

Emerging Issues in Competition, Collusion, and Regulation of Network Industries



edited by:
Antonio Estache

EMERGING ISSUES IN COMPETITION, COLLUSION,
AND REGULATION OF NETWORK INDUSTRIES

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In 2000, Bernard Van Ommeslaghe, Professor Emeritus from the Université Libre de Bruxelles (ULB) decided at the end of his very successful and innovative private sector career, to sponsor a Chair at his alma mater and to anchor it at the research center ECARES at ULB. The main purpose of the “Bernard Van Ommeslaghe Chair” is to support research, workshops, training activities and publications on market regulation and liberalization.

Overall the years, the Chair has supported events attended by some of the top European economists working in this field, including Emmanuelle Auriol, Estelle Cantillon, Claude Crampes, Mathias Dewatripont, Martin Hellwig, Elisabetta Iossa, Jean-Jacques Laffont, Ariane Lambert-Mogiliansky, Patrick Legros, David Martimort, David Newbery, Lars-Henrik Röller, Paul Seabright, Stephane Saussier, Giancarlo Spagnolo, Jean Tirole, Tommaso Valletti, Xavier Vives, Christian von Hirschhausen and Catherine Waddams. Since 2008, the beneficiary and organizer of the activities of the Chair is Antonio Estache.

Emerging Issues in Competition, Collusion, and Regulation of Network Industries

edited by

ANTONIO ESTACHE

ECARES

Université Libre de Bruxelles

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Acronyms and Abbreviations

| | |
|----------|---|
| 3G | third-generation |
| ACER | Agency for the Cooperation of Energy Regulators |
| ADB | Asian Development Bank |
| ALB | abnormally low bids |
| ATSF | Atchison, Topeka and Santa Fe Railway |
| BNSF | Burlington Northern Santa Fe |
| BTRE | Bureau of Transport and Regional Economics |
| CASC-CWE | Capacity Allocation Service System for Central Western Europe |
| CEER | Council of European Energy Regulators |
| CER | Community of European Railway and Infrastructure Companies |
| CN | Canadian National |
| CNE | Comisión Nacional de Energía |
| CP | Canadian Pacific |
| CRE | Commission de Régulation de l'Énergie |
| DA | Dutch auction |
| DEA | data envelopment analysis |
| DG-Comp | EU's Directorate General for Competition |
| DSO | distribution system operators |
| EA | English auction |
| ECARES | Advanced Research in Economics and Statistics |
| ECMT | European Conference of Ministers of Transport |
| ENTSO-E | European Network of Transmission System Operators for Electricity |
| ERA | European regulatory agency |
| ERGEG | European Regulators Group for Electricity and Gas |
| ERI | Electricity Regional Initiative |
| EU | European Union |
| FCC | Federal Communications Commission |
| FPA | first-price auction |
| GDP | gross domestic product |
| GSS | guaranteed standards scheme |
| ICB | international competitive bidding |
| IDIQ | indefinite delivery/indefinite quantity |
| INELFE | Interconnexion Electrique France-Espagne |
| IFI | international financial institution |
| IPV | independent private values model |
| IRA | independent regulatory agencies |
| ISO | independent system operator |
| ITO | independent transmission operator |
| KCS | Kansas City Southern |

| | |
|-------|--|
| MI | megaliters |
| NRA | national regulatory authority |
| NS | Norfolk Southern |
| OBA | output-based aid |
| OCS | offshore continental shelf |
| ODA | official development assistance |
| OECD | Organisation for Economic Co-Operation and Development |
| OFGEM | Office of the Gas and Electricity Markets |
| OFT | Office of Fair Trading |
| OPA | overall performance assessment |
| PLC | private limited company |
| PPP | public-private partnership |
| RAGs | Regulatory Accounting Guidelines |
| REE | Red Eléctrica de España |
| RTE | Réseau de Transport d'Electricité |
| SFA | stochastic frontier analysis |
| SLC | substantial lessening of competition |
| SPA | second-price auction |
| STB | Surface Transportation Board |
| TEN-E | Trans-European Energy Network |
| TP | traditional procurement |
| TSO | transmission system operator |
| UCPTE | Union for the Coordination of Production and Transmission of Electricity |
| UCTE | Union for the Coordination of Transmission of Electricity |
| UPSP | Union Pacific Southern Pacific |
| WaSC | water and sewerage company |
| WMA | wholesale master agreements |
| WoC | water-only company |
| WSL | water supply licensing |

Foreword

This book presents a comprehensive review of the vast economic literature covering the governance issues of network industries and suggests paths to improve their efficiency.

Its various chapters were presented between 2008 and 2010 at the University of Brussels in a seminar organised by ECARES within the chair that I preside.

When reading this book everyone will be struck by the complexity of the issues facing network industries in terms of competition, mergers, collusions and regulation. The tracks towards public interest are tortuous because they are quite specific to the activities concerned (railways, telecommunications, electricity or gas transmission and distribution, water supply and sewage services). At the same time, since they offer public services, they strongly depend on cultural, social and legal environments. In addition to this, internationalisation issues play an important role, especially in highly-fragmented economical spaces such as the European Union.

On all these aspects, the book is very comprehensive. It provides extensive coverage of those issues that are clearly specific to network industries such as access charges, customer eligibility to competitive supplies, cross-subsidies, unbundling of competitive activities and services supplied in natural monopolies. It analyzes service procurement issues: which services are to be privatized, with or without asset ownership?

At the same time, the authors study how to customise the responses to classical regulation issues for the network industries – such as the design of the regulatory system, the number of regulators, international structure, operating procedures, recruitment issues or capture prevention.

The presentation is illustrated by the discussion of specific cases such as the structuring of regulatory agencies for electricity transmission in the E.U., the competition in railways transport (with a comparison between the two Americas and Europe) or the experience that may be drawn from the regulation of water and sewage activities in England and Wales (a somewhat unique example of a successful regulation!).

Generally speaking, the observation of many specific situations is quite unsatisfying. The survival of dominant historical operators – the so-called ‘national champions’ – is still usual in numerous countries, which is evidence to the fact that the efforts towards favouring entry or unbundling competitive activities have been rather unsuccessful up to now. Many governments have been unable to free themselves from the influence of these *quasi* monopolies, whether private or public.

In this regard, several chapters of the book are dedicated to regulatory capture. They address the problem in great detail and suggest possible ways to improve the situation.

The authors make a clear distinction between direct and indirect capture. The former – originally developed by Stigler in 1971 – can be fought by increasing the number of agencies but also by eliminating information asymmetry between the agency and its principals. The latter, indirect capture, is the one by politicians who exert control over the agencies. According to some authors this kind of capture is now more widespread than the traditional one.

As regards anti-merger policies, market structuring (privatisation versus liberalisation), agencies system design or capture prevention, the book shows clearly that there cannot be standard formulas.

However the analyses offered in this book will supply economists with a strong base from which to formulate concrete recommendations to decision makers and law makers. Very often, officials and legislators have only a confused view of economic situations and are not even aware of the distortions that may exist between general and private interests. Particular interests are not only those of the regulated firms, but may concern other pressure groups, such as consumer segments, unions, or the personal interests of individuals involved in the control processes; this is because the agency model prevails here as anywhere else in human organisations.

Obviously, remedies are difficult to implement due to the size of the financial interests involved and, perhaps more importantly, because of inappropriate behaviour of the regulators and their principals.

It is the economist's duty to make decision makers and legislators aware of the seriousness of these stakes to the collective. This book is an important contribution towards helping them along this line.

Bernard Van Ommeslaghe
Universite Libre de Bruxelles

May 2011

Introduction and Overview

ANTONIO ESTACHE

A decade into the 21st century, the world has seen a great deal of change in network industries as different as computer hardware and software and various components of infrastructure – electricity, gas, telecommunications, transport, and water and sanitation. In spite of their very obvious differences, these industries all involve goods or services that require substantial coordination because their consumption by one user affects that of many other users. They also involve strong commitments to specific standards and require compatibility with other goods or services, characteristics that make it costly for producers and users to switch from one form of the good or service to another. These characteristics – which have endured despite technological developments and in some cases have been accentuated by them – constitute good reasons for public agencies responsible for competition and regulation to keep a close eye on the sector.

They are also good reasons for academics to be interested in network industries. In fact, since the early 1990s, substantial theoretical advances have been made simply because the world has offered so many natural experiments in new forms of organisation and management – and often mismanagement – of these industries. Lessons from attempts at reform dating back to the early 1990s begged to be analysed. Because of their social and political dimensions, policy reforms in infrastructure offer a particularly interesting set of experiences, in particular those in which liberalisation and privatisation have led to popular discontent.

Debates on what is right and wrong in the regulation of the sector remain hot as experience and learning move along in tandem. For many consumers, low-priced access to basic infrastructure services is still perceived as an entitlement, explaining why many governments have failed to demonstrate much enthusiasm for pricing that reflects true costs in these sectors. Taxpayers end up papering over the ensuing conflicts, as governments resort to explicit and implicit subsidies to meet the average prices demanded by the operators while ‘protecting’ users. In parallel, fine-tuning of market structures and of levels and types of competition,

as well as half-hearted or equivocal enforcement of regulatory requirements to improve the transparency of costs in these industries have, on average, allowed operators to maintain and often increase rates of return in spite of the high social and political visibility of these evolving sectors.

One purpose of this volume is to review what we have learned about some of these unforeseen dimensions of competition in and regulation of infrastructure services. Another is to identify issues that face those who plan, own, operate, regulate and consume networked infrastructure services. To these ends, we have collected eight papers prepared for conferences in 2008 and 2009 sponsored by the Bernard Van Ommeslaghe endowed chair at the Université Libre de Bruxelles in Belgium.¹

These papers address three main policy topics: mergers and alliances, procurement policy and capture (of regulators by the regulated), and collusion and corruption. These topics have fuelled policy debates for the past five years or more, and they promise to stay on the agenda for the next five, considering the slow pace of regulators and other relevant agencies in dealing with them.

It was probably inevitable that problems would crop up following the reforms initiated during the 1990s, when governments around the world started to seriously consider the benefits of improving competition in network industries. Trailblazers learn by doing – and sometimes leave a mess. Since those early reforms, all infrastructure sectors around the world have seen change, though to varying degrees.

The easiest sector to reform was telecommunications, which early on proved to be a useful example of what could be achieved by fostering competition. Significant technology advances in the sector offered opportunities to unbundle the production (and provision) of telecommunications services into various segments. There was no longer any reason for a single monopoly to control the supply of these services. The arrival of cell phones offered an array of choices never imagined 10 years earlier, and in the process made competition that much easier. Competition opportunities increased exponentially, bringing new issues in their wake. For instance, the mechanisms adopted for awarding licences to new entrants were much debated. Should licences be negotiated or auctioned? If auctioned, what criteria should be used for the award? Meanwhile, new regulations were needed to define the rules and prices for access to shared infrastructure. A demand for a return to some of the pre-reform regulations was sparked by the recognition that high-cost, low-profit clients might be snubbed by competing operators. In some cases, service obligations were imposed. Meanwhile, important information asymmetries in the costs of activities that remained monopolistic forced regulators to benchmark performance to ensure that operators did not cut costs at the expense of quality. These and other issues

¹ One of the mandates of the chair is to facilitate exchange between policymakers and researchers on policy issues raised by the regulation of network industries. The conferences took place at the university's European Center for Advanced Research in Economics and Statistics.

were particularly contested in the electricity, railways, and water and sanitation sectors.

Policymakers strive to balance regulation and competition, public and private investment, public and private financing, public and private risk taking, and the interests of today's infrastructure users and taxpayers against those of tomorrow. Policymakers must also weigh the economic context of reform against the evolving characteristics of the sector in question. Such issues have shaped the global policy agenda and informed the various papers presented here.

The book is organised into two sections. The first three chapters are sector specific. Covering railways, water and sanitation, and electricity, they focus on issues of regulation, competition and coordination that emerged as industries were unbundled and consolidated – both horizontally and vertically – to implement liberalisation decisions. Mergers, alliances and various contractual agreements among operators – quasi-mergers, in effect – appeared within ten years of the reforms that unbundled many of the network industries covered in this book. Such alliances raise a number of concerns about whether the postreform benefits expected by consumers are in fact being realised.

As Chapters 1–3 highlight the effective 'rebundling' of the sectors in question, they reveal the institutional dimensions of competition and regulation policy. In so doing, they explore how reconsolidation affects procurement processes, increases the risk of capture, and affects political interests. These issues, in turn, are the focus of the book's second part. Chapters 4–8 summarise evidence of procurement, capture, and collusion relevant to network industries, emphasising the political economy of regulation in these industries.

With these issues as background, I will now turn to the main messages of each chapter.

In Chapter 2, Russell Pittman analyses why railway mergers and alliances have the potential to lessen competition and efficiency, even as policymakers work to promote it – both intermodally and across railway service providers. He highlights the essential differences between (i) mergers and alliances that aim to increase efficiency and improve intermodal competition for freight, and (ii) those that reduce competition, raise prices, and cut quality across all dimensions – customer service, technical efficiency, and environmental impact. Pittman also, and importantly, shows how the nature and effects of railway mergers and alliances depend on their context. He focuses on competition for freight among vertically integrated train and infrastructure enterprises, and competition among independent train-operating companies using monopolised infrastructure. As he points out, competition among vertically integrated rail operations is typical of geographically large, freight-dominated countries, including Argentina, Brazil, Canada, Chile and the United States. Competition among independent train-operating companies using monopolised infrastructure, meanwhile, is the main model in Europe. He notes that in North America, freight carriers now focus on alliances because, to a large extent, they have already exploited the potential for mergers. In Europe, however, mergers make sense under regulatory and competition guidelines and practices that prevail there.

The difference in organisational structure between the Americas and Europe, as presented by Pittman, is a useful way of organising the discussion. But it is important to keep in mind that conditions vary by country. For instance, the degree to which the separation of train and other infrastructure operations in Europe has actually taken place – as well as the degree of actual competition among train-operating companies – varies a great deal by country. That said, Pittman’s main point holds true: context shapes the role and impact of mergers and alliances and, in turn, should be considered when grappling with the outcome of alliances and mergers in network industries.

Pittman also points out that, no matter what the dominating organisational model of the sector, global railway experience shows us just how strategic firms have been in assessing the risks associated with regulatory and competition law. In the process, they have often favoured short-term profits over the promise of long-term returns – probably not the best choice, considering that long-term commitments are needed for many of the assets involved. Pittman argues that long-term risks need to be taken into account more explicitly when considering how to regulate the market entry of large firms. It is also essential to remember that significant fixed costs must somehow be recovered if there is to be any incentive for operators to make the best investment, operations, and maintenance decisions – best from the viewpoint of society, that is.

To this end, we may have to be satisfied with market structures and pricing practices that are quite different from those identified in political speeches and basic economics textbooks. Industrial organisation theory can be deployed to analyse the welfare consequences of a wide range of remedies to ensure that they are not applied in isolation from their context. At bottom, Pittman’s chapter suggests that the policymakers in charge of sector restructuring may be too concerned with unbundling the various business units of vertically integrated network industries – just for the sake of doing so. This may be because they underestimate the potential for competition among vertically integrated providers distributed across adjacent territories or countries. Pushing too hard for an alternative market structure may increase the risks that mergers or alliances among providers in adjacent territories – vertically integrated or not – will harm actual or potential competition at points of intersection.

In Chapter 3, Leandro Arias and Alan Horncastle look at the impact of mergers and alliances on the water and sanitation sector. Their analysis includes quasi-mergers, joint ventures, consortia, and other types of alliances among firms that would otherwise be competitors or engaged in client-provider contracts. To discuss the risks to competition in the sector, they focus on a case study of water mergers and quasi-mergers in England and Wales. In this industry, as in many other network industries, England and Wales seem to be at the frontier of restructuring efforts. As a result, even if the characteristics of the sector in the United Kingdom are quite unique, its regulatory and competition practices can be seen as indicators of issues that will eventually need to be addressed in continental Europe and other parts of the world.

Arias and Fields provide a brief summary of the sector's evolution since a policy change in 1989. Privatisation transferred the assets of public companies to private companies, resulting in an industry supplied by 39 private operators. Before the change, ten public water authorities had provided 100% of the sewerage services and 77% of the water services; 29 private operators had provided the rest of the water services. Since privatisation, the sector has consolidated. There are now 21 companies: 10 water and sewerage companies (WaSCs) and 11 water-only companies (WoCs) operating in small segments of the WaSCs' regions. Arias and Fields show the essential role played by the Competition Commission and find that the stringent conditions imposed by the special water-merger regime were designed to reduce the opportunities for mergers. The opportunity to replace mergers with quasi-mergers was limited, however, since in England and Wales quasi-mergers are dealt with by competition law in the same way as mergers. This allows competition authorities to apply all available regulations to cases of alliances, consortia, and other quasi-merger arrangements.

One important contribution of the chapter by Arias and Fields is to illustrate very effectively how the design of a regulatory regime ideally complements the mechanisms put in place by a competition agency to promote both static and dynamic efficiency. The discussion of the British case shows the extent to which a concern for efficiency was built into regulatory design from the beginning, a feature not found in the water sector of most other European countries. Under a regulatory arrangement such as that of England and Wales, quasi-mergers and mergers are less likely to threaten efficiency in the water sector.

The structure of the industry is, however, likely to evolve in the United Kingdom. The constraints imposed by the Competition Commission have been reassessed with a view to ease mergers (and quasi-mergers, in effect), especially in the newly developed competitive non-household retail sector. For instance, one idea proposed is to increase – by a factor of seven! – the sales threshold imposed, a prospect that has kicked off an investigation by the Commission. Arias and Fields expect the outcome to be a further consolidation of the industry, but they also express the need to determine that the potential benefits of new mergers outweigh the negatives. To this end, they discuss how consolidation in any form demands that competition and regulatory policy tools be appropriately applied – and their effects monitored – so that performance gains are shared across all users.

In Chapter 4, Claude Crampes and Lucille Rives focus on the need for coordination – at both national and international levels – among the many actors created by the liberalisation of the European energy sector. They consider the impact of reform on national electricity regulation, and the likelihood that international transmission companies will have stakes in countries with differing regulation mechanisms. In particular, they discuss how the regulatory structure for cross-border trade should evolve, and how the connection between an international transmission system operator (TSO) and its regulator(s) might be altered.

They explain that the news is not interconnection. National electric grids in Europe were interconnected long before the idea of a single energy market was introduced. What is new is that, since the reforms, the European cross-border transmission sector has been organised differently. This is because the 1999 market liberalisation prompted the separation of transmission activity from generation and retail operations, at least from an accounting viewpoint, even when physical separation was not implemented. In this more competitive environment, there is a need to guarantee free international grid access to all suppliers while ensuring operators that access tariffs cover their costs without distorting competition – for example, through predatory cross-subsidies. Network activities are managed by independent entities: distribution system operators (DSOs) manage distribution transformers and lines, while TSOs take care of the transmission network as well as the interconnections and operations of the electric system. Interconnections thus have a key role to play in fostering competition, but because of the strong residual monopolistic dimensions of the business, they also need to be regulated.

To ensure the proper development of an independent regulatory capacity, a 2003 European directive required that each country set up an independent national regulatory authority (NRA). Despite the efforts of these regulatory bodies, accidents and ongoing problems have prompted demand for new legislation that formally requires TSOs to cooperate, to begin unbundling, and thus to facilitate the exchange of information. That demand was answered by the Third Legislative Energy Package, presented by the European Commission on 23 April 2009. The package identifies interconnection as key to the creation of a common market, giving new responsibilities to national TSOs and NRAs while creating a European regulator for interconnections, the Agency for the Cooperation of Energy Regulators (ACER), as well as a European association of TSOs, the European Network of Transmission System Operators for Electricity (ENTSO-E).

