of risk from the government to the operators. A prevalent assumption at the time was that operators would be able to reduce the reliance on subsidy considerably over time. Consequently, operators submitted optimistic bids based on a perception that strong efficiency gains and revenue and passenger growth would be achieved, so that they generally would require a declining annual subsidy or could pay a rising premium.

Due to general dissatisfaction with the level of quality and service standard, the investment level and the service bundling, phase two franchising policy was introduced. This embodied a stronger strategic focus and intention to increase quality and investment. Nonetheless, the phase had unspecified objectives on performance, investment and competition much like Beauty Contests. The lacks of transparency regarding the scoring system lead to blind bidding (Modern Railways, 2003).

Kain (2009) argue that transparency in selection criteria is important for both franchisor and bidders. As the bidders did not know the weights applied to the different attributes, there is some doubt to whether the auction process will result in the most efficient firm being chosen. Partly as the various bids would be difficult to compare, and partly because one risks that the winning firm was the one that provided the best guess, as opposed to the most efficient solution. Finally, the success of competitive franchising is contingent on the winning operators delivering on their promise. The unspecified objectives would make a vague basis for monitoring contractual fulfilment.

Alexandersson and Hultén (2005) argued that similar issues prevailed in several countries, and that such common secrecy practice opposes the policy of the European Union to have a transparent selection process. Wallis, Bray and Webster (2010) warn against the adverse selection that may arise in competitive tendering when elements of Beauty Contests are included. This would be the case if the bidder is selected based on its ability to identify and exploit the flaws in the evaluation of the tender and the contract documents, rather than best value for money.

Phase three developed in a rather different direction, towards a high degree of specification. This made bids easier to compare, although it restricts entrepreneurial activities as the business planning is left with the franchisor. Kain (2009) argued that the specifications made it easier for the franchisor to establish their robustness and plausibility. Nonetheless, if the aim of privatisation is to capitalise the profit maximising incentives of the private sector together with their ability to be flexible and find innovative solutions, as described as some of the primary motives of the privatisation of the UK (Shaw, 2000), then the micro-management of the third auction process puts the whole privatisation into question.

The emerging conclusions from research appear to be creating specific and explicit assessment criteria, and their weighting, available to all potential bidding firms. Evidence also suggest that in order to make the franchising process successful, the criteria needs to be of a nature that can be monitored and evaluated in retrospect. Finally, the franchisor should assess the required number of assessment criteria. Too many criteria may lead to micro-management, and constrain the opportunity to let the private sector push for innovative solutions. This is particularly relevant if the state wishes train operators to carry the revenue risk, such as the operators are required to do in the UK.

4.2.2 The winner's curse and strategic bidding

The competitive tendering of railway routes in Europe has encountered several of issues related to operators submitting bids that were too bullish. The key indications on this have been the vast amount of contracts that have been renegotiated, the level of exits and the level of bankruptcies of train operators in the various countries.

Theory, as debated in previous sections in the thesis, provide three plausible explanations for the problems observed related to overly optimistic bidding. The first related to the winner's cruse, the second the issue of moral hazard where the operators understand that its negotiation power increases once it has won the contract and hence submit bullish bids, and finally predatory pricing, in order to deter future competition. In the following sections, the two latter will mostly be referred to as strategic bidding.

It is challenging to determine exactly whether a bullish bid is due to the bidders wrongly assessing their ability to increase revenues or decrease costs, or whether the bidders are strategically bidding. Nonetheless, the researches presented below suggest that in parts, this is indeed caused by operators bidding strategically.

Shaw (2000) argued that there might be traces of the winner's curse in the UK, as the bids from the first round of franchising would suggest that the total subsidy would decrease through the years of the private sector operation from £1.7 billion to £806m. Based on these ambitious targets, substantial increase in revenue and cost cutting would be necessary to remain financially feasible, which Shaw argued that seemed implausible. Inexperience was pointed out as one explanatory factor to the optimistic bids. This must necessarily point to the inexperience at both the franchisor and the operators' part. Shaw claims that the bullish assumptions that would lead to such a subsidy reduction was a belief widely held by both operators and the authority.

Later, when twelve operators out of the twenty-five franchises, had their contracts either renegotiated due to trouble or were put under management contracts, Shaw's original disbelief seem largely confirmed. Smith and Wheat (2009) reported an early improvement in productivity of 18 percent but that this was driven by frontier shifts with only small advances in average technical efficiency. Regardless, the productivity declined significantly after year 2000, and by 2006, the cost level was more or less exactly where it started before privatisation.

Smith and Wheat (2012) argue that the British operating companies that ran into trouble experiencing lower revenue growth and (in particular) lower cost reduction relative to the assumptions in the bids were subjects of the winner's curse, as opposed to a deliberate strategy of low-balling. Cowie (2009) argued that the poor performance of some of the early franchises suggested the presence of winner's curse in the British rail market, partly due to the inexperience of the bidders. However, he also pointed out that the poor performance may be caused by the strong position of the winner to renegotiate the contract.

Kain (2009) found that British operators bid aggressively in order to secure the franchises and/or made bids on very unrealistic assumptions. Despite the fact that the operators' experienced strong economic growth in the UK, the expected dramatically reduced subsidy transferal did not happen, because of the strong cost increase. Kain argued that Great Britain demonstrated that the authority was incapable of assessing bids to distinguish unrealistic bids from robust business plans. Furthermore, the commercial risk was not successfully transferred to the private operator. The inexperience in competitive tenders on both the government side and the companies' side was another cause for the disappointing results.

Kain (2009) argued that as the British government had shown a high propensity to rescue struggling operating companies, it undermined the commercial discipline so that bidders were not penalised for over-optimistic bids. Effectively, he argued that if it is not credible that any government can tolerate the collapse of a service, there is no real transfer of the risk.

Lalive and Schmutzler (2007) argue that there was only one obvious case where the winning bid was being subject to the "winner's curse" in Germany, where DB is still the dominant operator. The operator FlexVerkehrs AG that won the auction went bankrupt within a year after commencing the service in 2002. The low willingness to rescue failing operators may explain, partly, why Germany has had fewer occurrences of the winner's curse.