As Crampes and Rives point out, the new regulatory framework for interconnection raises several issues. For example, both national and European regulators have the right to scrutinise the TSOs' activities, and both have powers that affect the TSOs' decisions on interconnection. Such decisions may be distorted by moral hazard, as the current distribution of responsibilities is quite complex. Also, not all countries put the same effort into regulating the sector and promoting competition among international actors. The authors' analysis leads them to argue for more decentralisation and greater accountability, even as they warn of cross-border spillover effects and the capture of national regulators.

Crampes and Rives raise three other interesting issues. The first is the need to address the cost of public service when designing a regulatory regime. This cost is likely to be quite different across countries and may explain the varying regulatory choices made across nations. The second is the need to address – more explicitly than seems to be common in the discussion of cross-border trade – the governance of the agency responsible for supranational coordination (ACER in the European context) in order to reduce risks of capture. Third, they remind us that interconnections are also crucial when considering policies to reduce the

risks of climate change. Since renewables are not evenly available across the European Union (EU) and since some nations are only intermittent providers, stronger interconnections will be needed if international trade in renewable energy is to be a realistic option.

In Chapter 5, Christian Ruzzier discusses the relevance of public procurement design to effective competition and regulation policies in network industries. This and similar issues are now emerging, simply because private operators' interest in functioning without subsidies seems to be limited. Ruzzier shows that the economic literature on public procurement has come a long way in recent decades and presents creative solutions for many of the problems observed in procurement practices. He suggests that to ensure correct procurement design, it is essential to go beyond economic considerations – political, social, and environmental factors must also play a major role.

Ruzzier addresses five main questions, which seem to be among the most commonly discussed by practitioners: (i) Under what conditions should provision (or production) be delegated to the private sector? (ii) How should asset ownership and management be allocated between the public and private sectors over the lifetime of assets? (iii) How much unbundling should take place and under what circumstances? (iv) How should partners be chosen in order to minimise cost, avoid collusion, encourage entry, and ensure efficiency? (v) How do corruption and collusion affect choices and outcomes in the process of infrastructure procurement?

No question has just one answer. Instead, Ruzzier points to several key recommendations made in the literature. Regarding how responsibility for the delivery of infrastructure services should best be allocated between the public and the private sector, he shows how modelling choices affect results. This explains the many disagreements over the optimal mode of delivery, as discussed in the literature. Ruzzier suggests that for tasks that are both hard to control (that is, that have high contracting costs) and offer large social benefits, public provision seems to be the most desirable solution. For others, the private solution is often more desirable in terms of cost, although quality is hard to predict and depends on a number of factors, including the design and efficacy of regulation. This is why the telecommunications sector is handled well by private operators, while water services are probably best left to the control of public operators. To allocate the responsibilities in transport and energy optimally would require a much more nuanced diagnostic.

Regarding the second question – that is, whether to bundle or not (especially with regard to the distribution of responsibilities between the public and the private sectors) – the literature emphasises the key role of positive externalities, or complementarities across tasks. But these are not the only factors – contracting costs, financing constraints, and optimal risk sharing are all relevant as well. Auction design, too, is an important variable.

But the question of auction design is a complicated one. In a nutshell, optimal design depends on a project's goals and constraints. In other words, no one size fits all when it comes to real-world procurement practices. In spite of the

well-known advantages of conducting a competitive auction, other selection mechanisms such as negotiations, ‘beauty contests,’ lotteries, and limited bidding (in which only several, invited bidders can submit a bid) can outperform auctions. For instance, negotiations can deliver more desirable outcomes for society when there is uncertainty about the quality of a good or service, or when the government must provide the contractor with (costly) project specifications, or when *ex post* adaptations to the project are needed.

Regarding how partnering might minimise costs, avoid collusion, encourage entry, and ensure efficiency, the answer echoes that for the optimal design of auctions: it depends. There are some easy tricks to play, such as setting a reservation price to ensure that only serious bidders participate in the auctions. But, in general, the optimal number and type of players depend on the goals and the context – as illustrated in Chapter 6.

Finally, on corruption, the main message of Ruzzier’s overview is that, contrary to common wisdom, many commonly recommended policies – such as separating the regulatory function from other government functions or relying more on competitive tenders to pick providers – do not necessarily discourage corruption more than alternate modes, such as sole sourcing or limited tenders. This point is explored in more detail by Liam Wren-Lewis in Chapter 7 and Tina Sørøide in Chapter 9.

Chapter 6 presents Atsushi Iimi’s overview of the empirical evidence for what drives effective procurement policy. Although the chapter emphasises recent research on developing countries, it also includes developed countries, since they often serve as a benchmark to assess the scope for gains in developing countries. In sum, Iimi complements the theoretical overview offered by Ruzzier in Chapter 5 with matching empirical evidence.

To give us a sense of what is at stake, Iimi reminds us of the financial and economic importance of the infrastructure sector. An average developing country spends between 6 and 12% of its gross domestic product (GDP) on public infrastructure development; the poorer the country, the higher the share. This includes investment, operations and maintenance. The equivalent amount is around 2 to 4% in developed countries. Iimi summarises the empirical evidence on how much stands to be saved if procurement processes are more effective.

Iimi points out that, in the context of aid-financed infrastructure procurement, the empirical evidence supports many of the broad theoretical propositions discussed by Ruzzier in Chapter 5. In developing countries, procurement reform might save at least 8% of current expenditure. Open and non-discriminatory competition with free entry would lower the government costs of public works, if other conditions were held constant. Several actions could help cut these costs. First is assessing the optimal degree of competition in infrastructure procurement auctions. Most of the evidence available for the United States and developing countries suggests that the observed number of bidders in power, roads, and water and sanitation is insufficient to meet efficiency objectives.

Second, promoting e-procurement, welcoming international joint ventures, and fostering local bidders all offer opportunities to enhance competition, openness,

and non-discrimination. Efficiency gains might reach 40% for some projects. In view of these potential gains, one or more of these options is being internalised in international procurement practices – but not all, and not everywhere.

Third, Iimi suggests that disclosing more information on procurement procedures and the results of past projects can be useful. This helps procurement planning, especially assessments of whether to bundle or unbundle public contracts. It also allows planners to focus on project quality assurance more specifically, even though the costs of projects that must meet strong, reliable quality standards may go up.

Overall, Iimi's chapter suggests that the scope for improvement in the procurement of infrastructure services is still large. And the evidence available suggests that this is just as valid for developed countries as for developing countries. Many of the theoretical results discussed by Ruzzier have not yet been internalised in procurement practices. Iimi offers a few explanations for this, one being that procurement is a sector largely controlled by lawyers and engineers, who prefer to keep rules simple to minimise enforcement costs. There is no formal evidence for this assertion, but a simple look at the staffing of procurement agencies makes it appear credible. How economists and other professionals deal with risk in procurement practice simply begs for an empirical test, but that goes beyond the scope of this book.

In Chapter 7, Liam Wren-Lewis focuses on the role of regulation in ensuring that network infrastructure is operated efficiently and equitably. He concentrates on the risks of regulatory capture. Indeed, a major weakness in the design of infrastructure policy is citizens' inability to guarantee that regulatory agencies will act in their interest and not be captured by special interest groups. The chapter points to the theoretical drivers of capture in network industries. A general model is used to integrate the various theories and to highlight the main policy areas that need to be assessed empirically.

The chapter starts with a discussion of the various definitions and types of capture. Wren-Lewis reduces the scope of the discussion by focusing on capture as special interests' manipulation of the government agencies that regulate network industries. In doing so, he specifically excludes capture by politicians, a topic covered by Mark Thatcher in Chapter 8. The rest of the chapter discusses the principal ways in which capture has been modelled in economic theory. This includes a useful reminder of the problems that capture might cause in the context of infrastructure policy, as well as some potential positive effects. The main contribution of the chapter, however, is its suggestion of ways to either reduce capture or to mitigate its effects.

Wren-Lewis's review of the literature suggests that the main policy aims relevant to the sectors covered in this book boil down to one of two things: (i) reducing the power of interest groups to influence decisionmakers or (ii) reducing the ability of regulatory agents to exploit the information asymmetry between them and their principals. The first of these two objectives flows from the 'interest-group' theory of capture, which argues that capture can be reduced by decreasing the power of the groups most likely to capture and increasing the

power of the groups that suffer from capture. This is what sector liberalisation may be expected to achieve, for instance, by increasing the number of actors and hence the costs of successful capture. The second objective is a by-product of a theory of capture revolving around the principal-agent model. According to this approach, one way to reduce capture is to increase the number of regulators, since this would decrease the ability of any individual regulator to hide information.

To address these various policy options systematically, Wren-Lewis organises his discussion into four areas: (i) the choice of market structure, (ii) the design of the regulatory structure, (iii) the appointment of regulators, and (iv) the shaping of regulators' careers. He shows how the interaction of the various theories of capture can lead to inconsistent recommendations on how to minimise capture risks. For instance, privatisation and increasing regulatory independence have ambiguous effects. If an interest group holds power over politicians, then distancing them from control of the firm is likely to reduce the effect of capture. On the other hand, if the main risk is that of a firm capturing government agencies, then distancing the agency from relatively accountable politicians may increase the probability of capture.

Regarding market structure, the main options considered are liberalisation and privatisation. Wren-Lewis suggests that liberalisation is unlikely to be a sure bet when it comes to reducing the risk of regulatory capture. That said, he argues that both theories of capture support liberalisation as a more effective preventive measure than privatisation.

In designing regulatory structure, the main policy issues identified by Wren-Lewis are the number of regulators, the role of consumer advocates, the degree of regulators' decentralisation, and the degree of regulators' independence. While empirical studies are sparse, current theoretical literature generally favours increasing the number of actors when possible to reduce the risk of capture. Increasing the role of consumer advocates – for instance, by involving them in the regulatory process – is clearly one way to increase the number of actors and hence to cut the risk of capture. But there is always the risk that consumer advocates will be captured themselves, or that they will not be given the representation and resources they need to gather information.

Regarding decentralisation, economic theory presents no clear evidence of the effects of decentralisation on capture, and recent empirical research leaves the question unanswered. The debate is also open regarding regulators' independence. Greater independence is likely to increase transparency; at the same time, less discretionary power promises to minimise the risks of collusion in regulatory decisions.

Regarding the appointment of regulators, the main issue to address is the extent to which elections or joint appointment by the executive and the judiciary may help reduce capture. Electing regulators seems to improve accountability and hence reduce capture, although not all empirical evidence leads to this conclusion. Similar results are available for sectors subject to regulators jointly appointed by the executive and the judiciary. This builds on the idea that as more actors are involved, capture becomes more costly.

Relevant issues include the length of regulators' terms and the policies in place to mitigate the conflict of interest inherent in the 'revolving door'. Wren-Lewis's survey of the literature leaves the relationship between term length and regulatory capture unclear. Meanwhile, the 'revolving door' that exists between jobs in regulation and jobs with interest groups, particularly regulated firms, is a clear-cut issue. Stopping the revolving door promises to reduce regulatory capture.

Wren-Lewis's survey is a pragmatic one. He points to a number of robust specific policies but also identifies a number of standard policy recommendations that appear less reliable. This lack of reliability is probably the consequence of a poor diagnosis of the source of capture or a bias in the interpretation of sources. In some instances, agency problems can be underestimated by politicians who favour interest groups' explanations; in other instances, the opposite may hold. Wren-Lewis has been effective at showing us that getting the explanation wrong can lead to unproductive anticapture policies in this sector.

In Chapter 8, Mark Thatcher offers an empirical assessment of the evolution of European network industries' legal and institutional structures for the regulation of network industries in Europe over the past 30 years, focusing on the theoretical sources of capture identified by Wren-Lewis in Chapter 7. Thatcher argues that the changes have followed three main trajectories. First, with privatisation and liberalisation, new rules have been introduced to better protect the interests of society, such as regulations mandating universal service. Second, European-level regulation has grown, guided by a series of European directives and overseen by formal and informal networks of regulators. Third, independent regulatory agencies (IRAs) have been formally established in network industries in most European countries.

Although these changes have greatly altered the possibilities of capture of various forms, Thatcher focuses on the risks of capture faced by IRAs, in particular: (i) the capture of IRAs by those they regulate, notably large suppliers of network services and infrastructure, and (ii) the politicisation of IRAs, which may represent capture by elected politicians or indirect capture by the regulated via their political allies. He also distinguishes between direct and indirect forms of capture. Direct capture is by regulated firms and elected politicians, while indirect capture is by politicians acting in the interests of regulated firms.

Thatcher's focus allows him to argue for the importance of putting the theoretical arguments in context. Indeed, he argues first that in Europe, risks of informal or indirect capture are often more important than the types of capture highlighted by the theoretical literature surveyed by Wren-Lewis in the previous chapter. The discussion is largely based on a detailed assessment of the situation in France, Germany, Italy and the United Kingdom. These countries offer interesting examples. In the three continental European countries, the revolving door has, for the most part, remained closed, since most IRA members are drawn from national elites working in the public sector, such as the *Grands Corps* in France or the *Accademia* in Italy. Britain is different – most IRA members come

from and then return to the private sector. Yet, according to common wisdom, capture is less a problem in the United Kingdom than in continental Europe.

Thatcher explains this by the fact that some drivers of capture are easily underestimated. For instance, resource imbalances between regulatees and IRAs or alliances between regulatees and governments may be more significant than the revolving door, or the use of appointment powers for direct capture may largely reflect the limited resources of IRAs – in terms of both staffing and spending – relative to their tasks and to the regulatees. But Thatcher argues that the most significant risk of capture arises when governments have to work with powerful domestically based ‘international champions’, such as Electricité de France (EDF) and major European telecommunications companies with an international presence. In these cases, national governments are more concerned with the global positioning of their operators than the cost those operators impose on national users.

Overall, Thatcher argues that it is not clear how the creation of IRAs has affected risks of regulatory capture. On the one hand, the pressure to capture regulators may have increased simply because the privatisation of suppliers has increased incentives for their managers to focus on extreme profits. Moreover, IRAs have ‘depoliticised’ network regulation and emphasised its technical aspects. This has made their operations more opaque to users and other less technical stakeholders. On the other hand, Thatcher correctly notes that strong capture risks also existed under state-owned monopoly suppliers, even if those suppliers sought investment programmes, the creation of patronage jobs, and protection from competition more than they sought profits. The real conclusion may simply be that creating IRAs and instituting other changes such as privatisation and liberalisation may have altered the forms of capture rather than stopped them. Thatcher surmises that risks of capture persist, although perhaps those risks owe more to informal processes and alliances than to the use of formal powers. The real challenge is thus to track these informal processes and to continue associating capture with increasing costs to capturers.

Chapter 9 concludes the book. Tina Søreide surveys economists’ models, looking for the various ways in which formal and informal processes – managed by politicians, operators and other key actors in regulatory implementation – can hurt the effectiveness of service delivery in network industries. Specifically, she examines how researchers have attempted to defend the proposition that welfare-promoting competition and regulatory policies are difficult to implement and enforce, even as evidence of the surplus rents and weak performance of regulated firms is widely available across all the sectors covered in this book. She discusses two competing explanations for this phenomenon.

The first explanation of policy failure is that the recommendations made by economists may be too narrowly focused and hence dismissed as useless or incomplete by politicians and policymakers. Competition and regulation policies are all about managing trade-offs, she points out. Such trade-offs are palpable to the many actors involved in the adoption – or blocking – of a particular policy.

Ignoring their existence (often in the name of avoiding capture) is a sure way to be ignored by those who need to manage them in the real world.

The second explanation is that sound policies will not be implemented if they fail to account for the processes that can lead to their effective implementation. Søreide reviews the literature on the possible reasons why policies are not implemented. She explores three main reasons commonly discussed by policy practitioners in network industries: the private agenda of politicians, an inadequate level of detail that needs to be addressed in deals and policies, and the relevance of the legal frameworks supporting the policies. Søreide's efforts to open the black box of infrastructure governance lead her to discuss each of these possible explanations.

On the importance of a private agenda, Søreide considers four motives for how politicians assess sector-specific policy: (i) getting re-elected, (ii) boosting their power quickly through populist appeals, (iii) feathering their nest by showing themselves to be friends of the industry, and (iv) enriching themselves directly through corruption. Her interpretation of the research on these hidden agendas and how they affect policy outcomes in network industries is humbling. In a nutshell, she finds that despite a vast number of publications, there are many unanswered questions about how political performance affects competition and regulation policies across network industries. Researchers tell us about the importance of democracy, checks and balances, and the separation of powers, but they do not have a lot to say about the optimal sector-level response to weak or unpredictable performance at the political level. All this suggests that our understanding of the political economy surrounding policy advice in this sector is still very weak.

On the specific characteristics of deals and policies, Søreide reminds us that in most countries, competition in network industries is seldom subjected to the same degree of antitrust control as in other industries. This is why we must understand the specifics of each deal to accurately assess the risk of influence as an obstacle to policy implementation. We must also learn what leads some players to exploit regulatory weaknesses. Indeed, governments play a significant *ex ante* role in the sector as they drive the design of restructuring and many of the specific projects that need to be implemented – as in the case of public-private partnerships. The evidence she summarises suggests, however, that many of these decisions are often based on non-transparent processes, which provide significant latitude for officials and other strongly motivated actors to interfere with the recommendations of experts.

Capture and corruption is easily concealed as discretionary bureaucratic judgement or transformed into populist political marketing. Ultimately, Søreide argues quite convincingly that whether the characteristics of contracts and risk allocation are the result of undue influence (*ex ante*) or whether they are structures that tend to provide better or worse opportunities (*ex post*), the unfair generation of rents is an important yet underestimated question. To make policy more effective, we need sharper insight into the circumstances that encourage bribery. We also need to recognise the relevance of governance (political and

legal institutions, culture and history, development, and so on); sector-specific determinants (regulation, market design, entry opportunities, and so on); and firm-specific determinants (size and organisation, ownership structure, internal incentive schemes, headquarters location, and so on).

On the relevance of the legal context in which decisions are taken, Søreide blames economists for their unsystematic approach to understanding the factors that determine how well different parts of a legal framework function to promote network sector competition. Many tend to simply ignore the relevance of that framework when extending their policy advice. Yet, how well the framework functions is important for fair competition in network industries – and its effectiveness may vary significantly across countries, simply because transplanted laws and regulations often do not fit local circumstances. Sometimes, too, for cultural or other reasons, there is little incentive to speak out about violations – leniency programmes actually seem to be generally more effective than whistle-blowing laws, although this also depends on whether the specific design meets local characteristics. Søreide includes an interesting discussion of the scope for self-regulation in a sector known for its high levels of capture. The jury seems to be out on this point.

In concluding her chapter, Søreide pulls together many factors touched upon by previous chapters and leaves us with a pragmatic view of the reasons why policies have failed to deliver as expected in the sector. As she does this, Søreide memorably corners economists for failing to account for laws and politics in the design of their policies. But that is a much larger debate that goes well beyond the scope of this book.

Mergers and Alliances in Railways

RUSSELL PITTMAN

Railway mergers and alliances have the potential to significantly affect competition. On the one hand, those that increase efficiency – for example, through more effective interlining – can help rail networks better compete with roads for highly valued freight cargo. On the other hand, and as in other industries, mergers and alliances among actual or potential competitors can reduce competition and raise prices – with adverse effects on shippers and consumers as well as implications for road congestion, air pollution, fuel consumption and global warming. In the rail sector in particular, the nature of these effects depends on their context, especially on the rail sector's structure and the framework for competition set by policymakers. In this chapter I focus on two models: competition among vertically integrated train and infrastructure enterprises, and competition among independent operating companies using monopolised infrastructure. The former arrangement is termed 'vertical integration' and the latter 'vertical separation'. I will focus more on freight than on passenger operations, since the latter are typically subsidised and thus tend to raise different policy issues.

Competition among vertically integrated train and infrastructure enterprises is the model promoted by policymakers in the geographically large, freight-dominated countries of the Americas – first the United States and Canada, and more recently Mexico, Brazil, Chile and Argentina. At the risk of oversimplification, we can further divide this model into: (i) a 'North American model', as found in the United States and Canada, with an emphasis on origin-destination competition between parallel, vertically integrated railways and (ii) a 'Latin American model', as found in Mexico, Brazil, Chile and Argentina, with an emphasis on competition for the business of shippers and customers at particular points served by more than one railway (Pittman, 2004a).

Competition among independent train-operating companies using monopolised infrastructure is the model chosen by Brussels for adoption by the members of the European Union (EU). Again at the risk of oversimplifying, we may further divide this into (i) a 'vertical separation model' in which the network operator is prohibited from operating its own trains, a policy urged by the EU's Directorate

General for Competition (DG-Comp); and (ii) a ‘third-party-access model’ with vertically integrated infrastructure that is legally bound to provide access to competing, non-integrated train-operating companies.²

These models tend to blur a bit, as intermediate solutions such as ‘accounting separation’ are accepted as a means of preserving ownership integration while making third-party access terms more transparent, and thus (it is hoped) preventing discrimination. The degree to which the complete separation of train and infrastructure operations in Europe has actually taken place – as well as the degree to which actual competition among train-operating companies has appeared – varies a good deal by country (Gómez-Ibáñez and de Rus, 2006: part 1; Molnar, 2006; Pittman *et al*, 2007). ‘Third-party access’ tends to be observed in countries that have nominally chosen the vertical separation model but have moved only part way toward achieving it – that is, countries that have taken steps to open up the rail sector to competition but have not yet fully separated the incumbent freight operator from its infrastructural operations.³ Germany may be the most salient example of this – it has instituted accounting separation but not yet ownership separation of trains and track. Russia is another example, though here train-operating companies compete only in theory (ECMT, 2004; Friebe *et al*, 2007; Pittman *et al*, 2007).

The role and impact of mergers and alliances vary across contexts. In North America competing, vertically integrated, parallel freight rail enterprises have merged up to the point that further mergers seem more likely to be of the end-to-end variety – and even these are problematic from the regulatory standpoint.⁴ Meanwhile, end-to-end alliances of various degrees of formality seem to be flourishing, as railways attempt to squeeze maximum production from a highly utilised infrastructure. In Western Europe there are fears of dominance or even monopolisation of both services and infrastructure as a single, state-owned company continues to make acquisitions, with some likelihood that the problem will spill over into Central and Eastern Europe as well. But to the degree that vertical separation in particular countries is incomplete, there is a countervailing fear that vertically integrated incumbents will successfully entrench their monopoly positions. In general, North American freight carriers seem focused on alliances at this point, while European carriers seek merger partners.

The chapter considers these different contexts in more detail.

2 More broadly, vertical separation has become something of a reformers’ default for infrastructure sector reform around the world; see, for example, Newbery (1999).

3 This is consistent with a broader point posed by Newbery (1999): ‘Liberalizing entry into a ... utility which remains both vertically integrated and state owned is the least disruptive reform.’

4 An ‘end-to-end’ merger is one that combines a railroad whose network connects points A and B with another railroad whose network connects points B and C. This can be considered a ‘vertical merger’ in the traditional antitrust context to the extent that it combines in a single railroad company the business of carrying traffic between A and C, but it can be considered a ‘horizontal merger’ to the extent that it combines two railroads that were competing, premerger, to carry traffic from B (to different destinations) and to B (from different origins).

2.1 THE AMERICAS: COMPETITION AMONG VERTICALLY INTEGRATED RAILWAYS

Recent decades have seen the consolidation of the North American railway system. Canadian railway shipping has remained divided between two transcontinental carriers, the Canadian National (CN) and Canadian Pacific (CP) railways. On the US side, however, the number of Class I railways has declined over the past 30 years from 41 to 5: the Burlington Northern Santa Fe (BNSF) and Union Pacific (UP) in the west, CSX and Norfolk Southern (NS) in the east, and Kansas City Southern (KCS) in the centre. Both horizontal ('parallel') and vertical ('end-to-end') mergers have continued this consolidation. Most recently and significantly, the number of major competitors dropped from 4 to 2 in the west – as Burlington Northern combined with the Atchison, Topeka and Santa Fe Railway (ATSF) in 1995 and Union Pacific combined with Southern Pacific in 1996 – and from 3 to 2 in the east, as CSX and NS carved up the assets of Conrail in 1998.

This process of consolidation came to at least a temporary halt at the turn of the 21st century. Faced with the first proposal to form a transcontinental railroad in the USA – the proposed merger of BNSF with CN – the Surface Transportation Board (STB) first imposed a moratorium on Class I rail mergers (in 2000) and then issued a new merger policy statement (in 2001) that significantly increased merger applicants' burden of proof that a merger would be pro- rather than anticompetitive.⁵ No mergers of Class I railroads have been proposed since.⁶ From a competition standpoint this set of developments is rather remarkable, since it is parallel mergers that have generally raised the most serious concerns, though the STB has approved a number of them. Meanwhile, the BNSF/CN combination would have been mostly end to end, a type of merger likely to have a much smaller effect on competition in general.⁷

The academic literature generally suggests that the sweeping railway deregulation in the USA – the 4R Act of 1976 and the Staggers Act of 1980 – had strong, positive effects on productivity in the industry, and that mergers had some additional positive effects as well, at least through the mid-1990s.⁸ But the long-term impacts of the more recent wave of large horizontal mergers are not as clear: the UP/SP combination resulted in dramatic and expensive service problems for shippers in some areas of the country; the trade press reported similar if

5 'Because of the small number of remaining Class I railroads, the fact that rail mergers are no longer needed to address significant excess capacity in the rail industry, and the transitional service problems that have accompanied recent rail mergers, we believe that future merger applicants should bear a heavier burden to show that a major rail combination is consistent with the public interest' (STB, 2001: 9). I discuss this 'heavier burden' in Pittman (2010).

6 Kwoka and White (2004) describe these events in greater detail.

7 See, for example, the decision of the STB regarding the division of Conrail between CSX and NS: 'With very minor exceptions, the combination ... will be end-to-end and not parallel. It has been our experience that end-to-end restructurings of this kind rarely result in a diminution of competition' (STB, 1998: 50).

8 See Berndt *et al* (1993), Wilson and Bitzan (2003), and Ivaldi and McCullough (2005). Chapin and Schmidt (1999) are less positive regarding the effects of mergers.

less dramatic difficulties following the NS and CSX absorption of Conrail;⁹ and the overall positive trend in customer surplus for freight rail shippers found by Ivaldi and McCullough (2005) reached a peak and then turned downward after 1998.¹⁰ Related literature suggests that Class I railroads are large enough to have exhausted available economies of system size, but that some economies of density have remained and may yet remain – and thus that any more horizontal mergers would likely pair further losses of competition with further reductions in cost.¹¹ Finally, the evidence is strong that, for those commodities that cannot be shipped economically by road or water or air, the presence of competing, vertically integrated rail companies lowers prices for shippers.¹²

Even before the STB took a more sceptical stance on mergers – and increasingly since – US freight railroads were relying on alliances to improve efficiency, provide better service to shippers, and draw traffic away from roads (and from one another). Using a typology of strategic alliances suggested by Yoshino and Rangan (1995) and applied to the North American freight rail sector by Natarajan *et al* (2005), we may divide modern North American freight rail alliances into four categories:¹³

- *Make-or-buy alliances* that involve close cooperation between a single railroad company and an input supplier.
- *Technological alliances* that involve multiple railroad companies in technological cooperation with input suppliers and/or joint industry groups.
- *End-to-end alliances* that focus on joint marketing (and sometimes operations and investments) through end-to-end interchange partners – the A-to-B and B-to-C lines described earlier – though we might also apply this label to alliances with trucking companies.
- *Parallel alliances* that pair competing railroads as parallel carriers.

9 On UP/SP, see especially Kwoka and White (1999). Karakari *et al* (2002) and Breen (2004) attempt to show positive results of the UP/SP merger, but their arguments are not convincing. See, for example, the discussion before the Antitrust Modernization Commission, http://govinfo.library.unt.edu/amc/commission_hearings/pdf/051205_Regulated_Industries_Transcript_reform.pdf, 58–61.

10 According to an official from a shippers' trade association, 'There has been such havoc following all these mergers, with absolutely billions of dollars in lost shipments and other costs incurred by shippers.' See Milligan (2000), Watson (1999), and Gallagher (1999).

11 The literature on the cost structure of US freight railways is extensive. See, for example, Wilson (1997), Bitzan (1999 and 2000), Schmidt (2001), Ivaldi and McCullough (2001 and 2008), and Bitzan and Keeler (2007).

12 We replace the category labels applied by Natarajan *et al* (2005) with our own.

13 For parallel competition, see Grimm (1985), Winston *et al* (1990), Burton (1993), and Schmidt (2001). For competition among railways serving common points – 'source competition' – see MacDonald (1987, 1989a, 1989b) and Majure (1996).

The first three categories appear to be the real growth areas, which is probably just as well given the fourth option's obvious potential for anticompetitive outcomes.

In the first category, Natarajan *et al* (2005) include (i) a long-term contract in which CSX employees work under the management of GE Transportation Services for the maintenance and management of CSX's fleet of GE locomotives and (ii) CP's contract with Alstom Canada to operate CP's Ogden Shops in Calgary. This type of alliance is one standard outcome in the continuum of the make-or-buy decision; that is, whether to rely on the market for an input or to produce it within the firm.¹⁴ Long-term contracts such as those between suppliers and customers of an intermediate product typically do not raise serious concerns about competition unless both parties possess market power in their respective markets *and* the contract is a *de facto* or *de jure* exclusive one. If those conditions are met, such contracts may have the effect of denying business to competitors (at either or both the supplier and customer levels) and so foreclosing competition. Given the small number of Class I railroads serving most regions today and the concentrated nature of many rail supply markets,¹⁵ the existence of market power on both sides of such contracts is likely. But it appears that most contracts impose no exclusivity on either side; they thus seem unlikely to foreclose competition.

In the second category – technological alliances – Natarajan *et al* (2005) include (i) the Portec Rail Friction Force Alliance, which focuses on improving the efficiency of the all-important wheel-rail interface, and (ii) the cooperative arrangement among the nation's freight railroads, Amtrak, the Federal Railroad Administration, the Illinois Department of Transportation, and the Association of American Railroads, which are seeking to establish interoperability standards for positive-train-control technologies and systems. Alliances such as these, which place many competitors in the same room, should be able to avoid garden-variety collusion so long as they follow the advice of counsel (in the same way that meetings of trade associations do). Standard-setting organisations, such as trade associations, are ubiquitous in modern market economies, but the process of standard setting has the potential to raise complex competition issues, and partners in a standard-setting organisation or alliance must take note that US courts 'have found antitrust liability in circumstances involving the manipulation of the standard-setting process or the improper use of the resulting standard to gain competitive advantage over rivals'.¹⁶

The third category, alliances among end-to-end interchange partners, covers a wide continuum of cooperation. At one end are the marketing alliances that exist among an increasing number of such partners, designed to solicit more traffic and improve shippers' levels of satisfaction with the interline move. (According

¹⁴ The classic sources include Coase (1937) and Williamson (1975).

¹⁵ See, for example, the Competitive Impact Statement in *US v. Amsted Industries*, <http://www.usdoj.gov/atr/cases/f222700/222730.htm>, and *US v. Ivaco* (704 F. Supp. 1409 [W.D. Mich., 1989]).

¹⁶ See US Department of Justice and Federal Trade Commission (2007). See also *Allied Tube & Conduit v. Indian Head* (486 U.S. 492 [1988]); *American Society of Mechanical Engineers v. Hydrolevel* (456 U.S. 556 [1982]); and *Abbott et al* (2006).

to some reports, one recent innovation has been the delegation by one partner to the other of price quotations for the entire haul [Gallagher, 2003; Boyd, 2008]). Requiring much deeper coordination are operating alliances, in which trains originating on one railway run ‘preblocked’ – that is, without using switching yards or even changing locomotives – deep into the system of the terminating carrier, sometimes all the way to the final destination (Frailey, 2002; *Traffic World*, 2003). And then there are alliances that join infrastructure investments to improve interchange efficiency, most notably (i) the Meridian Speedway project, in which NS invested in improvements in KCS trackage to improve its ability to ship to the west coast via either UP or BNSF (Malone, 2004; *Virginian-Pilot*, 2005; Machalaba, 2008b), and (ii) the Patriot Corridor project, for which Pan Am Railways and NS have applied to the STB for permission to form a joint venture, Pan Am Southern, to which Pan Am would contribute a 155-mile mainline track and NS would contribute \$140 million in cash and property to upgrade the line and improve rail services between Albany, New York, and Boston, Massachusetts.¹⁷

To the degree that these end-to-end interchange alliances among Class I carriers were crafted as exclusive agreements, they could raise competition issues (and regulators’ concerns for the broader public interest). On the other hand, interchange arrangements themselves are generally efficient and procompetitive. For example, critics lament the lack of interchange agreements – as well as of private trackage rights agreements – when discussing the three vertically integrated carriers created by the Mexican railways reforms (OECD, 2006).

Alliances that include joint infrastructure investments may be especially interesting from a competition standpoint. Such investments are, on face value, output enhancing and designed to enable speedier and more efficient rail movements and to thus better compete with roads, and with other railways, for freight cargo.¹⁸ For those commodities for which motor carriers compete with rail, this is likely the end of the discussion regarding competition. But for those commodities dependent on rail, the number of carriers offering service is typically very small, and it seems possible that a joint venture that significantly disadvantages a competitor could be found exclusionary, and thus in violation of regulatory or antitrust laws. (This could be the case especially if the competitor were denied access.) On the one hand, it is difficult to imagine a joint-venture partner making an investment if it did not expect favourable access terms to new infrastructure capacity as a result; on the other hand, it is not difficult to imagine – especially given the experience in telecommunications and other sectors – that a competitor not invited to participate would complain of discrimination and demand access.

Regarding the fourth category, parallel alliances, over the years there has been a great deal of joint activity – whether or not formally termed *alliances* – involving

17 Science Letter (2008) and Anderson (2008). The proposal is STB Finance Docket No. 351471.

18 See, for example, Machalaba (2008a) and Anderson (2008). Anderson reports that the Patriot Corridor project ‘will help [NS] compete directly with CSX Transportation’.

railroads that are direct competitors to one another, especially if one includes in this category terminal railroads serving cities such as Chicago, St Louis and Kansas City. More recently, the competitors Union Pacific and BNSF have been part of broader public-private partnerships to expand rail capacity in the ports of Los Angeles and Long Beach, California, and in the Chicago metropolitan area (*Railway Gazette International*, 2004). They are also partners in expanding capacity on a jointly owned line serving the coalfields of the Southern Powder River Basin in Wyoming (Union Pacific Railroad, 2006). Boland (2001) reports other examples:

- CN and CP share track to increase traffic on light-density lines (eastern Canada) and to increase capacity on high-density lines (Fraser Canyon).
- BNSF and UP have implemented joint dispatching over shared track assets in the Gulf Coast area of Texas.
- NS and CSX have mutual traffic solicitation rights in shared asset areas of the former Conrail system.

Non-cartel agreements among direct competitors are treated under a ‘rule of reason’ standard in US antitrust law, wherein any harm to competition is measured against economic benefits from the agreement, and accepted if not detachable from greater benefits (US Department of Justice and Federal Trade Commission, 2000). The same is true for most competition laws around the world (Whish, 2008). Thus railway companies engaging in directly horizontal alliances must take care that any ancillary agreements that may reduce competition are no more restrictive than absolutely necessary to render the benefits of the alliance achievable. But it is fair to say that, as with the standard-setting organisations and trade associations discussed earlier, this sort of cooperation among competitors generally draws little interference from antitrust or regulatory authorities.

2.2 EUROPE: ASPIRATIONS TO VERTICAL SEPARATION

European Commission policymakers have been seeking to open up the European freight rail business to above-the-rail competition since at least 1991. In that year the Commission issued Directive 91/440, which required incumbent national railways to provide access to their infrastructure to international, intermodal (that is, trailer and container) freight carriers under non-discriminatory prices and terms of service. This was followed in 1995 and then 2001 by Directive 95/18 (as amended, Directive 2001/13) ordering the further opening of access to all international freight operators over a number of years, and then by Directive 2001/14 ordering the opening of access to domestic as well as international freight carriers by 2007 (Stehmann and Zellhofer, 2004; Nash, 2006). While none of these directives required the complete vertical separation of train operations from infrastructure (that is, ownership separation), during this period the head

of DG-Comp stated that he considered such separation necessary if competition were to be effective (Monti, 2002). The main policy objective has been to create smoothly operating cross-border train operators that would ease road congestion and air pollution by taking business away from motor carriers.

The state of actual competition that has followed these directives is mixed. On the one hand, there has been some entry by new, non-integrated freight-train-operating companies, particularly in Poland, Romania and the United Kingdom.¹⁹ Even with this small number of entrants, concerns have been expressed that entry will drive prices down to near-marginal costs, that entrants (especially shippers integrating into transporting their own products) will only take the high-margin 'block train' traffic, and that the system may deteriorate in the long run, with service to shippers of smaller 'wagonload' volumes being lost to motor carriers (Posner, 2006, 2008). This scenario calls attention to the importance of the fixed costs of infrastructure in the rail sector, and to the issues of access pricing and price discrimination that we will discuss further.

On the other hand, concerns have also been expressed that the German incumbent freight carrier DB Cargo – still connected organisationally with the infrastructure owner and still state owned – may be in the process of precluding the development of above-the-rail freight competition in Western Europe, as it has successively purchased NS Cargo (Netherlands), DSB Gods (Denmark), EWS (UK), Transfesa (Spain), SFM (Italy), and Romtrans (Romania). In addition, DB Cargo was rumoured to have sought to purchase Green Cargo (Sweden) and was reported to be considering the acquisition of CTL Logistics (Poland).²⁰

A separate and potentially contradictory problem is that many Western European nations have not imposed the full ownership separation of their incumbent, vertically integrated railway enterprises, making it probable that national-level freight monopolists will surrender access to international carriers only grudgingly.

In fact, some argue that these two problems are not contradictory but rather connected. Matthias Raith, former general manager of one independent train-operating company, Rail4Chem (Germany), claimed that the incumbent European freight carriers were forming alliances and agreements to foreclose new entry, likening them to 'elderly boxers embracing one another in the ring because they both know they are at the end of their careers'. Mr Raith proposed an alliance among small European freight-train-operating companies designed to promote their ability to compete with entrenched incumbents, and Rail4Chem went on to form such an alliance, along with COMSA (Spain), fer Polska (Poland), LTE (Austria and Slovak Republic), NordCargo (Italy), viamont (Czech Republic), and, most recently, VFLI (France) (*Journal of Commerce*, 2003; Needham, 2004; *International Railway Journal*, 2005; Scherp, 2005).