Similarly, Alexandersson and Hultén (2007) argue that the Swedish government have been able to let operators go into bankruptcy. They believe that this may have signalled to future bidders to estimate their bids more carefully.

Sweden has, however, experienced that SJ has placed bids that have later resulted in great losses. The government has bailed SJ to avoid bankruptcy. Previously SJ had a complete monopoly on long-distance passenger services, which may be the reason why the government may feel that they could not afford SJ going bankrupt even though they placed overly

optimistic bids to win competitively tendered routes. SJ has been taken to court for abusing its dominant position by predatory bidding (Alexandersson & Hultén, 2007).

Similarly, Kain (2007) argue that state-owned operators should be allowed to bid, if propriety can be assured and cross-subsidisation can be averted. The state-owned operator serves as a benchmark, a reality check, for authorities to identify overly optimistic bids or strategic bidding. Nonetheless, as with SJ, they too sometimes seem prone to bid tactically.

Two types of strategic bidding have been observed in Sweden: one is based on the believes that the government will bail out certain companies, which is similar to what we have observed in other countries, and the second relates to larger companies abusing their financial ability to incur short-term losses to win a contract. In light of theory, the second seem to suggest that competition does indeed not start afresh, and suggest that operators bid aggressively in competitive tendering in the hope of obtaining an advantage later on.

Alexandersson and Hultén (2007) pointed to winning bids for railway franchises in Sweden that indicated overoptimistic bids, or strategic bidding. They identified 19 tenders that appeared to have been based on a production-based approach. There was little uncertainty regarding demand and such factors, hence there was relatively little variation in these bids. In two bids, they found that the threshold values and discontinuous economies of scale seemed to be of importance, consequently leading to large variations in the bids. Finally, in six tenders, the information-based differences appeared to produce miscalculations and hence substantial difference between the bids. In at least seven tender processes, they identified bids that indicated strategic bidding.

Alexandersson and Hultén (2007) argue that the reason why large oligopolistic companies are able to practise strategic bidding is due to these firms being less financially restricted. For the same reason, they claim that the larger operators are more able to endure a loss-making period and succeed to reach a renegotiation without a new tender, which effectively reduce the risk of placing low bids in the tendering process. They maintain that the CPTA[6]-managed firms may have relied on additional taxpayer money from their owners if necessary, demonstrated by their high share of low bids.

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[6] County Public Transport Authorities

A rough conclusion at this point is that the government's inclination to renegotiate the contracts determines to some extent the level of overly optimistic bidding. This suggests that the government should not rescue struggling operators through a renegotiated contract. This may however, be challenging to credibly commit to. The government is constrained by a desire to ensure that there is a given level of service on various railway routes. When a contract is won by a company that incur investments and obtain significant experience, it may cost the government more to start a new tendering process. Hence, once the contract is obtained, the negotiating power of the operator increases. It appears that the British government have been able to somewhat reduce the amount of overly optimistic bids through successfully signalling that no renegotiation would take place during the third franchising round. They successfully held the line and did not renegotiate the contract with GNER when the incumbent failed. They entered into a management contract with the incumbent, whilst they almost immediately started the process of re-tendering the franchise. On the other hand, should a mass defaulting of franchise operators occur, the government may be forced to rescue the operators nonetheless (Preston, 2008).

The development in the UK may also contain a component of time. The UK and Sweden were both nations that introduced competitive tendering early. The winner's curse seems somewhat moderated after the initial tendering rounds, but it is not an extinct problem (Smith, Nash & Wheat, 2009). This trend is supported by theory. A new market, with limited data and experience, with many bidding entities, increases the possibility of the winner's curse. Learning would eventually increase the bidder's ability to make rightful assumptions, and decrease the risk of a winner's curse.

Learning on the franchisor's part will equally increase the chances of choosing bids with sound but ambitious business plan, rather than bids based on faulty and overly optimistic assumptions. The winner's curse may be higher when the operators have the revenue risk as well, in such a case, the firms may make bullish assumptions on both its ability to increase revenue and its ability to decrease costs, rather than purely the latter.

Reasonably, information becomes a key factor to reduce the likelihood of the winner's curse. Theory suggests that open auctions can reduce the impact of the winner's curse because the various parties learn from observing other bidders valuation of the object. This implies that the authorities may benefit from introducing open auctions to battle the reoccurring issues of winner's curse. The franchising authority may find an open ascending auction too complex, in

particular if aspects of a Beauty Contest are included. If this is unfeasible, it should still be possible to spread the tendering of contracts to various auctioning processes over time, so that part-taking firms and the authority have the opportunity to learn from the auctioning processes. Furthermore, information should be made available to all potential bidders to enable firms to make more sound assumptions.

Unfortunately, the increased interaction between the firms increases the likelihood of collusion and strategic bidding. Nonetheless, most experience point to the winner's curse being the predominant issue in the first years of privatisation, maybe combined with moral hazard. Hence, it is advisable to consider mitigating the risks of winner's curse, and that this should be the primary motivation in the initial years. Furthermore, the government should consider ways to commit credibly not to renegotiating contracts with operators.

The thesis will proceed to discuss contract design. What appears evident is that also the characteristics of the contracts will influence the likelihood of the winner's curse and strategic bidding. This has already been touched upon briefly, as it was argued that the winner's curse becomes stronger when the government also transfer the revenue risk to the operators.

4.3 Contract Design

Competition for the market implies that the winning operator will be the monopoly supplier of rail service on a given level of specified routes. Following the arguments made by Demsetz, competition for the market alone would be enough to prompt an efficient outcome. However, research suggests that contract design explains critical elements of the behaviour of the operating firms. Correct contract design can steer behaviour towards more efficiency and greater service levels. As mentioned briefly in the previous section, contract design also affects the chances of bullish bids. In accordance with the theory review, the contract design will particularly focus on the allocation of risk, contract duration and contract size.