19 On Poland and Romania (and other Central and Eastern European countries), see Pittman *et al* (2007). On England, see Glaister (2006) and Posner (2006, 2008).

20 *Railway Gazette International* (2007); *The Railway Insider* [Bucharest] (2008); *RZD Partner* (2008b); and 'Railion' (<http://en.wikipedia.org/wiki/Railion>). The dominance of DB Cargo within Germany is discussed by Locher (2006).

Since the railways of Western Europe are predominantly passenger rather than freight dominated, and since the countries are small relative to those in the Americas, the econometric results cited earlier for the US system should be applied to Europe only sparingly. Nevertheless, the policy goal of increased cross-border train operations – including but not limited to freight – suggests that the results for the United States concerning economies of system size (exhausted at relatively low levels) and density (apparently less easily exhausted) may be relevant in the future. The results suggest the feasibility of regional train companies, either vertically integrated or not, since these tend to possess market power within their regions *but also* the ability to compete at points of intersection.²¹ (Since many commodities are hauled by motor carrier to a railhead, such ‘points’ of intersection need not be precise. See, for example, Pittman, 1990.) In general, the literature on vertical economies (that is, economies of scope between train and infrastructure operations) is less consistent, but at least modest economies are strongly suggested.²²

These contradictory problems would seem to have contradictory implications for how further mergers and/or alliances might affect competition. If the problem is the remaining market power of an incumbent national carrier, such as CFR Marfă in Romania, for example, then a purchase by DB of an independent Romanian train-operating company (such as Romtrans) or of a potential entrant into Romania (such as CTL) would appear to be procompetitive – a way to wrest the market from an incumbent dominant carrier. If, on the other hand, DB or another company is likely to dominate the Europe-wide above-the-rail freight market, then strengthening a company such as CFR Marfă through mergers and/or alliances – or, correspondingly, the proposed merger of the incumbent Czech and Slovak freight carriers and the proposed merger of the incumbent Austrian and Hungarian freight carriers – would better maintain competitive options (*The Railway Insider* [Bucharest], 2007; *RZD Partner*, 2008a; *Forbes*, 2008). And in either case the model pursued by Rail4Chem (now a part of Veolia Cargo) through the European Bulls – the formation of an alliance among smaller freight carriers – is only to be encouraged from a competitive standpoint. (Behind all these considerations is the issue of recovering network costs in a model of vertical separation. The setting of access prices is crucial here.)

Finally, regarding both passenger and freight rail in Europe, one factor dominating the conversation is the small share of rail vis-à-vis other modes, mostly road freight routes but also air and road passenger routes. (This is more the case in Western Europe than in Eastern Europe, however.) The formation of an alliance among West European incumbent passenger rail providers, dubbed Railteam, is designed specifically to attract business away from air carriers – through, for example, unified booking, discount fares, and reduced border delays (White, 2007; *The Economist*, 2007). If a competition enforcer

21 Savignat and Nash (1999) make a similar suggestion. If these regional ‘monopolists’ remain vertically integrated, they mirror those in Latin America.

22 Bitzan (2000); Ivaldi and McCullough (2001, 2008); Growitsch and Wetzel (2006); Wills-Johnson (2007). A non-econometric discussion is in Pittman (2005).

or regulator defined the product market narrowly as a ‘passenger train service’, such an alliance might be seen as an anticompetitive agreement among national incumbents not to invade one another’s territories. To the degree that the more accurate product-market definition includes air transport, the small share of rail carriers renders such concerns much less pressing.

Similarly, for goods that may be competitively hauled by road, the share of rail within Europe is typically quite low, and an agreement among incumbent rail freight carriers would seem to pose little risk of harming shippers. But for commodities that are (economically) ‘rail captive’, the innocuous nature of agreements and alliances among national incumbents is not as clear. For these commodities the correct product-market definition is typically ‘freight transport by rail’, and the high market shares of incumbents, combined with barriers to entry (especially to network access), make such agreements and alliances more likely to raise concerns over competitive practice.

2.3 ACCESS PRICES

As noted above, when competition above the rail is created, one crucial issue becomes the financing of maintaining and improving infrastructure. In this regard rail is no different from any other network industry, except that the share of total delivered costs that belongs to fixed network costs is probably higher for rail than for any other sector other than water. As with other network industries – the telecommunications sector is probably the most studied in this regard – there are trade-offs that must be made between encouraging competition and supporting investment.

The principal problem is the usual one of seeking the most efficient method for recovering fixed costs.²³ An access charge set at the level of marginal infrastructure costs achieves the most efficient level of usage in the short term, but the fixed costs must then be recovered in some other way, for example, through taxation and the economic distortions that inevitably accompany it (as measured by the shadow price of public moneys – especially high in developing countries). An access charge set at the level of full infrastructure cost recovery results in the inefficient turning away of potential users that could pay the marginal cost of their usage but could not pay the average cost (what is often termed ‘fully allocated’ cost by regulators). An access charge seeking a second-best middle ground through prices set according to willingness and ability to pay (e.g., Ramsey prices or two-part tariffs) is likely to be judged discriminatory – as of course it is, by definition – and thus illegal by a competition enforcement authority.

EU Directive 2001/14 essentially calls for setting rail-access prices at marginal costs – that is, charges must be based on ‘costs directly incurred as a result of operating the train service’ – but using a broad interpretation of marginal costs that includes reservation and scarcity charges, environmental costs and volume-

23 I have discussed this in the context of railways in Pittman (2004b).

related savings (Nash, 2005, 2006). But markups above marginal costs are permitted where necessary for financial reasons, and where such markups are non-discriminatory. Nash believes that the latter requirement probably rules out two-part tariffs – consistent with the reaction of the Bundeskartellamt to such a proposal by DB – but may possibly permit Ramsey pricing.²⁴

Perhaps a bit surprisingly, the issue of access prices turns out to be a relative weakness of the above-the-rail competition model. Nash (2005) notes the inability of an infrastructure operator to have complete knowledge of the cargo being hauled by all trains, while the Australian Bureau of Transport and Regional Economics (BTRE, 2003) reports that, in practice, attempts by infrastructure operators to levy different access charges among a small number of train-operating companies has led to rent dissipation through bargaining, regulatory challenges and litigation. Based on the more successful North American experience of setting shipping tariffs rather than access charges, it appears that it is easier for a vertically integrated railway company to discriminate among a large number of shippers than for a vertically separated rail infrastructure company to discriminate among a smaller number of train-operating companies (see also Bouf, 2002).

What is the relevance of this issue to the question of mergers and alliances among railway companies? Many such agreements – in any of the policy contexts discussed here – will involve voluntary arrangements for the use of one company's track infrastructure by another company's trains. One would normally presume that the two companies involved in such an agreement would negotiate an efficient pricing regime. A problem in the experience of the American model – in Mexico in particular – has been that companies fear that any terms that they agree to for private, voluntary track-sharing arrangements will be adopted by the regulator and the courts and imposed for mandated track-sharing arrangements. This has been one reported reason for the paucity of such voluntary agreements. A similar problem in Canada, where each of the two principal railways enjoys statutory access to a subset of the shippers that are served only by the other and that cannot economically utilise other modes of transport, is that both railways seem satisfied to pursue a 'live and let live' policy rather than starting a battle for shippers (Ouellet, 2000).

Clearly the ability of the government to set the right access price is a crucial component of any regime of mandatory access, whether under the American model (as trackage rights are imposed in a merger settlement, for example, or to protect competition in other situations) or under either variant of the above-the-rail model. The fact that there is little agreement – conceptual or empirical – on the right access price makes this issue especially difficult.

Yet another problem in Europe – particularly in the context of encouraging cross-border freight and passenger train operations – has been the lack of

²⁴ See Bundeskartellamt, 'Reform of DBAG's route price system to comply with competition', 8 September 2000, http://www.bundeskartellamt.de/w/Englisch/News/Archiv/ArchivNews2000/2000_09_08_1.php. See also Pittman (2004b).

harmonised national access-pricing regimes. The EU Directive discussed above includes principles for setting access prices but does not impose uniformity, and in practice the regimes differ a great deal by country (ECMT, 2005 ; Nash, 2005). This is not the only factor discouraging cross-border operations; differences in other terms of access are a factor, and anticompetitive behaviour has been named as another.²⁵ But certainly the multiplicity of access-pricing regimes has played a part. This is a bit ironic, since most West European rail systems are passenger rather than freight dominated, so that some would argue that freight operations should have to contribute little to fixed charges in any case.

2.4 LESSONS FOR OTHER NETWORK INDUSTRIES

What lessons may we derive for other network industries from the competition issues raised by railway mergers and alliances?

I would argue first that the potential for competition among vertically integrated providers has been undervalued in policy debates, both as a restructuring model on its own and as a factor in understanding mergers and alliances. This option has taken a poor second place to vertical separation in the worldwide debate among economists regarding the restructuring of infrastructure sectors, but it has many virtues – not least the (self-evident) one of maintaining whatever economies of vertical integration are available. As evident in the restructuring of Mexican railways, and in competition among railroads serving common points but not parallel corridors in the United States and Canada, competition may be created without having to break up going concerns (Pittman, 2007).

It seems conceivable that restructuring along these lines has at least some potential in both the electricity and water sectors. (In Australia there is already some discussion of future desalination plants competing with traditional water purification plants.) Correspondingly, it is important for competition authorities and regulators to be alert to the possibility that mergers or alliances among providers in adjacent territories – vertically integrated or not – may harm actual or potential competition at points of intersection. If one railway or long-distance electricity transmission line or gas pipeline or water pipeline serves Brussels (or comes close to Brussels) from the southwest, and another serves it (or comes close) from the southeast or northeast, the two may be able to compete with each other to provide service to Brussels, and a merger or alliance that appears to be of the relatively innocuous end-to-end variety could eliminate the only competition available.

A second lesson is that firms are generally savvy regarding regulatory and competition law processes and may behave strategically – in particular, they may decline to behave competitively to earn short-term profits if they fear that the result will be a less profitable future. This has apparently been the case in Canada,

25 See, for example, Italian Competition Authority, Case 1681, 'Rail Traction Company/Rete Ferroviaria italiana-Ferrovie dello stato', 18 January 2007, Provvedimento no. 17327, Avvio istruttoria, Bollettino no. 33/2007.

where shippers captive to the CN or CP have a statutory right to competitive services from one or the other company under some circumstances, but where neither company has provided the cooperation necessary. It also seems to be the case in Mexico, where the three vertically integrated incumbents have eschewed voluntary track-sharing agreements, apparently out of fear that the terms of such agreements would be used by regulators under less voluntary conditions. This may be an especially relevant consideration when considering competitive or regulatory remedies that rely on the market entry of other large firms.

Finally, a more optimistic lesson: it is not always true, but certainly it is often true, that customers in network industries have many options that may protect them from monopolistic behaviour. In the case of rail freight, the most obvious protection is provided by other transport modes. For many commodities – especially non-bulk ones – road haulage may be as economical and efficient (or indeed more so) than rail haulage, and water may be an economical and efficient option for bulk commodities in the right circumstances. Shippers in countries using the ‘Latin American’ or ‘North American’ model may be protected by competition from railroads serving common points even if those railroads lack parallel routes, while shippers in countries with above-the-rails competition may begin operating their own trains if they think they are paying too much to their incumbent supplier.²⁶ Of course, these factors are sector specific and situation specific, but the technological convergence of telecommunications and cable television companies seems to provide a similar example.

This goes to the heart of competition issues in network industries, and it may be a good point with which to close. Network industries have, almost by definition, significant fixed costs that must be somehow recovered if they are to be built in the first place and then maintained and improved. This means that we should be satisfied with a market structure whose competitive practices fall far short of the economist’s ideal of perfect competition; prices cannot be shaved too close to short-run marginal costs and remain sustainable. A not unrelated point is that efficient network usage may involve some kind of price discrimination, charged either by the network operator as an access price or by an integrated service provider. Short-run marginal cost pricing in a network industry is a recipe for long-run disaster – or, as Henry Posner (2006) summarises, ‘Open Access advocates should be very careful what they ask for because they just might get it.’

26 And, as railroader Posner (2006) laments, they are likely to run these operations ‘as cost centers, not to be confused with profit centers’ – that is, with no concern for infrastructure cost recovery unless forced to consider it via access charges. See also Pittman *et al* (2007) for the recent experience in Central and Eastern Europe with shippers of bulk commodities beginning to supply their own train services over the national track infrastructure.

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Lessons from Mergers and Alliances in the British Water Industry

LEANDRO ARIAS AND ALAN HORNCastle

The issue of consolidation through mergers and quasi-mergers is a critical one for infrastructure because it might lead to a degree of market concentration that threatens competition. In particular, quasi-mergers – in the form of joint ventures, consortia and other types of alliances among firms (that would otherwise be competitors or engaged in client-provider contracts) – pose a challenge to regulators and procurement agencies, which have to juggle various regulatory instruments to ensure that consumers reap the benefits of effective competition. This challenge is as serious in the water sector as it is in other infrastructure sectors around the world.

In this chapter, we examine water mergers and quasi-mergers in England and Wales, focusing on how they are treated by regulators and authorities overseeing competition, and how they might evolve in the future. The example from England and Wales is a useful one since regulatory and competition practice here tends to indicate issues that will eventually need to be addressed in continental Europe and other parts of the world.

The most interesting lesson that can be drawn from our case study is that under a regulatory arrangement like the one in place in England and Wales, quasi-mergers might not threaten competition in the water sector. It should be noted, however, that the characteristics of the water sector in England and Wales are unique and, as a result, the scenario described in this chapter should be used mainly as a point of reference.

The chapter is organised as follows. In Section 3.1 we describe the unique characteristics of the water sector in England and Wales. Section 3.2 outlines how water mergers and quasi-mergers are treated, and presents a summary of water merger and quasi-merger activity to date. In Section 3.3 we discuss how the proposed water competition reform might reshape the sector in the future. In Section 3.4 we analyse how the treatment of mergers and quasi-mergers might change in the future, and assess the effect of these potential changes. Section 3.5 summarises the key messages of the chapter and concludes.

3.1 THE WATER SECTOR IN ENGLAND AND WALES

The water sector in England and Wales has some unique characteristics that make for an interesting case study. The fact that the sector is radically different from other European comparators means that there could be much to learn from analysing how the quasi-merger issues discussed by Estache in other chapters of this book may be relevant to this case.

There are two distinctive features of the water sector in England and Wales:

- *Ownership structure of operators.* Companies are privately owned, as a result of a process of privatisation undertaken in 1989.
- *Economic regulation.* Companies are regulated by a national economic regulator, Ofwat, under an RPI-X regulatory regime.

We will discuss these two features in more detail.

3.1.1 *Industry structure*

Prior to privatisation, there were ten public sector water authorities supplying water and sewerage services in England and Wales. The public authorities provided 100% of the sewerage services and 77% of the water services. The rest of the water services were provided by 29 privately owned statutory water-only companies (WoCs) operating in some areas within the water authorities' regions (Ofwat, 2006: 87).

Privatisation was implemented in 1989. The assets and liabilities of the ten water authorities were then transferred to ten water and sewerage companies (WaSCs). Shares in these companies were sold in November 1989. The position of the 29 statutory WoCs also changed. Prior to 1989 the WoCs were subject to restrictions on the dividends they could pay and the debt they could borrow. After privatisation these restrictions were removed, allowing the companies to convert to private limited company (PLC) or limited company status (Ofwat, 2006: 87).

Privatisation was followed by a period of consolidation, in which many of the small WoCs merged with one another or were taken over by WaSCs (see Table 3.2). This led to the industry structure seen today, in which there are 10 WaSCs supplying 100% of the sewerage services and 81% of the water services, and 11 WoCs that operate within small areas of the WaSCs' regions and provide the rest of the water services.

As a result of privatisation, all the water companies in England and Wales today are privately owned, though Welsh Water, which is a company limited by guarantee, is owned by members without a financial stake rather than by shareholders. Table 3.1 shows the ownership structure of the operators, together with their annual revenue, which gives an indication of their size.

Table 3.1 *Water companies' ownership structure and size*

| Company | Owner (as of December 2008) | Annual turnover, 2007–8 (£ million, 2007–8 prices) ^a |
|---|--|---|
| WaSCs | | |
| Anglian Water Services Ltd. | Osprey Acquisitions Ltd. | 957 |
| Northumbrian Water Ltd. | Northumbrian Water Group PLC | 595 |
| Severn Trent Water Ltd. | Severn Trent Water PLC | 1,257 |
| South West Water Services Ltd. | Pennon Group PLC | 413 |
| Southern Water Services Ltd. | Greensands Holdings Ltd. | 610 |
| Thames Water Utilities Ltd. | Kemble Water Ltd. | 1,454 |
| United Utilities Water PLC | United Utilities Group PLC | 1,418 |
| Dŵr Cymru Cyfyngedig/ Welsh Water | Glas Cymru Cyfyngedig | 614 |
| Wessex Water Services Ltd. | YTL Power International | 391 |
| Yorkshire Water Services Ltd. | Saltaire Water Ltd. | 785 |
| WoCs | | |
| Bristol Water PLC | Sociedad General de Aguas de Barcelona, S.A. (Agbar) | 88 |
| Bournemouth & West Hampshire Water PLC | Biwater PLC | 37 |
| Cambridge Water PLC | Cheung Kong Infrastructure Ltd. | 21 |
| Dee Valley Water PLC | Dee Valley Water Group PLC | 19 |
| Folkestone & Dover Water Services Ltd. | Veolia Environment | 18 |
| Portsmouth Water PLC | South Downs Capital Ltd. | 34 |
| South East Water PLC (including Mid Kent) | Utilities Trust of Australia (UTA); Hastings Diversified Utilities Fund (HDUF) | 164 |
| South Staffordshire Water PLC | Alinda Infrastructure Fund | 77 |
| Sutton & East Surrey Water | Aqueduct Capital Ltd. | 50 |
| Tendring Hundred Water Services PLC | Veolia Environment | 14 |
| Three Valleys Water PLC | Veolia Environment | 224 |

Notes: WaSC = water and sewerage company; WoC = water-only company; PLC = private limited company. ^a For WaSCs this includes sewerage turnover.

Source: Ofwat, 2008a; <http://www.ofwat.gov.uk/industrystructure/ownership>.

3.1.2 Regulatory regime

As stated above, Ofwat regulates the water companies using an RPI–X regulatory system. This system implies that the prices that companies can charge are set for five years. If in these five years companies can provide the services with lower costs than those assumed by Ofwat, they can keep the difference. But if companies spend more than the regulatory assumptions, they lose the money. Charges are reset every five years to take into account the actual performance of the companies. The objective of this type of regulatory system is to incentivise companies to achieve efficiency gains.

There are three key elements that characterise Ofwat's RPI-X system. These are:

- *Quality regulation.* As explained above, under RPI-X, companies have a clear incentive to spend more efficiently because they keep part of the savings. In order to avoid these savings being obtained by a reduction in quality, the RPI-X regime needs to be complemented by quality regulation. Quality regulation ensures that companies deliver the quality required by consumers and the government. The two most important incentive schemes of Ofwat's quality regulation are the following:
 - ◇ *Guaranteed standards scheme (GSS).* A scheme that lays down the minimum guaranteed standards of service that appointed water companies have to deliver. Companies make payments to customers if they fail to meet these standards.
 - ◇ *Service incentive mechanism (SIM).* A measure of performance that reflects the broad range of services provided to customers. During price reviews, adjustments to each company's price limits are considered in order to penalise or reward performance achieved in the SIM.
- *Comparative competition.* Ofwat's comparative competition regime sets targets for efficiency savings by reference to estimated performance gaps with the best-performing firms. This is necessary to ensure that companies make every effort to be more efficient during the regulatory period. The comparative regime estimates the performance gap for each company using the outturn costs of *all* companies. As a result, the price set for a particular company depends on the costs of all the companies. If the prices of this particular company were set using only its own costs, the incentives for efficiency would be lower, as this company could choose to be less efficient without facing the prospect of a tough regulatory efficiency assumption.
- *Risk-reduction devices.* These consist mostly of a set of rules on how to pass some of the costs incurred by companies during the regulatory period on to customers. This is to avoid some of the risks of a pure RPI-X system, and in particular, the risk of changes in uncontrollable costs. Note that, in an extreme case, if all the costs were passed through to tariffs by risk-reduction devices, the regulatory system would allow tariffs to change automatically as costs changed (this is known as a 'rate-of-return' regulatory system). These risk-reduction devices can therefore be seen as the rate-of-return elements of Ofwat's RPI-X system.

3.2 MERGERS AND QUASI-MERGERS TO DATE

Since privatisation in 1989, the water sector has gone through a process of consolidation. This process has been determined, in part, by the special water merger regime: a set of specific rules that competition authorities use to deal with water mergers and that differ from the rules used to deal with mergers in other sectors.

This section outlines the key characteristics of the special water merger regime and reviews the merger and quasi-merger activity from 1989 till now.

3.2.1 The special water merger regime

The special merger regime for water companies was put in place at the time of privatisation with the objective of preserving the number of comparators, enabling Ofwat to undertake comparative competition.

The special water merger regime establishes that the government office that enforces both consumer protection and competition law, the Office of Fair Trading (OFT), must refer to the government office responsible for investigating mergers, the Competition Commission, any merger involving two or more water enterprises, if the UK turnover of the target water enterprise exceeds £10 million or if the acquiring firm already owns a water enterprise with a turnover exceeding £10 million (OFT, 2003: para 9.12). Note that all the 21 water companies have turnovers that are above the £10 million revenue threshold, which implies that, in effect, the OFT must refer any future water merger to the Competition Commission.

The Competition Commission must then determine whether Ofwat's ability to make comparisons among water companies will be impacted by the merger, and if so, what remedial action should be taken (Competition Commission, 2004).

Ofwat's involvement is at the Competition Commission inquiry stage, when it presents its views on the effects of the merger to the Competition Commission.

How does this compare with the standard regime? Under the standard merger regime, which is used to deal with non-water mergers, the OFT must examine mergers in which the turnover of the acquired company is above £70 million per year, or in which the newly merged entity would supply or acquire at least 25% of all goods or services supplied in the United Kingdom or in a substantial part of it (OFT, 2003: para. 2.3). Based on the results of its examination, the OFT then refers a merger to the Competition Commission if it believes that the merger will give rise to substantial lessening of competition (SLC) in the market.

What is the treatment of quasi-mergers? In England and Wales, competition laws treat quasi-mergers the same way they treat mergers. The Enterprise Act 2002, which forms the basis for UK competition law, establishes that:

a person or group of persons able, directly or indirectly, to control or materially to influence the policy of a body corporate, or the policy of any person in carrying on an enterprise but without having a controlling interest

in that body corporate or that enterprise, may ... be treated as having control of it.²⁷

This gives the competition authorities in the UK a good degree of discretion in what gets treated as a merger, which allows them to apply all available competition policy tools in cases of alliances, consortia, and other quasi-merger arrangements.

3.2.2 Mergers to Date

Since 1989 market consolidation has been significant. As a result of this process, only 11 WoCs remain today out of the 29 WoCs in existence at the time of privatisation. Meanwhile, the number of WaSCs has remained the same. Table 3.2 depicts the process of consolidation in the water sector since privatisation.

It is worth noting that almost half of the referred mergers have been prohibited. This, combined with the fact that today no water company is below the £10 million revenue threshold (that is, any water merger must be automatically referred to the Competition Commission), might deter other potential mergers in the water sector.

Table 3.3 outlines the merger cases that have been referred to the Competition Commission under the special water merger regime, and the remedy (if any) imposed by the Competition Commission in each case.

²⁷ Enterprise Act 2002, Part 3, Chapter 1, Section 23.3.

Table 3.2 *Consolidation in the water sector*

| Water companies at privatisation | Current water companies |
|--|---|
| Anglian Water Services Ltd Hartlepool Water Co. | Anglian Water Services Ltd |
| Northumbrian Water Ltd Newcastle & Gateshead Water Co. Sunderland & South Shields Water Co. East Anglian Water Co. Essex Water PLC | Northumbrian Water Ltd |
| United Utilities Water Ltd | United Utilities Water Ltd |
| Severn Trent Water Ltd East Worcestershire Waterworks Co. | Severn Trent Water Ltd |
| Southern Water Services Ltd | Southern Water Services Ltd |
| South West Water Services Ltd | South West Water Services Ltd |
| Thames Water Services Ltd | Thames Water Services Ltd |
| Dŵr Cymru Cyfyngedig (Welsh Water) | Dŵr Cymru Cyfyngedig (Welsh Water) |
| Wessex Water Services Ltd | Wessex Water Services Ltd |
| Yorkshire Water Services Ltd York Waterworks PLC Bournemouth & District Water Co. West Hampshire Water Co. Bristol Waterworks Co. Cambridge Water Co. Chester Waterworks Co. Wrexham & East Denbighshire Water Tendring Hundred Water Services Ltd Colne Valley Water Co. Lee Valley Water Co. Rickmansworth Water Co. North Surrey Water Co. Eastbourne Water Co. West Kent Water Co. Mid-Sussex Water Co. Mid-Southern Water Co. Mid Kent Water Co. East Surrey Water PLC Sutton District Water PLC Folkestone & Dover Water Services Ltd Portsmouth Water PLC South Staffordshire Waterworks Co. | Yorkshire Water Services Ltd Bournemouth & West Hampshire Water PLC Bristol Waterworks Co. Cambridge Water Co. Dee Valley Water PLC Tendring Hundred Water Services Ltd Three Valleys Water PLC South East Water PLC Sutton and East Surrey Water Folkestone & Dover Water Services Ltd Portsmouth Water PLC South Staffordshire Waterworks Co. |

Note: Water and sewerage companies are highlighted in bold.

Source: Ofwat (2006: 88), updated and simplified by the authors.

Table 3.3 *Water merger cases referred to the Competition Commission*

| Case | Remedy or prohibition imposed by the Competition Commission |
|---|--|
| Mid Kent Water and South East Water (2007) | £4 million one-off payment to consumers £3.1 million synergy savings taken into account in the following regulatory price control |
| Vivendi and First Aqua (2002) | Divestment |
| General Utilities, SAUR, and Mid Kent Water (1997) | Prohibited |
| South West Water and Wessex Water (1996) | Prohibited |
| South West Water and Severn Trent Water (1996) | Prohibited |
| Lyonnaise des eaux and Northumbrian Water (1995) | 15% price reduction |
| General Utilities PLC and I Mid Kent Water Co. (1990) | Divestment |
| Southern Water PLC and Mid-Sussex Water Co. (1990) | Allowed with no remedy |

Source: Competition Commission's reports.

3.2.3 *Quasi-mergers to date*

Given the private sector ownership of the water sector in England and Wales, procurement contracts awarded by the government are virtually non-existent. This leaves little room for quasi-mergers, such as those most commonly found around the world, in which companies join together to bid on government contracts.

There is still some room for quasi-mergers in private procurement processes. This is because private operations can be outsourced (that is, companies privately procure work on the basis of competitive tendering). An interesting case in this regard is Welsh Water, which outsources a large part of its asset operations in long-term contracts to subcontractors, including other water undertakers such as United Utilities, Veolia and Severn Trent.

But there are two key factors that leave little room for anticompetitive quasi-mergers in private procurement. These are:

- *Incentives of the regulatory regime.* As explained in Section 3.1, under the current regulatory regime, companies can keep the gains of reducing costs, including procurement costs. As a result, they are highly incentivised to procure efficiently. The only exception could be when water companies are associated with suppliers (see below).
- *Regulatory supervision of procurement activities.* Ofwat monitors procurement processes to ensure that trade with associates is efficient and does not hide cross-subsidies. Companies are required by the regulatory accounting guidelines (RAGs) 'to ensure that the price paid for a product or service does not exceed a fair market price' (Ofwat, 2005). Ofwat regularly publishes league tables summarising how different companies are doing in this area.

As a result, anticompetitive quasi-mergers in procurement occur rarely in the water sector in England and Wales.

But the water sector in England and Wales is evolving, and some of the possible changes might affect mergers and quasi-mergers. The next section discusses how the water competition reforms now under consideration might reshape the sector in the future. Based on this, the following section, 3.3, assesses the effect that the potential changes could have on mergers and quasi-mergers.

3.3 WATER COMPETITION REFORM

In 2008 Ofwat and the government both embarked on wide-ranging consultation exercises aimed at designing reforms to foster competition in the water sector. What exact shape these reforms will take is still under discussion and will only be clear with the publication of a Water White Paper in December 2012. This section describes the status of the proposed reforms, focusing on how the sector might be reshaped.²⁸

3.3.1 Time for regime change

Competition is a means to an end. As rivals seek to outdo one another, they often put pressure on margins, reduce costs and improve quality. As explained in Section 3.1, the regulatory regime in the water sector seeks to indirectly mimic some of the pressures of direct market competition, mainly through a system of comparative competition whereby Ofwat sets tougher price limits for less efficient companies. Other forms of indirect competition, outlined in Box 3.1, are also observed in the sector. But what Ofwat seems keen to see is *direct* competition in the market, meaning that individual customers can choose their suppliers.

Box 3.1 Existing indirect competition in the water sector

Comparative competition. Incumbents compete with one another to receive more lenient efficiency targets from the regulator.

Capital market competition. Companies and individuals compete for corporate control.

Contracting out competition. Providers of the incumbents compete to deliver particular products or services.

Self-lay. Incumbents compete with contractors to install water mains and service pipes in new developments.

Inset appointments. Incumbents compete with new market entrants that can replace them in specific very small geographic areas.

Source: Authors based on Ofwat's documents.

28 For a more detailed discussion of the current water competition reform, see Oxera (2008, 2009).

Despite numerous attempts to kick-start direct competition in the market over the years, the regimes and rules developed have failed to generate any significant entry. The latest attempt to introduce direct competition in the market was the water supply licensing (WSL) regime established in December 2005. The WSL was supposed to assist competition between incumbents and entrants that can use incumbents' networks (or purchase wholesale water from them) to supply eligible customers.

But the WSL has failed to encourage direct market competition. In Ofwat's words:

No customers have yet switched supplier, few wholesale master agreements (WMAs) have been signed between licensees and appointed water companies, most WMA negotiations are taking too long to complete, and not even half of licensees appear to be actively engaging in WSL negotiations (Ofwat, 2007: 14).

According to Ofwat, the three principal reasons for the WSL failure have been the following:

- *Restrictive eligibility threshold.* Under the WSL regime, eligible customers are non-households likely to be supplied more than 50 megalitres (ML) of water per annum. Eligible consumers number only about 2,200 (Ofwat, 2007: 3 and 40).
- *The application of a 'retail-minus' cost principle to calculate wholesale water charges.* This principle implies that the prices that incumbents charge to entrants for wholesale water is equal to their retail charge, minus the costs that they avoid as a result of entry (Ofwat, 2007: 17–18).
- *Barriers to water abstraction rights trading.* The major barrier is that the Environment Agency has the discretion to reduce the size of abstraction rights when a trade happens (and has used this discretion), which disincentivises trading (Ofwat, 2008b: 76–80).

Based on its experience in the failure of WSL, Ofwat has proposed to change the rules governing competition in order to level the playing field for entrants to the market. But whether this regime change will increase entry remains unclear, as the underlying economics of the water sector might also be limiting entry. In other words, a level playing field does not guarantee that the opposing team will want to play.

3.3.2 *Ofwat's proposed reforms*

Ofwat has proposed a broad range of possible reforms to the regulatory framework. These reforms, summarised in Box 3.2, imply significant changes to

the rules and market framework structuring the entire value chain of water and sewerage services.

Figure 3.1 shows how the separation proposal splits up the value chain. Ofwat proposes to introduce competition in the contestable parts of the value chain, which it considers as those to the left and to the right of the network elements (that is, treated water distribution and sewerage collection). In relation to the network parts, Ofwat seems inclined to continue applying the tools traditionally used to regulate natural monopolies.

Box 3.2 *Reforms proposed by Ofwat*

Accounting separation of all elements of the value chain, and legal separation of contestable elements, starting with water and sewerage retail services (see Figure 3.1).

Implementation of separate price controls across the value chain.

Replacement of the retail-minus-cost principle by a set of general criteria for access pricing.

New non-household retail market arrangements for water, including the removal of the eligibility threshold.

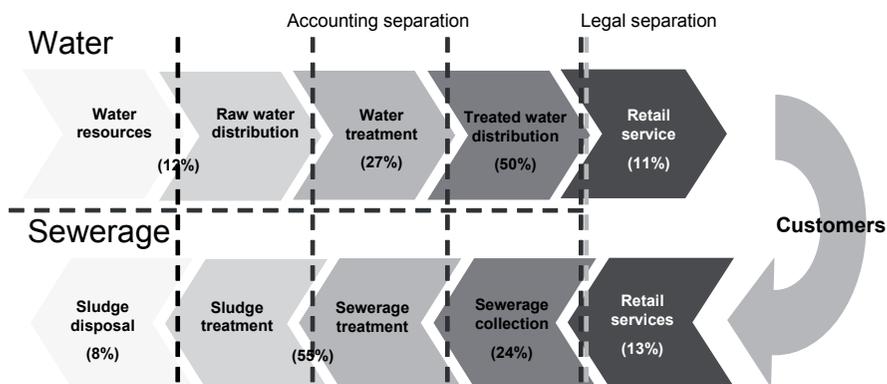
New non-household retail market arrangements for sewerage.

New water abstraction and treatment market architecture, including an effective market for trading water abstraction rights.

New sewerage treatment and sludge disposal market architecture.

Source: Authors, based on Ofwat’s documents

Figure 3.1 *Water and sewerage value chains*



Note: Percentages correspond to indicative industry cost allocations and add up to 100% in each industry.

Source: Ofwat (2008b); Ofwat (2009a); and authors’ modifications.

In relation to the timing of the reform, Ofwat has proposed a ‘test-and-verify’ approach. This means that it will start by making some minor reforms, and based on the results obtained, will then move on to introducing further changes.

On this basis, Ofwat has proposed to start by introducing competition in water and sewerage non-household retail markets before moving to water abstraction and treatment and sewerage treatment and disposal. Retail competition could be a low-risk starting point for the process of changing the industry. Although, as Figure 3.1 shows, in terms of cost, retail services represent a small percentage of the business, and since the non-household market is only a fraction of this small percentage, the initial effect on bills is likely to be small.

3.3.3 Independent review of competition and innovation

In early 2008 the Chancellor of the Exchequer, the Secretary of State for Environment, Food and Rural Affairs and the Welsh Minister for Environment, Sustainability and Housing commissioned Professor Martin Cave to undertake a review of competition and innovation in the water industry. The aim of the review was to recommend changes to the legislative and regulatory frameworks of the industry.

The results of this review (hereafter, the Cave Review) were published in two parts: an interim report and a final report. The interim report, which focuses mainly on measures to implement retail competition, put forth the following recommendations (Cave, 2008):

- *Increased eligibility.* Extending retail competition to a wider range of non-domestic customers by first lowering the eligibility threshold from the current 250 Ml per year to 5 Ml, and subsequently to 1 Ml.
- *Increased coverage.* Extending retail competition from water services to include wastewater services.
- *Business separation.* Legally separating the retail from the network side of companies.
- *Network access.* Replacing current arrangements with more flexible access-pricing principles to ensure that retail entrants earn a fair margin.

In addition to the above, the final review puts forward recommendations on a series of other issues. The more concrete of these, for implementation between 2010 and 2015, include the following (Cave, 2009):

- *Reforming abstractions.* Granting the Environment Agency greater powers to tackle over-abstraction, and removing current obstacles to the trading of abstraction licences.

- *Regulatory measures.* These include stipulating a duty for Ofwat to promote innovation, creating an industry-funded body to coordinate research and development activity, providing incentives to correct bias toward capital expenditure solutions, and providing greater scope for the bilateral negotiation of service standards.
- *'Marketlike' measures.* The review encourages companies to look beyond the self-provision of assets and to seek solutions outside their own company boundaries through the introduction of an economic purchasing obligation that requires companies to procure upstream solutions at the best value, subject to analysis by a procurement panel.
- *Merger reform.* This implies the removal of 'retail-only' mergers from the special water merger regime, and (for the remainder of the supply chain) the raising of the turnover threshold for mandatory references from £10 million to £70 million – the standard threshold for other merger references.

In addition to the above, the final report introduces some important modifications to the interim proposals for retail competition. It lists practical benefits to altogether abolishing the eligibility threshold for non-domestic customers, and accepts that legal separation may not be the best solution for the smallest water companies.

Based on these findings of the Cave Review and the recommendations from Ofwat, the government has committed to publish, by December 2012, a white paper that will outline which of the reforms (if any) discussed above will be taken forward.

3.4 POTENTIAL CHANGES TO THE SPECIAL WATER MERGER REGIME AND THEIR LIKELY EFFECTS ON MERGERS AND QUASI-MERGERS

How mergers and quasi-mergers evolve in the future is likely to depend on how the special water merger regime changes under the current competition reform.

In this section we discuss several potential changes to the special merger regime, focusing on the possible effects on water mergers and quasi-mergers. The three changes discussed are:

- Removing the special merger regime for non-domestic retail mergers
- Changing the OFT automatic referral rules for nonretail mergers and domestic retail mergers
- Redefining Ofwat's approach to water mergers.

Each one of these changes is discussed in more detail below.

3.4.1 Removal of the special merger regime for non-domestic retail mergers

Assuming that non-domestic retail competition is implemented successfully, it would be possible to remove the application of the special merger regime to non-domestic retail mergers. To the extent that competition is working effectively in the non-domestic part of the retail market, there would be no need for detailed regulatory intervention, such as the setting of price limits informed by comparative competition in this market. Against this backdrop, there would be little reason to retain the special regime for non-domestic retail mergers. Instead, under the standard merger regime, non-domestic retail mergers would be referred to the Competition Commission based on the SLC test.

Note that, in principle, the removal of the special merger regime would not apply to the domestic retail market. This is because competition is not likely to be implemented in this market. At least for the foreseeable future, Ofwat will have to keep regulating the sector as a natural monopoly (that is, using regulatory instruments such as comparative competition).

What are the potential effects on mergers and quasi-mergers? On the face of it, freeing non-domestic retail mergers from the special regime would clearly incentivise such mergers, as well as quasi-mergers in which two or more companies set up alliances or joint ventures to act in the newly developed competitive market.

But it is difficult to predict with certainty how mergers and quasi-mergers will develop in the future; non-domestic water and sewerage retail competition is a recent development, and no comparable previous experience is available. The only existing case of non-domestic retail competition in water and sewerage is in Scotland, where no mergers or quasi-mergers have yet happened. This lack could be due to various reasons, such as the fact that (i) competition only started one year ago; (ii) there is only one incumbent, Scottish Water; and (iii) there are only four companies competing in the retail market in addition to the Scottish Water Business Stream, which is owned by the incumbent. As discussed in Section 3.1, England and Wales present a different operating and market environment – for example, by being home to 21 privately owned operators. Such an environment is more propitious for the development of mergers and quasi-mergers than that of Scotland.