4.3.1 Risk allocation

Research suggests that the choice of contract will affect the type of bidders that the authority attracts. Gagnepain and Ivaldi (2002) found that management contracts damage society's welfare. An efficient firm would prefer a fixed-price contract, whereas an inefficient operator would favour cost-plus contracts. In accordance to such schemes, the efficient firm will

provide the optimal effort level, whereas the inefficient operator will avoid bankruptcy, by satisfying its individual-rationality constraint.

Furthermore, Piacenza (2006) found that operators under either a gross or a net contract had lower cost distortion than those subjected to a cost-plus contract had. Nevertheless, he also discovered that companies' inefficiency to some degree was caused by the differences in commercial speed levels on the tracks. Thus, fixed-price subsidization became less successful as a mechanism to force firms to operate efficiently if the operating conditions were too unfavourable.

Operators that are placed under management contracts demonstrate an inferior performance to that of similar operators that are placed under net contracts. Smith and Wheat (2012) investigated the effect of renegotiation of contracts relative to operating companies that were placed under management contracts. They found that operators placed under management contracts, experienced "a substantial and statistically significant deterioration in efficiency for the affected operating companies relative to best practice" (p. 44). This remained until the management contracts ended and a new tendering round was initiated. They found no reason to believe that there was any inherent difference between the operating companies that were placed under management contracts and the other operating companies that had to renew their contract.

Management contracts seem to have damaging effects on efficiencies. In effect, it removes the profit maximising mentality that the private sector is known to promote, by removing any incentives to improve performance (Smith and Wheat, 2012). As such, management contracts should at best only be used whilst the government re-tender contracts should an operator fail to operate a service, as was done with GNER in the UK (Preston, 2008). Gross contracts and net contracts seem more adequate as tools to promote efficiency.

Moreover, net contracts seemed to provide more incentives to increase quality of service than both gross and management contracts, as the operator benefits from increased revenues. Beck (2011) argued that gross contracts proved a limited impact on improving quality of service, almost certainly because of the lack of incentives to improve services. At best, gross contracts provide a low maximum bonus to reward any initiative to advance service quality.

Gautier and Yvrande-Billon (2009) confirmed, in most parts, that high-powered incentive schemes are associated with a higher performance. They focused on productive efficiency and

found that operators that were responsible for the productive risk (i.e. costs), performed better than those who did not. Nonetheless, they found the observed relationship to be a non-linear one. If operators in addition bore the commercial risk (i.e. revenue), they had a lower productive efficiency. Gautier and Yvrande-Billon hypothesised that firms operating under a net cost contract can exert both productive and commercial effort to improve the financial performance. If the two are substitutes, the operators will choose to increase the commercial effort, at the cost of productive effort. In other words, the operator would rather invest in increasing the level of patronage (or the willingness to pay per passenger) than investing in cost-reducing measures. The data confirmed that net contract operators had a lower technical efficiency relative to gross contracts operators, though they did not have the appropriate data on commercial performances, and therefore could not confirm the second part of the hypothesis.

Gautier and Yvrande-Billon's (2009) findings may be regarded as intuitive: on the one hand, shareholders want a return on their investment, and as such, they want to push for efficiency in order to raise profits. On the other hand, managers and employees want better (or at least not worse) benefits and working conditions. If commercial effort and productive effort are substitutes, two things make it more probable that commercial investment occur. Firstly, the shareholders may find it easier to justify increasing service quality as opposed to reducing costs as the latter may negatively affect the employees. Secondly, managers might chose on their own accord to promote commercial effort of the same reasons, though their reward would be bonuses rather than dividend and increased share prices. This is a highly streamlined image, as the franchise contract, pressure groups and labour unions etc. may influence the outcome too. Nonetheless, it provides some understanding for the outcomes presented by Gautier and Yvrande-Billon.

Net contracts seem to invite more operators to be a victim of the winner's curse. Introducing net contracts mean that the government intend to transfer the commercial risk as well to the operators, but in many cases they seem unable to successfully do so, which reduces the risk faced by operators to submit optimistic bids based on bullish assumptions (Kain, 2009). As mentioned in 4.2.2, net contracts allow more room to make wrong assumptions, as the bidders now have to make assumptions concerning both revenues and costs. Some of the wrongly calculated assumptions can also be explained by the low quality of information concerning demand that is available to the firms when submitting bids (Alexandersson & Hultén, 2006B).

In such cases, operators should include a risk premium in the bids, which they appear not to have done in some cases.

Alexandersson and Hultén (2007) found that the deviation between bids had risen in Sweden in the tendering of net contracts in recent years, a trend they did not find in gross contracts. Alexandersson, Nash and Preston (2008) found that net contracts in Great Britain appeared problematic. They argue that the consequences of suffering from the winner's curse become more apparent in contracts where the winner is required to bear the losses for a long period. Thus, the introduction of the "cap and collar" regime in the UK can reduce the likelihood of the winner's curse. Moreover, they have found competition for the franchises to increase with such a regime.

The cap and collar mechanism in the UK was introduced in the Railways Act in 2005. Under this regime, the actual revenue of an operator for a given year is compared with the target revenue forecast in the original bid. If revenue falls below given targets, the shortfall will be covered partly or mostly by the Department for Transportation. However, the operator will typically only be entitled revenue support from year five onwards. On the other hand, the operator is obliged to pay revenue share to the department if the revenue exceeds 102 % of predicted revenues (Competition and Markets Authority, 2015).

The risk allocation between the government and the operators may influence the level of competition. Beck (2011) argued that two key conditions could influence the likelihood of potential firms to submit a bid: The share of price risk assumed by the public authority for input factors and to what extent revenue risk will be carried by the operator. When the authority assumes a higher share of price risk on the input factors, particularly concerning infrastructure and personnel cost, as well as energy costs; the number of bids increases. The number of bidders decrease, if the authority oblige the operator to assume a higher (or all of the) revenue risk. Beck found that the more risk the operator is exposed to the lower the level of competition, and higher the risk premium calculated in the bid. These were the only effective entry barriers uncovered in the analysis.

In the theory section, it was argued that the responsible party for the risk should assume that risk. However, as outlined in section 3.3. the commercial revenue risk entails components that the operators can and cannot influence. Economic growth, the quality of substitutes, changes in demography and urbanization are all exogenous factors that the train operator cannot

influence. There are also costs that are outside of the operators' control, such as fuel prices and general wages development. The dilemma then becomes whether it is the government or the train operator that should carry that risk. In terms of responsibility for the risk, neither the government, nor the operators are able to control the risk. A possible argument is that the private operator still will be able to control even exogenous cost developments to some extent. For example can an increase in general wages lead an operator to become more capital intensive and/or reduce the amount of staffing on trains. It was argued in 4.1. that franchising appeared to have increased cost efficiencies, which suggest that allowing operators to carry this risk increases efficiency. However, there is more doubt whether any increase in patronage can be attributed to franchising, which cast doubt on whether the transferal of revenue risk is worthwhile.

Preston (2008) distinguishes between short-distance commuter services and regional services that have little potential of being commercial on the one hand, and inter-city services that may hold the possibility of being profitable on the other. He argues that taxpayers are entitled to expect that the prior group, which is heavily subsidised, have thorough specifications, and suggest that these could be served through gross contracts. He views the latter group as operators that could effectively be entitled to keep the revenue as incentives to invest in technology and techniques as he believes that these may increase the number of passengers and hence revenues.

It appears to be several of factors to consider when determining whether one should use gross or net contracts. If the authority is successful at distinguishing bids that are based on bullish and unrealistic assumptions, or bids that are indeed strategically low or high, then a net contract could arguably be the better alternative. Gautier and Yvrande-Billon's (2009) research suggest that even when the franchisor is able to distinguish "healthy" bids from "unhealthy" bids, operators under net contracts does seem to prioritise increased revenue rather than reducing costs. Hence, if the key objective of privatisation is to increase cost efficiency, gross contracts seem to be the best alternative. If the government is more indifferent between cost efficiency and quality improvements, net contracts could be a viable solution. This would particularly be the case on routes where the authority believes that investments in quality could increase the number of passengers. However, as most empirical experience suggests that the franchisor is indeed unable to distinguish the soundness of the bids, gross contracts may still be the best alternative.

4.3.2 Contract duration

There is less agreement, and less empirical research around the effect the duration of the contract has. One the one hand, the many defaulted contracts and cases of renegotiation have made research challenging, and on the other hand, parts of discussion is related to which factors one should prioritise.

One argument that is agreed upon is that due to the high costs associated with the auctioning process the contract duration, when viewed in isolation, should be long. This would allow for the costs associated with competitive tendering to be divided over a longer period of time, which would, all things equal make it more attractive to part-take. For example, the train operators claim that they spend up to £5 million per franchise bid, and the Department of Transport suggests that their costs are around £2.5 million. As an indication (though it is maybe naïve to think that the operators would be entirely honest), this suggest that the costs are considerable. On the other hand, relative to the annual turnover of the passenger rail industry, it is modest.

Preston (2008) found a franchising round overall to cost approximately £472.5 million, with the annual turnover of the rail business being £5.7 billion in 2005/06 (including revenue support). Merkert (2009) concentrated on the issue of transaction cost dynamics in franchised passenger train operators in Britain from 1996/1997 to 2007/2008. He claimed that transaction costs had grown considerably faster than operating costs. Furthermore, he suggested that optimal contract duration in the UK, with respect to transaction costs, would be 5 years and 4 months, which was independent of whether it was a management, gross or net contract.

On the other hand, there are compelling arguments founded in theory, which states that all things equal, a longer contract gives the operator more opportunity to create barriers to enter which can damage competition later. Furthermore, long intervals between competitions make it difficult for operators that do not win a contract to stay in the market, hence again decreasing competition in subsequent period. This is related to some of the inconsistency in the definition of bidding markets by the European Commission. Because the contracts entail significant investment and operators gain significant experience, competition does not necessarily start afresh. Moreover, the longer the period between each competition the harder it is for potential competitors to survive without a contract.

When Alexandersson and Hultén (2007) found that large firms were more likely to place either very high or very low bids, this may be to deter future competition of exactly the aforementioned reasons. Unrealistic bids forced smaller firms into bankruptcy, whereas deep pockets and other resources gave an advantage to large firms in the case of unrealistic low bids.

On the other hand, Nash and Smith (2008) argue that competition remain healthy in the franchises that have been refranchised so far, with some operators having left the market, and new entrants having arrived. Of the twelve franchises they analysed that had been refranchised, only three had gone to the main incumbent. However, many incumbents continued to operate, having won different franchises. Similarly, Alexandersson and Hultén (2007) found that it was often difficult for the incumbents to keep their contracts when they are re-tendered. However, this was also contingent on whether the contract was gross cost or net cost. In the former, they found that the incumbent was able to defend only 39 per cent, whereas in the latter case, the incumbent succeeded in 70 per cent of the tendered contracts.

One explanation why new entrants often seem to win the franchise may be that entrants bid aggressively to win contracts. On the other hand, it may be the selection bias, i.e. the winner's curse. The incumbent, knowing the revenues and costs, make realistic assumptions, but the new entrant submit a winning bid based on bullish assumptions. The final finding from Alexandersson and Hultén (2007) suggests that the higher complexity of net contracts raises the entry barriers. Furthermore, as net contracts tend to be of a longer duration than gross contracts, this suggests that length may indeed partly determine the level of competition.

The arguments made so far imply that when transaction costs are high, the contract duration should be increased. However, on the other hand, competition appears to increase when the contract period is shorter. If transaction costs are considered unimportant, and the aim is to increase competition for each route, and/or prevent operators creating entry barriers, contracts duration should be made short.