Table 3.4 outlines the types of mergers and quasi-mergers that could potentially happen in England and Wales as a result of removing the special regime for non-domestic retail mergers, and presents the Scottish example as a reference.

Table 3.4 *Potential mergers and quasi-mergers in the non-household retail market*

| Type | England and Wales | Scotland |
|---------------------|---|---|
| Incumbent–incumbent | <p>Likely, incumbents might sell off their non-domestic retail arms to other incumbents, or form alliances with them. In particular, this could happen between WaSCs and WoCs in the same region. Some alliances in retail are already taking place (for example, Wessex Water has a joint venture with Bristol Water to provide only one bill rather than two for customers who receive their water supply from Bristol Water and sewerage services from Wessex Water).</p> <p>Less likely, if there is no clear legal separation between non-domestic retail and domestic retail, as mergers and quasi-mergers would still fall under the special water merger regime due to the domestic part of retail.</p> | Not possible, as there is only one incumbent (Scottish Water). |
| Incumbent–entrant | Likely, given that incumbents might benefit from the potentially more aggressive business approach of entrants to expand business outside their own region. | Not likely, given that Scottish Water Business Stream does not need to enter into another region. But Scottish Water Business Stream could attempt entering the market in England and Wales. To do this it could potentially partner with one of the four entrants today competing in Scotland, or attempt to enter on its own. |
| Entrant–entrant | Likely, given the large size of the market. | Less likely than in England and Wales, given the smaller size of the market. |

3.4.2 *Change in the OFT automatic referral rules for non-retail and domestic retail mergers*

There are two key amendments that could be introduced to the referral rules for non-retail mergers and domestic retail mergers.

- *Raise the £10 million automatic referral threshold.* The threshold within the special merger regime could be increased. The Cave Review suggested raising the threshold to £70 million, in line with that currently applied to standard mergers (see Section 3.1) (Cave, 2009: 96).
- *Introduce an OFT test for both SLC and prejudice to comparative competition.* A test could be applied to identify those mergers that are

problematic from a competition and regulatory perspective, for referral to the Competition Commission. Such a change is in line with Ofwat's suggestion – made in response to Cave's interim report (outlined in Figure 3.2) (Ofwat, 2009b) – that the OFT should refer water mergers based on the following tests:

- ◇ *For non-retail mergers.* If the merger is believed to prejudice comparative competition (the current Competition Commission test), or if the merger is believed to result in SLC (the current OFT test).
- ◇ *For retail mergers.* If the merger is believed to result in SLC (the current OFT test). This is equivalent to removing the special merger regime in the case of retail mergers.

These two amendments could be implemented in a number of ways, for example:

- Less permissive
 - ◇ A £70 million threshold, implemented as in the current water merger regime (that is, a threshold above which all mergers are automatically referred to the Competition Commission).
 - ◇ An OFT test for both SLC and prejudice to comparative competition on mergers below the £70 million threshold.
- More permissive
 - ◇ A £70 million threshold implemented as in the standard merger regime (that is, a threshold above which the OFT is allowed to consider the merger). This implies a SLC test for mergers above the £70 million threshold.
 - ◇ An additional OFT test for prejudice to comparative competition on mergers that are above the £70 million threshold.

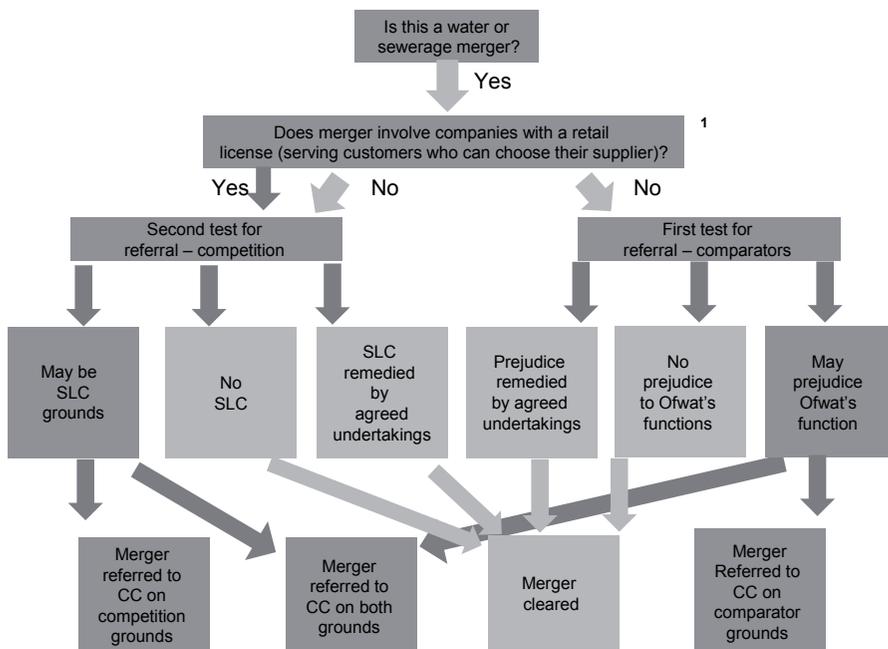
What are the potential effects on mergers? The less permissive approach might incentivise some water mergers, as it removes the likelihood that mergers below the threshold will face a Competition Commission inquiry. But companies might still be reluctant to go through the OFT process. It is worth noting that the OFT has shown a willingness to undertake complex analysis in its investigations; the recent Co-op/Somerfield merger saw the examination of more than 40,000 consumer questionnaires, described as 'probably the largest consumer survey ever conducted in a merger case' (OFT, 2008). As such, while mergers may

not be referred to the Competition Commission as a matter of course, detailed analysis may still be required.

The more permissive approach would incentivise more water mergers as it would, in principle, significantly reduce the chances of below-threshold mergers facing a Competition Commission inquiry.

But as explained in Section 3.1, under the standard merger regime, a phase 1 examination by the OFT is triggered not only when the acquired company has a turnover of £70 million, but also when the combined entity has a 25% share of the supply of ‘goods or services of any description’ (and when the merger would give rise to an increment in that share of supply). If the 25% share requirement were to be introduced along with the £70 million threshold, this additional provision could be used to capture many water mergers that would otherwise fall below the £70 million threshold since, in practice, the OFT has broad discretion in interpreting what is meant by ‘goods or services of any description’ (OFT and Competition Commission, 2009: para 3.31; and OFT, 2003: paras 2.3–2.5).

Figure 3.2 *Ofwat’s suggested OFT test*



Note: 1. In answering this question Ofwat does not separate retail into domestic and non-domestic categories. Neither does it specify what happens if the merging companies have a non-retail business as well as a retail business. A probably more accurate question that could go in this box would be: Does the merger involve companies with only a non-domestic retail licence?

Source: Ofwat (2009b).

In addition, the threshold could be set at a different level. A £70 million threshold is proposed in the Cave Review, but if the threshold were to be amended, a more in-depth assessment of its level may be required.

The changes to the existing referral rules currently under discussion would do more to encourage mergers involving small WoCs. This can be appreciated by analysing the data in Table 3.5, which ranks companies by turnover. This ranking shows that seven companies (or five, if the companies owned by Veolia are excluded) fall below the £70 million threshold, whereas none fall below the £10 million threshold.

Table 3.5 *Water companies ranked by annual turnover*

| Company | Annual turnover, 2007–8 (£ million, 2007–8 prices) ^a |
|---------------------------------|--|
| Tendring Hundred ^b | 14 |
| Folkestone & Dover ^b | 18 |
| Dee Valley | 19 |
| Cambridge | 21 |
| Portsmouth | 34 |
| Bournemouth & West Hampshire | 37 |
| Sutton & East Surrey | 50 |
| South Staffordshire | 77 |
| Bristol | 88 |
| South East (includes Mid Kent) | 164 |
| Three Valleys ^b | 224 |
| Wessex | 391 |
| South West | 413 |
| Northumbrian | 595 |
| Southern | 610 |
| Dŵr Cymru | 614 |
| Yorkshire | 785 |
| Anglian | 957 |
| Severn Trent | 1,257 |
| United Utilities | 1,418 |
| Thames | 1,454 |

Notes: a For water and sewerage companies this includes sewerage turnover. b Owned by Veolia Environment.

Source: Authors, based on Ofwat (2008a).

What are the potential effects on quasi-mergers? Quasi-mergers do not seem likely to increase as a result of a change in the OFT automatic referral rules for non-retail mergers and domestic retail mergers. The history of mergers and quasi-mergers in the sector suggests that regulated monopolies tend to merge, rather than to become associated via special agreements such as alliances (see Section 3.2).

3.4.3 Redefining Ofwat's approach to water mergers

As explained in Section 3.1, the regulatory system applied by Ofwat relies heavily on its ability to make comparisons across companies. In Ofwat's words:

We strongly believe our ability to use comparisons is central to a robust and challenging regulatory process. The use of comparisons forms a backdrop to all of our work, and we are able to challenge companies whose performance falls short of their peers in all aspects of regulation from reviewing the quality of their asset management data systems to the levels of service delivered. ... At the broad level publishing comparative information on individual company performance and making cross-industry relative efficiency judgments at price reviews are the most explicit ways in which we use comparative competition to regulate the industry. But our entire approach is premised on our ability to make comparisons (Ofwat, 2006: 18).

As a result, Ofwat places high value on comparators, and has historically been opposed to mergers in the sector.

Box 3.3 outlines the principles proposed by Ofwat during the latest water merger between Mid Kent Water and South East Water.

It is clear that the comparative competition regime has delivered significant benefits since privatisation in 1989. For example, as a result of efficiency gains, water companies' bills are 30% lower than they would have been without Ofwat's regulation (Ofwat, 2009b: 1).

But there seem to be additional factors that, if incorporated into Ofwat's approach, could relax Ofwat's position on losing one comparator as a result of a merger. For example:

- *Efficient water resource management.* Lack of sharing of water resources, a problem particularly in the southeast of England, might be overcome if some companies are merged.
- *Innovation.* As highlighted by the Cave Review, the innovation could be improved by a central planning approach aimed at achieving more cooperation in the form of a centralised industry research and development fund (Cave, 2009: 14), which would be favoured if there are fewer players in the industry rather than through more competition.

- *Additional quantitative techniques.* There are a number of other means by which Ofwat could effectively apply comparative competition with a lower number of comparators. Such techniques include subservice-level modelling, use of panel data, system modeling,²⁹ stochastic frontier analysis (SFA), and data envelopment analysis (DEA).

Box 3.3 *Ofwat's outlook on water mergers*

Any merger is a detriment and prejudices our ability to make comparisons.

Reducing the number of companies with independent ownership further prejudices our ability to make comparisons. . . . The robustness of our econometric modeling relies on the largest possible numbers of comparators. Any reduction to the number of comparators has an impact on the robustness of the analysis produced by these models.

Each merger permanently reduces the number of independent comparators and as a result the detriment to the comparative regime increases for each successive merger.

Companies that are at or are close to the efficiency/service frontier in more than one area are valuable comparators. There are no guarantees that the merging of activities and management will allow the companies involved to remain at the efficiency frontier or establish a new frontier. Evidence from previous mergers shows that it takes a number of years for merged companies to deliver the efficiency savings that the merger is designed to deliver.

A merger between two sewerage companies has the greatest detriment on our ability to make comparisons.

Mergers between contiguous companies can affect our ability to make comparisons between companies that are operating in similar circumstances facing similar issues. Although we recognize that in some instances a merger between two smaller contiguous companies could potentially provide a comparator with an improved ability to deal with local issues, this is balanced by the damage to our comparative regime of a merger that involves contiguous companies. Where a company is taken over by another company operating in the industry – that is not contiguous – there is a greater possibility of it being divested and potentially becoming an independent comparator than there is for contiguous companies where the activities are merged to a greater extent.

A merger diminishes the potential range of performance that a diverse group of companies displays

Source: Ofwat (2006: 23–24).

²⁹ A detailed discussion of the possible impact that panel data and system modelling techniques could have on how Ofwat regulates water companies is provided in Kumbhakar and Horncastle (2010).

The quantitative techniques for comparative competition were much discussed during the latest water merger, with the Competition Commission concluding:

In summary, we found there to be scope for exploring the use of both sub-company data and, in particular, panel data. There might also be scope to ensure that Ofwat made the maximum use of the available data from other sources (e.g., other countries or industries), and to use alternative techniques (such as SFA and DEA) to validate the results of Ofwat's existing econometric models where possible. (Competition Commission, 2007: para 6.22)

The introduction of some of these techniques has already been considered by Ofwat. For example, in the methodology paper of its 2009 price review (PR09), Ofwat stated that it would 'make best use of time series data' (Ofwat, 2008c: 41). But so far, these new methodologies do not seem to play a prominent role in the instruments used by Ofwat.

What are the potential effects on mergers? A redefinition of Ofwat's approach to water mergers, one that takes into account some of the factors discussed above, could soften Ofwat's position on potential mergers. As a result, companies might face less opposition from Ofwat during the Competition Commission enquiries and would be more incentivised to merge.

What are the potential effects on quasi-mergers? There does not seem to be a clear sign that quasi-mergers should increase as a result of redefining Ofwat's approach to mergers. The reason here is similar to the reason discussed in Section 3.2.2 – during the past 20 years, water sector quasi-mergers have not been deterred by the special water merger regime, but by the nature of the sector (that is, private ownership and the virtual non-existence of procurement contracts awarded by the government). As a result, relaxing the way in which the special water merger regime is applied could be a necessary, but not sufficient condition for the increase of quasi-mergers.

3.5 SUMMARY AND CONCLUSIONS

3.5.1 Mergers

Since privatisation in 1989, there has been a clear process of consolidation in the water sector. This has led to the industry structure seen today, in which there are 10 WaSCs and 11 WoCs operating in some areas within the WaSCs' regions.

This process has now slowed, in no small part because of the stringent conditions imposed by the special water merger regime, which establishes that a merger between any two companies with a turnover of more than £10 million must be referred to the Competition Commission. (And, as previously noted, since all 21 water companies have turnovers above this threshold, any merger will be automatically referred, in effect, to the Competition Commission.)

As part of the reforms currently being undertaken to introduce competition in the water sector, however, the special merger regime could be modified in

major ways. For example, the £10 million referral threshold could be raised to £70 million. Such a change would most likely lead to more consolidation in the sector.

A key challenge faced by Ofwat and the government is to ensure that any changes to the special merger regime produce net benefits. In other words, the potential benefits of new mergers must outweigh possible detriments to the regulatory regime.

3.5.2 *Quasi-mergers*

In England and Wales, quasi-mergers are dealt with by competition law in the same way as mergers. This allows competition authorities to apply all the available competition policy legal tools in the cases of alliances, consortia, and other quasi-merger arrangements.

The water sector in England and Wales has unique characteristics. For example, companies are privately owned and are subject to economic regulation under a RPI-X regulatory regime. This implies that quasi-mergers in which companies jointly bid for government contracts do not happen often, since there are no government-led procurement processes as in some other European countries. In addition companies are strongly incentivised by the regulatory system to procure efficiently.

But the current competition reform might encourage quasi-mergers in the near future, especially in the potentially competitive non-household retail sector (although it is not yet clear what form they might take). If quasi-mergers become more frequent in the water sector, competition authorities and regulators will need to ensure that competition policy tools are appropriately applied to deal with them in an effective manner.

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Regulating Electricity Transmission in the European Union – How Many Agencies?

CLAUDE CRAMPES AND LUCILE RIVES

National electric grids in Europe have been interconnected since the beginning of the 20th century, a long time before the European Union (EU) was born and began to build a single energy market. The primary reason for interconnection is security: the more national grids expand, the greater the need for mutual assistance. As the EU has grown, the European cross-border transmission sector has been organised into various national operators' associations. The evolution of the Union for the Coordination of Production and Transmission of Electricity (UCPTE) illustrates this process. Created in 1951, the UCPTE gathered all the electric operators of Western Europe to create a widely interconnected power grid. In 1999 the Czech Republic, Hungary, Poland and the Slovak Republic became full members of the UCPTE. Meanwhile, in 1999 market liberalisation prompted the separation of transmission activity from generation and retail operations. Consequently, the UCPTE became the Union for the Coordination of Transmission of Electricity (UCTE).

To guarantee the security of supply and networks, the EU added the objective of integrating national energy markets into a single market. Beginning in 1996, the European authorities have published a series of directives and regulations aimed at instituting a free European electricity market in which consumers will be able to choose their suppliers in a competitive setting.³⁰ To this end, the European authorities dismantled vertically integrated monopolies by separating production and supply, which are potentially competitive, from transmission and distribution, which are natural monopolies. To guarantee open access to the grid for all suppliers (for a price, of course), and to avoid cross-subsidies and distortions of competition, firms maintaining integrated ownership are required to keep their internal accounting and management of each transmission and distribution activity separate. Network activities must be managed by independent entities: Distribution system operators (DSOs) are now in charge of distribution transformers and lines, while transmission system operators

³⁰ In particular, directives 96/92/EC, 2003/54/EC and 2009/72/EC. See <http://eur-lex.europa.eu/en/index.htm>.

(TSOs) are responsible for the transmission network and the interconnections as well as the operation of the electric system. For instance, Réseau de Transport d'Electricité (RTE) is the TSO in France, whereas National Grid is the main TSO in Great Britain, Red Eléctrica de España operates in Spain, and so on. Interconnections have a key role to play in favouring competition, because they allow consumers to benefit from the advantages of complementary generation mixes as well as heterogeneous demand profiles. Second, to accompany the liberalisation process and to keep the newly dismantled monopolies under close scrutiny, Directive 2003/54/EC³¹ requires the establishment of independent national regulatory authorities (NRAs), such as the Commission de Régulation de l'Énergie (CRE) in France, the Office of the Gas and Electricity Markets (OFGEM) in Great Britain, the Comisión Nacional de Energía (CNE) in Spain, and so on.

Despite the efforts of these regulatory bodies, several accidents and ongoing problems have shown that a true common market is not yet a reality, and that the current organisational structure does not guarantee a reliable supply of power. A striking example is the blackout that occurred on 4 November 2006, when an overload on a German power network triggered chain reactions of outages across Western Europe, leaving 10 million Europeans without electricity. The German utility provider E.ON had unexpectedly turned off the 380,000-volt line it operates over the river Ems to allow a ship to pass through safely.³² The regulatory consequences of such an accident were summarised by Sir John Mogg, president of the Council of European Energy Regulators (CEER): 'This recent blackout demonstrates the need, now more than ever, for an integrated European electricity grid subject to proper regulatory oversight. We need new legislation that formally mandates the TSOs to cooperate and we must have effective unbundling that would facilitate proper exchange of information.'³³

The Third Legislative Energy Package,³⁴ adopted by the European authorities in 2009, constitutes the EU's response to the lack of cooperation among TSOs in efforts to guarantee the security of supply and complete the European energy market. The package identifies interconnection as key to the creation of a common market. Therefore, the EU authorities aim to organise an efficient cross-border transmission sector for Europe. To do so, the new legislation gives additional responsibilities to national TSOs and NRAs while creating a European regulator for interconnections, the Agency for the Cooperation of Energy Regulators

31 Directive 2003/54/EC concerning common rules for the internal market in electricity and repealing Directive 96/92/EC.

32 For details, see the UCTE's (2007) report at www.entsoe.eu/fileadmin/user_upload/_library/publications/ce/otherreports/Final-Report-20070130.pdf.