The actual duration of contract, vary across the different countries. In the UK, contracts are normally between 7 and 15 years. The norm is a seven-year contract, with an option to extend for a further three (Nash, Nilsson & Link, 2011). The franchises that last for 15 years involve a higher degree of commitment through investment obligations (Affuso & Newbery 2000, Shaw 2000). In Sweden, contracts are currently between three and nine years (Nash et al.,

2011). The contracts used, however, to last between one and five years (Monami 2000). As the contracts employed by the different local authorities in Germany vary greatly, so does the contract length. The duration may vary from two years to up to 15 (Nash et al., 2011).

The differences in contracts in some respect can be viewed in regards to whether net or gross contracts are employed, and what incentive mechanisms follow. Sweden primarily uses gross contracts where the quality is specified by the authorities. As such, the contracts limit the scope for innovation by the private sector. As the authority's main goal becomes to ensure compliance with the contract, the threat of losing the next tendering round provides the needed incentive to operate in accordance with the contract. Thus, gross contracts may benefit from being reviewed often. As net contracts also transfer the revenue risk of operators, Preston (2008) imply that the contracts should be longer in order to allow companies to make investments to increase patronage. A related argument would be that as the operators carry both the revenue and cost risk, there is already a strong incentive for the operator to comply with the contract. Overall, this relationship between risk allocation and duration may explain why countries that predominantly or only utilize net contracts have longer contracting periods than countries that predominantly operate with gross contracts.

Relating to the argument regarding contract length and investment, there seem to be diverting opinions on whether contract duration should be short or long to encourage investment. On the one hand, longer contracts may make it more attractive for operators to invest. This is related to the argument in the previous paragraph. The operators could lease the hardware from other companies that own rolling stock, whether it is a government owned or privately owned company, or one could include sellback clauses, but this would nevertheless only resolve the issues of investment occurred in hardware (rolling stocks, stations and other tangible assets). If the operator invests in intangible assets, particularly if they operate under net contracts, to build a strong brand, to market their services, to perform market studies to understand the customers, etc. these costs are not easily compensated. Monami (2000) argue that if the authority wish for such investments to occur, the contract length need to be sufficient to cover the costs of the investment.

On the other hand, shorter contracts increase the threat of losing the contract, which increases the incentives for operators to invest to signal their commitment to the rail services. When investigating the level of investment over and above the contract specification, Affuso and Newbery (2000) found that the coefficient of contract length was negative, contrary to their

(stated) prior belief. The coefficient was significantly different from zero. This implies that shorter contracts generate higher rates of investment. They argued that the operators behaved strategically, by delaying investment to near the end of the franchise to increase the prospect of having the contract re-awarded. This would also effectively provide a first-mover advantage and increase the entry cost for potential bidders.

Effectively, the arguments resemble those of the carrot and stick. On the one hand, a long contract may provide the carrot to investors to enable them to be awarded for the investments they incur. On the other hand, shorter contracts work similarly to the stick by forcing operators to invest in quality improvement in fear of losing the contract (Lien, 2015). There seem to be no agreement on whether the one or the other is the correct approach. In addition, it seems to depend on whether the authority prefers to use gross or net contracts.

Preston (2008) for example suggests that net contracts should be loosely specified, long duration franchises. Gross contracts on the other hand should be tightly specified and short term.

The ideal contract length will be determined in part also by whether the rolling stock is provided by the state or if the private operator is responsible for providing this. Rolling stock has an estimated lifetime of 30 years (Meld. St. 27), hence if the operator is expected to provide this they would require a risk premium, whether they lease it through a third party or invest directly in the rolling stock. The operator may have stock with considerable residual value if the contract is not re-awarded (Affuso and Newbery 2000; Monami 2000). On the other hand, this latter argument depends on whether there are effective second markets for rolling stock. This is rarely the case in initial contracting rounds.

As illustrated through theory, supplemented by empirical findings, there are diverting views on the impact that contract duration has on the investment level in the industry. A long contract reduces uncertainty for the operating companies and provides incentives to invest. On the other hand, a short contract encourages investment through the threat of not renewing the contract with the operator.

4.3.3 Contract size

Finally, the contract size is a vital aspect of the contract design. As deliberated in theory, one key argument favouring competition for the market is that few operators operating on separate

routes may achieve greater cost efficiencies than several operators competing heads-on. Hence, determining what the contract size of each franchise should be is one key determinant for the franchise success. Essentially, one needs to assess is how many rail kilometres, what geographical area, and whether these contracts should include passenger and freight traffic, or if these should be tendered separately. The analysis will include a consideration of economies of scale and density. Additionally, economies of scope need to be evaluated. Finally, the discussion will also consider transactional costs.

In theory of rail, it was identified that the railway market is characterised by some economies of scale, though at large, most operators seem to operate at a constant return to scale. It is only the largest and smallest operators that experience decreasing or increasing return to scale. Nonetheless, it is the presence of economies of density in the rail industry that suggests that heads-on competition is undesirable, and that as such, one should attempt to reduce the amount of franchises that have overlapping tracks. Furthermore, minimizing the amount of overlapping tracks may reduce coordination costs between operators. It may also reduce the externality concerning the impact of delay to one serving on the running of other operators, as identified in section 3.1.

Wheat and Smith (2015) found that in the UK in later years, there has been a rationalisation to larger franchises. They claimed that for large train operating companies, this appeared to increase costs, which is consistent with Preston's (1996) argument. Irrespective of size, all train operators experienced increasing return to density, implying a decreased unit cost. One could imagine that the rationalisation to larger franchises hence was motivated by decreasing costs caused by density economies outweighing (possible) diseconomies of scale. Nonetheless, in their case studies, two of the three rationalisations[7], resulted (or would result) in increased, not decreased unit costs. Alexandersson (2010) found that the importance of scale economies was exaggerated in the railway industry. This might explain why the diseconomies appeared to outweigh any potential density benefit.

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[7] Two that had occurred and one hypothetical

Although there is some inconsistency in the findings, European (and Japanese) studies on railway suggest diseconomies of scope. Hence, passenger and freight services may possibly benefit from being operated by separate companies (Preston, 1996; Alexandersson 2010).