33 CEER Press Release, 'European Energy Regulators investigate blackout in Europe', 7 November 2006, www.cre.fr/fr/content/download/9898/168164/file/1162919250886.pdf

34 The package consists of two directives on rules for the internal electricity and gas markets, two regulations on the conditions for access to those markets, and one regulation establishing the ACER.

(ACER),³⁵ as well as a European association of TSOs, the European Network of Transmission System Operators for Electricity (ENTSO-E).

The new regulatory framework for interconnection raises several economic issues that will be discussed later on. As described above, both national and European regulators scrutinise the TSOs' activities. Each organisation has powers that affect the TSOs' decisions on interconnection. The theory of multiprincipals³⁶ provides a useful tool set when studying the interacting incentives designed by these different regulators. The subsidiarity principle³⁷ – according to which decentralisation is desirable unless it pushes up coordination costs and discourages the internalisation of the side-effects of the decisions of local decisionmakers – is also helpful in assessing the proper level of decentralisation.

In Section 4.1 we analyse the hierarchical regulatory structure created by the Third Energy Package through a study of the powers attributed to each actor and a modelling of the actors' relationships. The analysis is based on an article by Caillaud *et al* (1996). Our main conclusion is that it is always optimal to decentralise part or all of the provision of incentives. In Section 4.2, we consider the possibility of mergers between national TSOs and the likely subsequent development of international TSOs with stakes in several countries under separate regulation mechanisms. We discuss how the regulatory structure should evolve and how the relationships between an international TSO and its regulator(s) could be altered. Our analysis relies on an article by Laffont and Pouyet (2003), who discuss the role of shareholders and lobbyists in the regulation process. To conclude, we suggest some topics for further research.

4.1 THE REGULATORY HIERARCHY OF THE EUROPEAN CROSS-BORDER TRANSMISSION SECTOR

In this section, we assess the current regulatory hierarchy of the European cross-border transmission sector. We first look at the powers granted by the Third Energy Package to national and European regulators overseeing cross-border transmission activity. We then discuss the interactions between the incentives supplied by national and European regulators and their impacts on TSO decisions on interconnection. Finally, we sketch a model of how to design regulation mechanisms when the regulation authority faces moral hazard and potential capture.

35 Regulation (EC) No 713/2009 of the European Parliament and of the Council of 13 July 2009, establishing an ACER; see <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32009R0713:EN:NOT>.

36 See Martimort (1992, 1996).

37 See Laffont and Pouyet (2003).

4.1.1 National and international regulators

This subsection introduces the regulatory principals that we examine later on. We first show how the Third Energy Package enhances the powers of national regulatory agencies to regulate interconnection. Then, we present the functions of the new European regulator for interconnection.

Enhanced powers for National Regulatory Authorities

Through a directive on the internal rules for electricity markets, the Third Energy Package enhances NRAs' role in cross-border issues. For instance, NRAs, already in charge of monitoring TSO compliance with the guidelines for management of congestion and interconnection, also assess TSOs' investment plans and their consistency with the Europe-wide ten-year development plan elaborated by the ENTSO-E.

Furthermore, the NRAs are explicitly required to cooperate more at the European level. They already cooperate to some extent, thanks to several structures such as the European Regulators Group for Electricity and Gas (ERGEG). The European Commission created the ERGEG as an advisory body in 2003. It is composed of representatives of the NRAs. Through it, the NRAs advise the Commission on how to further consolidate the internal electricity market. But despite efforts that have led to a convergence of views,³⁸ the main weakness of the institution, which works on a voluntary basis, is that it follows a constrained decisionmaking process in which 27 regulators have to agree

Regulating interconnection

After several years of debate about the appropriate regulatory structure to deal with cross-border issues, the European Commission opted for an independent body. Until now, interconnection was regulated only by the national regulators. The Third Energy Package set up the ACER to complement and coordinate the regulatory tasks performed at the national level.

The ACER supports NRAs in their efforts to cooperate. It also monitors and reviews the activities of the ENTSO-E. In particular, the ACER provides its opinion on the priorities of the TSOs' ten-year network development plan and in the preparation of technical and market codes. Furthermore, it has independent decisionmaking power over cross-border issues as well as a general advisory role in the European Commission, complementing the ERGEG's functions.

The role of the ACER will probably evolve in the next few years, most likely in the direction of gaining more power at the expense of the NRAs. Is that a good thing? Or is decentralised regulation a better option? We shall now discuss this design problem.

³⁸ See, for example, ERGEG (2008).

4.1.2 Regulation design of national TSOs

The question of choosing between a unique European agency and a set of national agencies, or a combination of both, to regulate a given economic sector was addressed in several fields before the problem arose in the electricity transport sector. For example, Caillaud *et al* (1996) ground the theoretical model we discuss in the following paragraphs in the organisation of both the Common Agricultural Policy and European research and development (R&D) policy. The regulatory framework within which those authors work is very similar to the one proposed in the Third Energy Package for cross-border issues. They address the question of how to balance the regulation process in a national and international hierarchical structure when the national entities are better informed than the international entity, and when the national firms create externalities that lie outside the scope of the national regulators.

Spillover internalisation versus informational opportunism

The hierarchical structure

The theoretical regulatory pyramid stipulated and analysed by Caillaud *et al* (1996) is made up of one European regulatory agency (ERA) and a set of NRAs, each of which is in charge of controlling one national monopoly. This regulatory structure is quite representative of that used for the transport of electricity. Indeed, the ERA can be likened to the ACER, the national sector regulators can be likened to the actual NRAs, and the natural monopolies could be the TSOs. (Note that in countries where there are several TSOs, for example, in Germany, the operators have regional prerogatives and so behave like monopolies.) However, compared with the real world of electricity transport, several important actors are missing from the model, in particular the national governments, the European Commission, and the ENTSO-E.

Externalities and spillover effects

The central question is whether TSOs' decisionmaking exerts effects beyond the scope of their profit function. Were private and social objectives positively related, there would be no reason to regulate firms (in this case, TSOs). That said, there is a general discrepancy between the private profit derived through the decisions of regulated TSOs and social welfare.

To explain the gap between the private and the social levels of effort in the industry we analyse, we observe that not all agents assign the same value to the energy transported internationally – or to interconnection capacities. For instance, a vertically integrated firm that owns both transmission and generation assets has little interest in investing in cross-border infrastructure if it anticipates energy imports. Indeed, investing in interconnection would make it easier for potential challengers to enter such a firm's home market. By contrast, national and European consumers value such investments because they increase the security of supply and make mutual assistance easier in case of domestic

failure, even though interconnection makes electricity more expensive in the exporting countries.³⁹ Notice also that beside the European dimension of an integrated energy market, European foreign policy is at stake. For instance, the Mediterranean network project, which aims to link the European grid to the Mediterranean countries over a distance of 8,000 km, is highly valued by some European actors.⁴⁰

When there are several decisionmakers with the same objective but different levels of information, the only problem is how to pool the scattered information (Marshack and Radner, 1972). By contrast, in the context of electricity transport, divergent interests arise both from externalities (e.g., local congestion) and from spillover effects that are internalised neither by the NRAs nor by the TSOs (e.g., loop flows). The first type of discrepancy is rather common, whereas the second comes from international by-products of national decisions. For example, because of loop flows, the decision to reinforce a domestic transport line can adversely affect the electricity flows in interconnections and, consequently, alter welfare in the neighbouring countries.

The informational structure

The basic assumption of the model discussed here is that some actions of the TSOs under scrutiny cannot be verified by the regulator(s), which is a matter of moral hazard. This means that regulation contracts cannot be based on these actions since the real decisions taken by the agent cannot be checked after the fact.

On top of an informational asymmetry in favour of the TSOs, the model supposes that the national regulators have an informational advantage over the ERA. Several reasons can explain this information gap. Mere geographical location makes it more difficult for the ACER to observe the TSOs' actions. Moreover, the new legislation enables national regulators to keep the TSOs' activities under scrutiny. To limit market abuse, national regulators have access to the firms' operational decisions up to five years after such decisions are made. Plus, national regulators have been working with TSOs since the year 2000, whereas the ACER is just starting out. Other similarities and divergences between the model and real life will be discussed further on.

Because the actions of TSOs are very often hidden, the regulation mechanism can be based only on observable states of the world (for example, the duration of blackouts) or signals (for example, the number of complaints) that are partially generated by hidden actions and publicly observable. The model we discuss here is based on the existence of signals. For instance, when a TSO increases its (unobservable) maintenance effort on the interconnections it manages, the NRAs and ERA can merely observe that the network users are more satisfied or that fewer complaints are received. Moreover, as the NRAs have an informational

39 Building a line between two countries creates a large market with the effect of price convergence.

In the high-price country, importing cheap energy drives the price down; in the low-price country exporting energy to customers with high willingness to pay pushes the price up

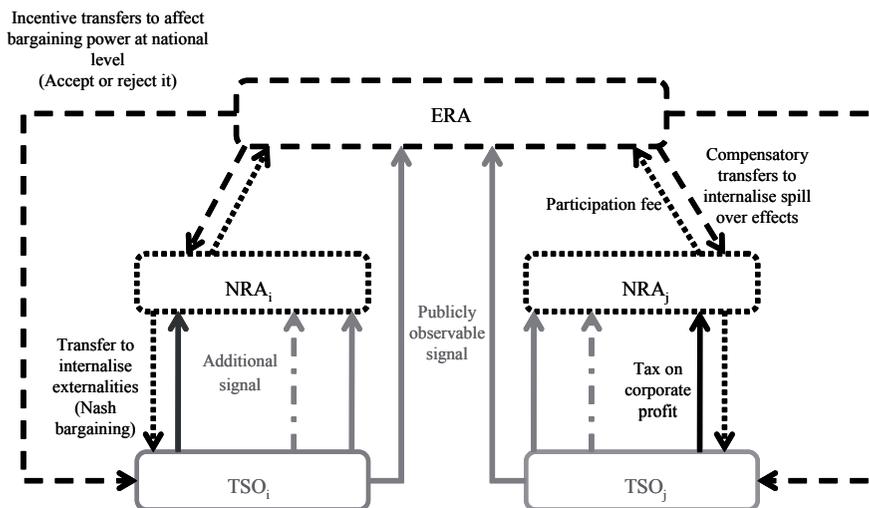
40 For details on the Transgreen project, see <http://transgreen.eu/topic/index.html>

advantage over the ERA, each NRA receives an additional signal that is not correlated with the one received at the Community level (see our illustration in Figure 4.1). The probability that each NRA receives a signal of good performance increases with the effort of the TSO under its jurisdiction.

Bargaining power

A more disputable assumption of the model when applied to electricity transport is the one concerning relative bargaining power. The ERA is supposed to have strong bargaining power against the TSOs since it proposes a system of subsidies that can only be accepted or rejected. National regulators, by contrast, have to negotiate their policy with the TSOs. Since the ACER is a new institution, this is not (yet) the case. Nevertheless, the idea that Community decisions are easier to enforce than national decisions is increasingly true across the EU. Additionally, the modelling of the relationship between each NRA and the corresponding regulated TSO by means of a bargaining process can be interpreted as a modelling of the degree of capture of the national regulator – that is, how much the NRA depends on the TSO’s private interests.⁴¹ In other words, it is more difficult for national TSOs to capture a European entity than to capture a national regulator.

Figure 4.1 *Financial and informational flows in the national TSO game*



Note: NRA = national regulatory agency; ERA = European regulatory agency; TSO = transmission system operator.

Source: Authors.

41 On the capture of regulators, see Faure-Grimaud *et al* (2003).

Financial flows

Consider now the financial flows under the control of the ERA. The ERA is entirely financed *ex ante* by member states' participation fees, and it must balance its budget. The regulatory instruments it controls are twofold: they consist of direct incentive transfers (subsidies from the ERA to the TSOs), and compensatory transfers between countries (transfers to the NRAs). Transfers from European institutions to the NRAs and TSOs to foster cross-border investments do exist – for example, the inter-TSO compensation mechanism.⁴² International transactions may be carried out by network operators in several Member States. The TSOs affected by energy flows resulting from transactions incur extra costs in their networks. The inter-TSO compensation mechanism is an annual voluntary scheme aimed at providing compensation for such extra costs. It has been in effect since 2002 and is organised according to EC Regulation 1228/2003: 'It supports the development of the single electricity market by ensuring that decisions on cross-border trade and on plant location and retirement are not distorted and that the costs of the transmission infrastructure are recovered from those responsible for its use.'

The Trans-European Energy Network (TEN-E) is another mechanism. The EU contributes to electricity transmission infrastructure projects of European interest. An annual budget of €25 million is spent on financing studies. The project between France and Spain is an example.⁴³

Even though such schemes are not directly the responsibility of the ACER, we can imagine that the ERA would provide similar incentives to develop interconnections. On the one hand, constrained by a balanced-budget condition, the ERA modelled by Caillaud *et al* (1996) asks Member States to contribute to financing transfers. On the other hand, the States receive compensatory transfers to internalise spillover effects. This is quite representative of the budget of the ACER. The agency's annual costs will be covered by Community grants. The agency has limited revenues stemming from fees to be paid by third parties when the agency makes particular decisions.⁴⁴

As we already noted, in the regulation game with hidden actions by the agent, the only feasible regulatory instruments are monetary transfers based on signals assumed to be positively correlated with the intensity of the effort devoted to greater efficiency. At the national level, each NRA determines the transfer to the TSO it regulates. National transfers are financed through a tax on corporate profit (including a direct subsidy from the ERA). They are also financed by

42 See Daxhelet and Smeers (2005) and Florence School of Regulation (2005).

43 Estimated cost: €700 million, funded in equal parts by the RTE and the REE, via their joint venture INELFE. European funding is being decided on at the level of the European Commission; it could reach €225 million. See <http://www.liaison-france-espagne.org/index.php>

44 'The Agency should be mainly financed from the general budget of the European Union, by fees and by voluntary contributions. In particular, the resources currently pooled by regulatory authorities for their cooperation at Community level should continue to be available to the Agency.' Regulation (EC) 713/2009.

consumers through payment of electricity bills, and that generates a dead-weight loss due to the cost of public funds.

Alternative scenarios

Given the assumptions and the institutional setting presented above, Caillaud *et al* (1996) contrast the social effects of three possible scenarios:

- *Full decentralisation* (the dashed portions of Figure 4.1 are not present). NRAs enjoy informational advantages but are constrained to bargain with the TSOs to implement their national policies and do not take spillover effects into account.
- *Full centralisation* (the dotted portions of Figure 4.1 are not present). The ERA is able to internalise spillover effects but suffers from an informational disadvantage. In this scenario, the ACER would be endowed with all the powers of the NRAs. Note that this alternative is rejected by many governments, who fear losing their sovereignty. This rejection is in line with Caillaud and his co-authors, who state that ‘full centralization at the Community level is never optimal from the aggregate point of view as soon as national regulators have an informational advantage’ (p. 94).
- *Partial (de)centralisation*. Because national and community policies are complementary, the partial decentralisation scenario is generically the best solution, even though full decentralisation may be optimal if the informational advantage of national regulators is large and they have sufficient bargaining power.

Moral hazard and risk of capture

Several useful lessons can be derived from this analysis.

First, regarding informational rent, the optimal contracts signed by the ERA, followed by national negotiations, lead to suboptimal decisions by the TSOs. This is because the moral hazard problems faced by the ERA and the NRAs imply that a rent will be left to the TSOs, which causes a social loss. The TSOs are able to extract some rent during the national negotiation process, since the NRAs do not have full bargaining power (because they are partially captured). To put it in other words, moral hazard and potential capture are the sources of TSO rents. The trade-off between full efficiency and rent minimisation leads to a distortion in producers’ decisions.⁴⁵

Second, it is always optimal to allow for national policies, that is, to decentralise part or all of the provision of incentives. This ensures that the burden of providing incentives is shared among the different regulatory entities. How it is

⁴⁵ Such results are standard in the literature on economic regulation. See, for example, Laffont and Martimort (2002).

shared depends on the size of the spillover effects and on the degree of national regulators' bargaining power, that is, their degree of capture. Two extreme cases can be distinguished:

- When the NRAs are totally independent from the regulated TSOs, they leave no rent during the bargaining process with the TSO they regulate. As the ERA suffers from an informational disadvantage with respect to the NRAs, it cannot do better than the NRAs. The ERA only determines compensatory transfers between Member States so as to allow them to internalise the externalities that their TSOs bring about. The task of inducing TSOs to make efficient decisions at the Community level is entirely left to the NRAs. (This is not true, however, in case of partial capture.)
- If the TSOs have some bargaining power, they are able to extract rents in the national negotiation framework. Once Community and national objectives are aligned through transfers across Member States, the ERA should influence the national negotiations so as to minimise the rent extracted by the TSOs. The capacity of the ERA to modify the status quo options in national negotiation processes is Pareto-improving for the Community. In this case, full decentralisation is not optimal despite the ERA's informational handicap.

Full decentralisation can also be optimal as long as spillover effects are not too great, or more precisely as long as the TSOs' hidden actions that create spillover effects are below a certain threshold. Indeed, as long as the TSOs' decisions have small impacts on the welfare of neighbouring countries, the subsidiarity considerations prevail. But in the case of large positive spillover effects, a supranational direct incentive policy will be desirable, complemented by the control of the better-informed NRAs.

In the absence of a totally independent ERA, it is not uncommon for the electricity transport sector to be characterised by some degree of capture; the NRAs are obliged to strike a compromise with both the TSOs and national governments. This leads us to conclude that the Third Energy Package makes sense. First, the creation of the ACER will help to limit the bargaining power of the TSOs. Moreover, by enhancing the NRAs' powers, the Third Package will help mitigate capture, making efficiency reachable at a lower cost. This reinforcement of the NRAs does not contradict the function of the ACER.

The future of the sector's complex regulatory structure depends on the capacity of the ERA to extract information from the NRAs. If the latter were obliged to transmit to the former all the information they have on the TSOs they regulate, the ACER would have all the advantages of a supranational entity (that is, the internalisation of spillover effects and no risk of capture) without the informational gap that can impair its decisionmaking process.

4.2 THE REGULATION OF INTERNATIONAL TSOs

In this section, we consider the possibility of mergers between national TSOs, which would lead to the creation of international TSOs. Then we discuss potential regulatory relationships between such international TSOs and international and national regulators.

4.2.1 International TSOs

Several new trends seem to suggest the desirability of international TSOs. To begin with, even though unbundling the ownership of production and transport assets is not yet compulsory – even after much debate in the run-up to the Third Energy Package – European authorities continue to put pressure on vertically integrated national incumbents. Furthermore, the creation of a Europe-wide TSOs' association as well as the further development of regional initiatives can be seen as preliminary to the creation of international TSOs.

Unbundling

The proponents of unbundling maintain that when a handful of vertically integrated firms controls the market, there are few incentives both to provide access to new entrants and to invest in network capacity. Unbundling would thus enable more competition and bring prices (and profits) down. To curtail the power of the energy giants, the European Council and the European Parliament encourage the effective separation of generation and transmission assets as an efficient step toward promoting investment in infrastructure, fair access to the grid, and transparency.