The size of the contracts may also work as a barrier to entry for smaller firms if the contract is too large, and reduce the level of competition for the market. Sizeable contracts may require investments over and above what is feasible for all but large firms and the incurred investment by incumbents will serve as an entry barrier at a new franchising round. Furthermore, as discussed in theory of competition for the market, the more significant the contract is for the operator, the more difficult it is for the competition to start afresh (both being assumptions for ideal bidding markets). This is both due to the aforementioned reasons, but learning and experience may also play a part. The effect on raising entry barriers may particularly be the case if net contracts are used.

Van Dijk (2007) suggested that the smaller franchises resulted in small and medium sized companies being able to offer passenger services for these franchises in the Netherlands, enabling competition for the franchises. Another related argument is that smaller contracts may translate into more competition, as there will be more operators at all times present in the market (each with its own franchise).

The previous argument may suggest that contracts should be small, though factoring in that there are some scale economies, they should be moderately small. An added benefit is that if an operator should default, there would be less consequences and costs associated with it as the size of the contract would be relatively small.

The issue of this argument relates to the costs associated with auctioning. As discussed previously, Preston (2008) found that train operators spend up to £5 million per franchise bid. Kain (2007) found these to be smaller, around £2-4 million around the change of millennium. Whichever is correct in today's market matters less than the overall understanding that operators pay a significant share to bid for a contract. Additionally, there are costs associated with developing and auctioning the contracts from the authority's side. Although one may argue that the absolute costs per bid from the operators perspective may decrease somewhat when the size of the contract falls (less complexity perhaps), there is a fair chance that the costs may increase for the government (added complexity of having to develop more contracts, the added issue of more companies to coordinate etc). All things equal, costs will favour

having larger contracts. Overall, there seem to be arguments favouring both small and large contracts.

In practise, there seem to be substantial differences in contract size. The UK have contracts comprising 26.5 million train kilometres on average, relative to 3.3 million train kilometres in Germany and 2.65 train kilometres in Sweden (Nash et al., 2011). The UK, on the other hand is the only country that franchise all of their contracts. This may be the reason why they have used longer contracts. On the other hand, there is little to suggest that the UK operators have been able to exploit the scale advantages, when one considers the development in cost efficiency.

4.4 On-Track Competition as a Supplement to Competitive Tendering

Johnson and Nash (2012) saw the potential for on-track competition to solve the failures of competition for the market in the UK. New entrants would be able to determine the working practices, wages and conditions, which the incumbent franchising operators could not. They therefore expected new entrants to have lower costs, which in turn could pressure the incumbents to improve costs. They still raised the concern of the entrant simply diverting existing traffic from the incumbent and what role the economies of density would play.

Preston, Wardman and Whelan (1999) modelled the effects of competition between operators to assess the consequences of allowing for on-track competition. They based their model on a case study for busy intercity routes in Britain, which had around 2 million end-to-end passenger journeys per year. They analysed four different scenarios for duopolistic on-rail competition and found that the only commercially feasible option that did not reduce social welfare was that the new entrant offered a lower quality, cheaper service. In such an instant, the entrant would capture a significant market niche, the peak hour non-business travellers. In all other cases, whether it be cream-skimming, fare reductions (price war) or heads-on competition (entrant match service frequency) the strategies where either not profitable or it reduced overall welfare. The latter would imply that the benefits to the passengers did not offset the increased operating costs of the additional services.

The incumbent and the entrant were assumed to have the same variable costs. Furthermore, it was assumed that competition in the market would be unable to drive the costs down, which

were presumed efficient from competitive tendering (Johnson & Nash, 2012). This assumption may be faulty as the cost began to rise shortly after this study was published. Rising costs in Great Britain may be due to peculiar characteristics of the British railway, which makes it infeasible to achieve sustaining cost reductions or it may be because competition for the market failed to realise feasible cost reductions. In the latter case, the assumption would be faulty.

Despite the presence of returns to density and scale economics in the industry, the open access operators appears in reality to lower average costs of train provision on important routes in Britain. Rasmussen, Wheat and Smith (2015) found that "there are small to no cost disadvantages of allowing open access operators to compete with franchised operators and in some cases there are cost advantages of doing so". Fundamentally, the lower costs seem to be due to lower input prices and what Rasmussen et al. identify as a potential "open access business model" effect. This could for example be the ability to negotiate their own terms in regards to wages. For some routes Rasmussen et al. found that it might be a potential to lower overall costs if services are switched from incumbent to open access, even weighted up against the lost scale and density benefits for the former.

Johnson and Nash (2012) argued that on-rail competition is a doubtful way to increase cost efficiencies in rail services, except from in Britain, where costs had increased after the introduction of competitive tendering. If this is not due to specific peculiarities of the British rail system, competition in the market may drive the cost down.

In conclusion, empirical analysis from the UK appears somewhat undecided about the cost efficiency of allowing competition in the market, due to the unclear impact on cost efficiency. On the one hand, loss of economies of density drives costs up, on the other the open access operators can force incumbents to strive for cost efficiencies if this is not successfully achieved through competition for the market.

There has been relatively little experience with open access operators outside the UK. The open access operators in Germany have entered markets that Deutsche Bahn (DB) has closed due to the lack of profitability. Beckers, von Hirschhausen, Haunerland and Walter (2009) found that nine attempts had been made to enter the market, with five ceasing to exist shortly thereafter. Four lines, however, are still served by small-scale operators, which operates profitably, despite DB's failing to do so. In Germany, the open access operators are not

competing heads-on as they do in the UK, i.e. they are in reality not competing in the market. They operate lines that are no longer served by DB, which imply that they still can exploit the economies of density.

An experiment with on-the track competition in the Netherlands came into effect after private company Lovers Rail asked for permission to add services on some lines already operated by Nederlandse Spoorwegen (NS). The initiative lasted from 1996-99 when the new entrant went bankrupt. Alexandersson and Hultén (2006A) argue that even though the company went bankrupt the mere threat of more entry into the network made NS expand and improve its service in these areas.

These arguments resemble that of the contestable markets, where the mere threat of entry forced operators to operate efficiently. Because there nevertheless are some entry barriers, it is questionable how substantial this threat in reality is. Nonetheless, it appears that competition in the market in many cases is fruitless. Although it is questionable if competition in the market is a reasonable alternative to competition for the market in the majority of cases, some experience suggests that it may not be harmful to allow such competition to happen. Competition in the market may force operators to strive for efficiency to avoid such competition actually taking place, provided that competition for the market fail to fully exploit efficiencies.

Furthermore, it is questionable whether any model has achieved optimal cost efficiency through competitive tendering. One the one hand, research show that the introduction of competitive tendering led to a fall in the level of subsidy required by various operators to run the service. On the other hand, as deliberated in previous sections, operators have suffered from the winner's curse, and/or they have behaved strategically, suggesting that competitive tendering in some way have failed to ensure the most efficient distribution.

5. FINDINGS

This thesis has deconstructed theory and research relating to various elements in the deregulation of the railway industry. The findings contribute to answer how the Rail Directorate can assess different auction processes and contract designs when introducing (some form of) competition. Essentially, the findings can be broken down to key learning points and key trade-offs that will be summarized in the following sections.

5.1 Key learning points

I.   *Competition for the market through competitive tendering of franchises has, broadly speaking, increased cost efficiency.*

The UK has largely proved the exception to the rule, though initially, also British rail operators increased their cost efficiency. The thesis has explored several of reasons why the UK experienced so different results from other European countries. Some of these contributing variables have provided additional learning points that are of general appliance.

II. *Being obligated to take over the staff at current wages and conditions lowers incentives to be efficient and increases the labour unions' negotiation power.*

Germany and Sweden avoided this issue as SJ and DB continued to operate. Competitors were allowed to hire staff at their own conditions and with the ability to offer the wages they wanted. This reduced the negotiation power of the labour unions and increased incentives for employees in the competing firms to be efficient.

III. *The propensity of opportunistic behaviour increases with governments that are willing to renegotiate contracts.*

Despite the political difficulty of allowing train operators to go bankrupt, empirical evidence indicate time and again that renegotiation is damaging, and that operators do change their attitude to risk when governments are willing to renegotiate. The government need to commit credibly to allow operators to go bankrupt if they want to reduce the chances of unrealistic, bullish bids. *This includes a potential dominant state-owned company.* NSB will continue to compete for services, which makes the latter part vital. Empirical evidences indicate that if the

government willingly bail the state-owned operator, that operator will, just as any firm, bid opportunistically.

IV.   Assessment criteria in competitive tendering of franchises should be specific and explicit, including the weighting of the different criteria. This should be available to all potential bidding firms.

Price auctions are generally preferred in terms of political controversy as a mean to auction railway contracts. However, price auctions have seldom been used in its purest form in rail auctioning because of the complex nature of the franchises. Hence, the common auctioning process is a hybrid form: An auction including some elements resembling a Beauty Contest. In order to mitigate issues of (perceived) favouritism and corruption, as well as providing a well-defined basis for monitoring contract fulfilment, assessment criteria and their weighting should be specified and made available.

V.   The chance of the winner's curse is higher in initial rounds or with inexperienced bidders.

Theory and empirical experience both imply that the winner's curse is more prominent in initial rounds due to limited data and limited experience on the behalf of the competing firms and the authority. Learning will increase the bidder's ability to make correct calculations.

VI.   Information should be made available to all potential bidding firms.

Following the previous arguments, information can reduce the chance of the overly optimistic bidding. Information will enable the competing firms to make calculations based on sound assumptions

VII.   Management contracts damage society's welfare.

Empirical researches indicate that management contracts leave little incentive to increase productive nor commercial efficiency. At best, management contracts may only be used whilst the authority re-tendered an unsuccessful franchise contract.

VIII.   Net contracts deter market entry more than gross contracts.

In the case of net contracts, empirical evidence suggests that the incumbents, in the majority of the cases, are able to re-win the contract once re-tendered. With gross contracts,

nevertheless, the incumbents seem less able to succeed in defending the re-tendered contracts.

IX.   *Net contracts should be loosely specified and should have a relatively long duration. Gross contracts should be tightly specified and of a short duration.*

Empirical experience suggest that gross and net contracts influence and incentivise different behaviour, and thus contract specification and duration should be partly determined by this. Net contracts on the one hand delegate most of the upside revenue and risk to the operators, which disciplines the operators. In gross contracts, on the other hand, the government retains some of the upside and risk, hence the operators require some additional discipline in terms of more specification and shorter contract duration.

5.2 Key trade-offs

I.   *The chance of the winner's curse is lower when competing firms can observe each other's behaviour. However, this increases the chances of collusion.*

An open auction may reduce the risk of winner's curse. This may be particular advantageous for price auctions, as the risk of winner's curse is higher in such a format. It appears that ascending open auctions are also less demanding to employ in a price auction design.

Open ascending formats may be unduly complex when aspects of a Beauty Contest are included, which may well be why most railway auctions are organised as a sealed-bid first price auction. Still, the issue of winner's cruse appears to be present, particularly in the initial rounds. Hence, the objective may still be to reduce the chance of winner's curse, rather than reducing collusive behaviour. In a sealed-bid auction, this is made possible by spreading the tendering of contracts to various auctions over time. Regrettably, this increases the chance of collusion as the various firms meet repeatedly.

II.   *The number of requirements specified in the auctioning process need to balance so that it ensures a minimum level of quality and control, but does not lead to excessive micro-management.*

In Beauty Contests, firms are evaluated on more aspects than price. Even in price auctions, the authority decides on minimum requirements needed. However, there is a balance between

ensuring a certain level of service, and micro-management. An excessive amount of criteria may inhibit the opportunity for private and public operators to advance innovative solutions.

III. *Net contracts appear to improve commercial effort only, and gross contract seem to improve productive effort.*

Experience suggests that net contracts and gross contracts provide operators with incentives to increase efficiency, which makes them better alternatives than management contracts. Nonetheless, net contracts are believed to increase the incentives to improve service quality, but research suggests that generally operators do little to improve cost efficiency. This is despite both the cost and revenue risks being allocated to the operating firm. Gross contracts, where the revenue risk remains with the franchising authority, appear to incentivise operators to increase cost efficiencies. Empirical research furthermore seems to suggest that net contracts increase the chances of the winner's curse. There are more assumptions, and hence more room to make overly optimistic ones.

IV. *A longer contract duration enables operators to lower the transaction costs. Additionally, it reduces the uncertainty for operating companies, which may increase incentives to invest. A shorter contract duration ensures that the frequency of competition is higher, which increases the ability for competition to discipline operators. Furthermore, a shorter contract duration encourages operating companies to invest through the threat of non-renewal of the contract.*

In parts, contract duration can be determined by whether the franchise is based is a gross or net contract. There are stronger incensements to investment in quality improvement under a net contract favouring longer contracts. There are diverging views on whether long or short contracts encourage or discourage investment.

V. *The contract size is conflicted by, on the one hand, the desire to exploit economies of density, scale and minimise transactional costs, and, on the other, the desire to allow for more competition.*

Larger contracts imply fewer companies may be able to bid for contracts and that there will be fewer companies operating routes on the national railway. Nonetheless, larger contracts imply better exploitation of economies of scale and possibly density. Larger contracts also reduce transactional costs. One option is to introduce smaller contracts in the initial round of

competitive tendering. When operators gain experience and build up stock (and potentially capital) the regulator can chose to reduce the number of franchises.

VI. *Competition in the market can be used as a supplement to competition for the market. It may increase unit costs due to the presence of economies of density, but if competition for the market does not discipline the operators, competition in the market may.*

Having in-market competition as a supplement to competitive tendering depends on the one hand on whether the latter is expected to achieve efficiencies, and on the other hand, it depends whether the average costs of operations are similar for the new entrants and the incumbent. If the government believes that competition for the market brings out full efficiencies and that entrants would operate at a similar cost base (or higher – due to the loss of scale economics), then additional in-market competition would be harmful. Otherwise, the picture is more ambiguous, though research suggests that in-market competition in such cases could provide benefits above any cost disadvantage of allowing on-rail competition.

The learning points and the trade-offs outlined suggest that with aligned decisions, the government may be able to achieve the objectives of the deregulation. However, the handling of the deregulation is of outmost importance. This thesis aims to be of guidance on the various decision variables and their implication, given the accumulated experiences of other nations.
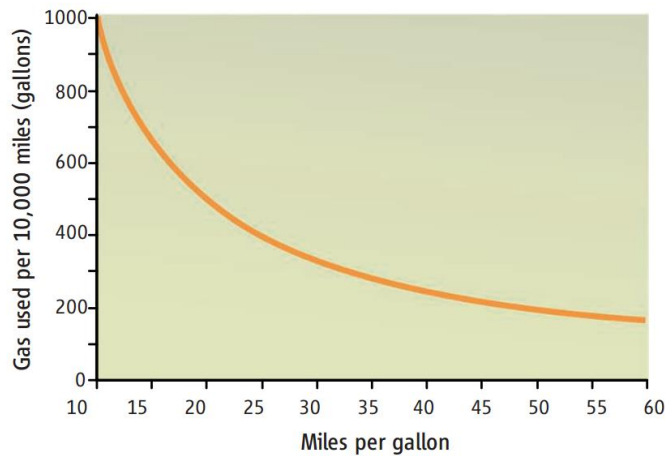
6. APPEDIX

6.1 MPG Illusion

Figure 1 Relationship between MPG and gas consumption
Source: Larrick and Soll (Science 2008)

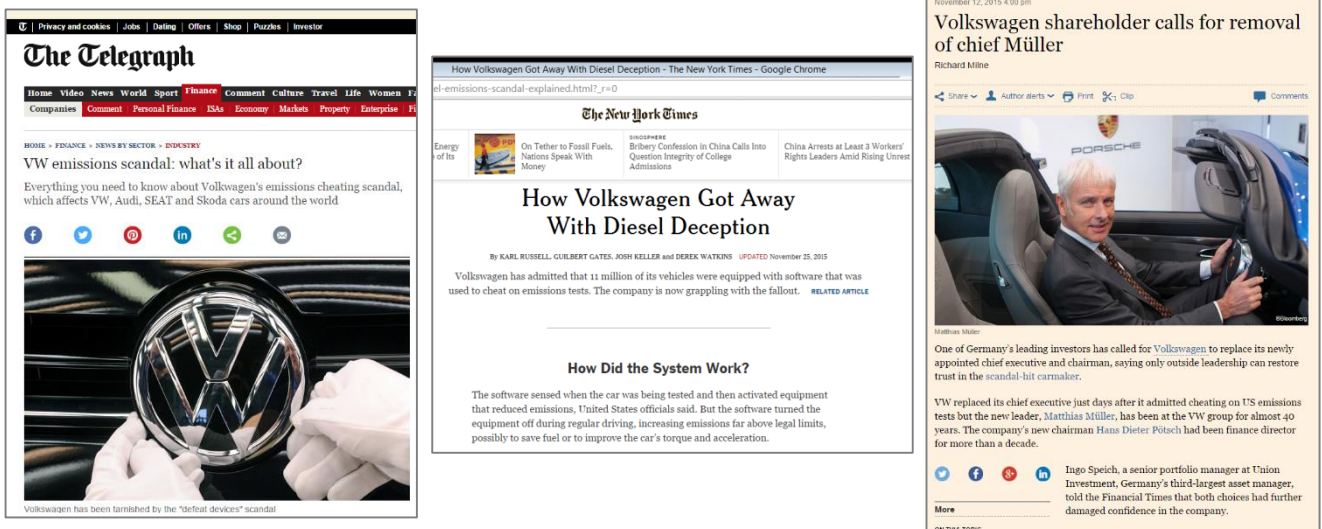## 6.2 The Volkswagen Scandal

Figure 2 Newspaper Articles of the Recent Scandal
Source: the Telegraph, the New York Times and the Financial Times

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