The proposals for unbundling ownership faced strong opposition during the negotiation of the Third Energy Package. Eventually, the members of the European Parliament signed a deal that allows companies to choose among three alternative models: ownership unbundling (adopted by Italy, Spain and the UK, among others), an independent system operator (ISO, as in, for example, Scotland, and in California and the Midwest United States), and an independent transmission operator (ITO). In the ISO model, large vertically integrated companies are allowed to retain ownership of their electric grids under the condition that decisions regarding the system (ancillary services, investments, and so on) are made by an independent entity. In the ITO model chosen by France and Germany, integrated companies keep making commercial and investment decisions but have to set up a framework to guarantee the independent operation of the electricity system as well as the transmission network.

Full unbundling still has powerful supporters, particularly among the members of the parliament and among commissioners.⁴⁶ Consequently, we can imagine that, sooner or later, ownership unbundling will become the rule all around the EU, so that most of the TSOs will operate as independent entities. Then, the

⁴⁶ For a discussion of the economic pros and cons, see Pollitt (2007).

separation of neighbouring European TSOs from energy producers on the basis of ownership will no longer be an academic exercise. As independent national monopolies emit and consume positive and negative externalities to and from their neighbours, they have some incentive to merge on a regional basis. Merging would increase the efficiency of the investment and operational decisions in those countries where energy externalities are at work, and it would allow them to benefit from economies of scope and scale, for example, in the management of maintenance teams. Some recent examples illustrate a new trend in cross-border mergers. In February 2010, the German operator E.ON sold about 10,700 km of German transmission line to the TENNET of the Netherlands. In March 2010, the Swedish operator VATTENFALL announced its wish to part with its network in East Germany, which was eventually acquired by the Belgian ELIA. In July 2010 it was EDF's turn to part with its three British distribution grids, which were bought by a Hong Kong consortium.

ENTSO-E

The European Transmission System Operators (ENTSO) association was created in 1999. It aims to harmonise guidelines for grid access and use. On 29 June 2001, the ENTSO gathered 32 independent TSO companies from the 15 countries of the EU, plus Norway and Switzerland. The limited effectiveness of such voluntary cooperation has been demonstrated by blackouts and other incidents resulting from either a lack of coordination or the absence of needed connections.

Consequently, the Third Energy Package created a Europe-wide TSO organisation to harmonise access and operating rules, exchange information, and coordinate investment plans for an integrated market. This organisation is also in charge of elaborating the ten-year network development plan (TYNDP). Agreement did not have to wait until the new legislation was adopted. On 28 December 2008, the 40 European TSOs spontaneously signed an agreement establishing the new structure, and the ENTSO-E was born. Existing associations such as the ENTSO have been dissolved and their tasks integrated into the new organisation.

Regional initiatives

In February 2006, the ERGEG launched the Electricity Regional Initiative (ERI). Seven regional electricity markets have been created in Europe: Baltic, Central East, Central South, Central West, Northern, South West, and France-UK-Ireland.⁴⁷ With the ERI's launch, operating and commercial standards will be further coordinated.

The Central Western ERI is the most advanced initiative thanks to the creation of CORESO and the Capacity Allocation Service System for Central Western Europe (CASC-CWE). CORESO provides real time and D-1 forecasts about the security of the Central Western networks to the TSOs in France, Belgium, Germany, the Netherlands and Luxembourg. Furthermore, CORESO

47 See http://www.energy-regulators.eu/portal/page/portal/EER_HOME/EER_INITIATIVES/ERI

contributes to the building of the CWE regional market by supplying merged files that forecast two days in advance. Meanwhile, the CASC is a joint cross-border service company in charge of services related to the auctioning of power transmission capacities on the common borders of France, Belgium, Germany, the Netherlands and Luxembourg. Behaving as a single TSO in the European market, the CASC increases liquidity within the five markets through the standardisation of computer systems and procedures. As such, it is an important step toward the merger of the five markets into a common regional electricity market.

Given the observed momentum toward the creation of international TSOs or alliances of national TSOs, an unchanged regulatory framework would lead to big firms engaged in various activities, with cross-border transmission regulated by as many NRAs as the countries they are engaged in. Under which conditions would it be socially preferable to have a single supranational regulator facing international TSOs, rather than several NRAs? Given the social gains at stake, international TSOs and their optimal regulatory framework deserve some attention.

4.2.2 Regulatory design for international TSOs

We examine some of the potential problems created by the regulation of international TSOs using a model developed by Laffont and Pouyet (2003).

Modelling the regulation of an international TSO

Hierarchical structure and informational gaps

The alternative regulatory structures contemplated by Laffont and Pouyet (2003) bring to light some possible organisational features of the electricity transport sector in the near future. The players are (i) one international monopoly (an international TSO) engaged in two countries; (ii) either one supranational regulator (ERA) for the two countries or two independent national regulators (NRAs), all facing asymmetrical information; and (iii) households living in the two countries and functioning simultaneously as consumers, taxpayers, shareholders and lobbyists. Notice that the supranational regulator could be the ACER or a joint creature of the two national regulators.

The TSO incurs two costs, each associated with its activity in one of the two countries where it operates. Each cost has an intrinsic part perfectly known by the TSO but only known in probability by the regulator(s). Contrary to Caillaud *et al* (1996), for whom the NRAs had an informational advantage over the ERA, here, the national and supranational regulators bear the same informational asymmetry with respect to the TSO. The TSO's intrinsic cost can be reduced by a specific effort that is not observable by the regulator(s). Nevertheless, the regulators can observe the resulting cost in each country, making this a case

of ‘false moral hazard’⁴⁸. The regulator(s) actually face an adverse selection problem.

Costs, profits and surplus

At the core of the analysis is the form of the cost function (or disutility function) of the two levels of effort incurred by the TSO. We assume that the cost-reducing efforts e_1 in country 1 and e_2 in country 2 create a disutility to the firm equal to

$$\psi(e_1, e_2) = \frac{1}{2}(e_1^2 + e_2^2) + \gamma e_1 e_2$$

The marginal disutility of

$$e_i, \quad \frac{\partial \psi(e_1, e_2)}{\partial e_i} = e_i + \gamma e_j$$

increases (or decreases) with e_j if $\gamma > 0$ ($\gamma < 0$). Only the case where $\gamma > 0$ is analysed. We focus on the case in which operating in country 1 or in country 2 are substitutable activities.⁴⁹ Applied to the cross-border transmission sector, such an assumption could be justified if the TSO had a limited common resource that could be dedicated to reducing the operation costs in the two countries.

The TSO’s reward is equal to the sum of the transfers from either the two national regulators or from the ERA (including the reimbursement of costs), minus the disutility of the efforts.

In country i , the objective of the national regulator consists of the surplus created by the activity of the TSO in i , plus the share of the TSO’s profit incurred to country i ’s shareholders, minus the operating cost and the net transfer paid to the TSO, corrected by the cost of public funds. Two important ingredients of the NRAs’ objective functions are the cost of public funds and the proportion of the TSO’s capital owned by households in the two countries.

48 See Laffont and Martimort (2002: 287). Specifically, if $C = \theta - e$, where θ stands for the intrinsic cost and e for the level of effort, the observation of C by the regulator allows us to treat the problem as a pure adverse selection model. Indeed, not observing the action e is the same as not observing the parameter θ .

49 For a more general analysis of multiprincipals where the agent has either substitutable or complementary activities, see Martimort (1992: 14). The limitation to the case $\gamma > 0$ comes from the necessity to keep

$$\frac{\partial \psi(e_1, e_2)}{\partial e_i}$$

positive for all e_j . Nevertheless, in the case of symmetrical effort $e_1 = e_2$, a weak complementarity condition $\gamma > -1$ is sufficient to meet both the condition of positive marginal disutility and the condition of convexity of the disutility.

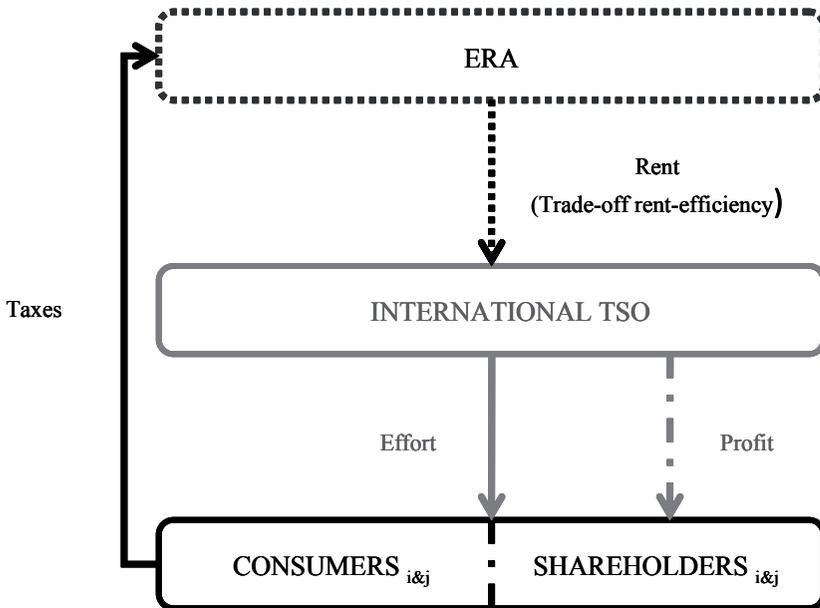
One or two regulation agencies?

If information is spread evenly (as it is in the case of perfect information), it does not matter if we centralise the regulation mechanism or leave the two independent agencies to run it. This is because the only ‘externality’ of the model appears in the disutility function, which is internalised by the TSO. When information is asymmetrical, however, political economy distortions are central to the regulation design. We first contrast the relative advantages and drawbacks of centralisation and decentralisation when economic regulation is not affected by political concerns. We then consider the case of a random majority creating political uncertainty.

Political stability and centralisation

What can we expect under the centralisation regime? With a single regulator knowing the distribution of probabilities of cost, the TSO retains control of its level of effort (as illustrated in Figure 4.2).

Figure 4.2 Relationships among the players in a centralised regulation regime



Note: ERA = European regulatory agency; TSO = transmission system operator.

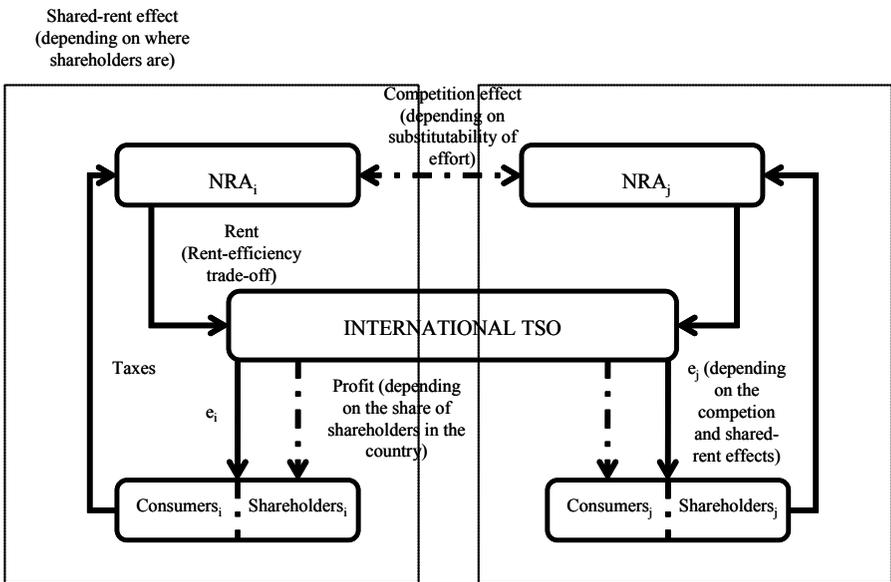
Source: Authors.

Here, efforts are distorted downward in comparison with the perfect information case. Indeed, facing a disadvantage in cost information relative to the TSO, the regulator has to leave some rents to the TSO to induce cost-reducing efforts. As the rents are socially costly, the ERA faces the standard trade-off between rent and efficiency. All firms, except the most inefficient one, earn a positive rent

Political stability and decentralisation

We now consider the interactions between the NRAs’ policies when regulation is decentralised. As illustrated in Figure 4.3, each NRA knows but cannot control that the other NRA’s policy affects the relation it has with the TSO. This means that each NRA designs its regulation mechanisms under constraints imposed not only by the informational opportunism of the TSO but also by the expected decision of the other NRA. In a nutshell, regulators compete with one another to extract efficiency from a firm without leaving it too much rent.

Figure 4.3 *Relationships among the players in a decentralised regulation regime*



Note: ERA = European regulatory agency; TSO = transmission system operator.

Source: Authors.

Two effects are at work: first, the ‘shared-rent effect’, which is a consequence of the ownership structure of the TSO. In each country, some citizens hold shares of the firm. Consequently, the informational rent is split between the two countries, depending on where the shareholders are. Under decentralisation, each NRA only takes into account the welfare of the agents in its jurisdiction. Consequently, the NRAs undervalue the welfare induced by their policy, and they implement very low effort levels. Second, under decentralisation, each NRA designs its optimal incentive policy to make the monopoly behave in its national interest. It does not take into account the fact that each regulation also modifies the incentive relationships between the firm and the other regulator. As the efforts are substitutes, the NRAs propose high-powered incentive contracts, which lead to very high effort levels. This situation is the result of the ‘competition effect’.

The level of effort in the decentralised framework can be larger or smaller than in the centralised one depending on the strength of each effect. Laffont and Pouyet (2003) show that the higher the substitution coefficient γ the more likely it is that the competition effect will exceed the shared-rent effect. Effort is distorted upward, and the rent abandoned to the TSO is ranked accordingly. The opposite occurs if γ is small, in particular if $\gamma = 0$. When that is the case, there is no competition effect, and effort is distorted downward.

Political uncertainty

The level of effort is only one aspect of the performance of a regulatory mechanism. A high level of effort can be too costly for the TSO in terms of abandoned rents. Under such circumstances, is centralisation better than decentralisation on welfare grounds? Using a model in which the majority of shareholders may be found randomly in one country or in the other, Laffont and Pouyet (2003) construct an example in which political economy distortions may favour decentralisation. Random majority generates a fluctuation in the interest group that captures the regulatory decision, which leads to trade-offs between rent extraction and efficiency. The analysis is built on the following timing:

- The regulatory structure (centralised or decentralised) to be set up in the two regions is determined by law.
- In each country a random fraction of households become shareholders.
- The regulators in charge build a social objective function that depends on the majority in place.

The last hypothesis means that under decentralisation, if the majority of shareholders is found in country i , the NRA of i takes into account only the surplus of the shareholders in i and that part of the rent of the TSO that accrues to those shareholders. On the contrary, when the shareholders do not hold the majority in country i , the NRA in i cares only about the surplus of the non-

shareholders. Under centralisation, the single regulator cares only about the majority in both countries.

A comparative analysis of welfare levels⁵⁰ shows that centralisation suffers from policy fluctuations, whereas competition between NRAs mitigates them, though at the cost of high-powered incentives. Consequently, centralisation is preferred to decentralisation if the shadow cost of public funds exceeds a given value. The converse is true when the shadow cost of public funds is below another value. Between these two thresholds, decentralisation (centralisation) is preferred to centralisation (decentralisation) when the size of the majority is small (large). The role of the cost of public funds is not surprising since, when that cost is high, it is socially costly to abandon a rent to the TSO. The role of the majority of shareholders is more surprising. The drawback of centralisation is that the single regulator cares only about the overall majority in both countries. When the size of the majority is small (just slightly greater than 50%), the proportion of consumers disadvantaged by the centralised regulator tends to be relatively large, and decentralisation becomes the preferred choice even though it provides the firm with too much rent. Decentralisation serves to limit the discretionary power of the regulators.⁵¹

Economic and political lessons

Following Laffont and Pouyet (2003), we can conclude that the mere existence of an international TSO is a sufficient condition for creating an international regulator. The optimal regulatory regime depends on the cost of public funds, on the technology of the TSO (the degree of substitutability of efforts devoted to the various countries), and on the degree of political uncertainty. Indeed, when the NRAs are captured (that is, when the national agencies act in favour of the randomly determined majority that controls the TSO), decentralisation might be preferable as it reduces the discretionary power of the public decisionmakers.

The model brings to light some of the economic problems that might arise if an ERA were to be created and endowed with all the powers of the NRAs. It also provides important political lessons. In particular, it reminds us that the social utility function that traditionally gives equal weight to consumers and shareholders should be reconsidered in the context of international regulation. Indeed, consumers and shareholders do not necessarily live in the same country, so the NRAs do not fully internalise the effects of their domestic regulation. Additionally, the regulatory institutions have been in place for a long time, and regulators are influenced by lobbyists who come and go with elections. Clearly, an ERA would be less sensitive to this form of capture, which means that its regulatory decisions may deviate from national interests.

50 This part of the analysis is based on the hypothesis that γ is large, which means, as seen above, that the competition effect is larger than the shared-rent effect.

51 This is in line with the results obtained by Martimort (1996).

4.3 CONCLUSION

This chapter assessed the current regulatory structure of the cross-border transmission sector. Based on Caillaud *et al* (1996), we saw that moral hazard and potential capture are sources of TSO rents. The trade-off between full efficiency and rent minimisation leads to a distortion in TSO decisions. Furthermore, it is always optimal to allow national policies to make themselves felt – that is, to decentralise part or all of the provision of incentives. Doing so spreads the burden of providing incentives among different regulatory entities. The way the burden is shared depends on the size of the spillover effects and on the degree of national regulators' bargaining power – that is, the degree of capture of national regulators.

Considering new trends – such as the increasing number of unbundled incumbents and what could be viewed as preliminary steps toward the formation of international TSOs (for example, ENTSO-E and regional initiatives) – we have discussed how the relationships between international TSOs and national and European regulators could evolve. Based on Laffont and Pouyet (2003), we have seen that the optimal regulatory regime depends not only on the existence of an international TSO but on the cost of public funds, on the technology of the TSO (the degree of substitutability of efforts devoted to the different countries), and on the degree of political uncertainty. Indeed, when the NRAs may be captured (that is, when they act in favour of the randomly determined majority in power), decentralisation may be preferable since it reduces the discretionary power of the decisionmakers.

It is possible to go still deeper into the issue of regulating cross-border electricity transmission. Indeed, our conclusions show that special attention has to be paid to the governance of the ACER to prevent the European regulator from being captured. Furthermore, the problem of 'missing money' owing to the presence of externalities is an issue that warrants future research. This problem can be summarised as follows: tariffs and congestion rents are not large enough to foster further investment in interconnections. The reason is that while cross-border infrastructure projects are mainly financed by the countries they interconnect, they generate positive externalities that benefit more countries. Consequently, the TSOs should be paid by all the agents who benefit from the network. The European Community has tried to tackle this problem through the Trans-European Energy Network and the ITC scheme. The measurement of the externalities generated by interconnections is a challenge. Besides a lack of adequate financing schemes, the development of interconnections is slowed by heterogeneous national administrative and technical procedures. This hurdle could be lowered by a powerful international regulation entity.

Interconnections are fundamental to the development of electricity production from renewable sources. Indeed, renewables are not evenly available across the EU. Additionally, wind power and photovoltaic power are intermittent sources. Combined with the development of smart grids, stronger interconnections would allow more efficient and reliable international dispatching of power generated

from renewable sources. But renewable sources are not yet mature and still require public subsidies. The multiprincipals theory and the subsidiarity principle could be applied in studying the interaction between national and European policies to subsidise green energy.⁵²

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52 On this theme, see Eichner and Pethig (2010).

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Policy Issues in Infrastructure Procurement

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The economic literature on public procurement has come a long way in recent decades and addresses many of the problems faced in the field.⁵³ Procurement of infrastructure in particular poses challenges – the fundamental reason being that infrastructure is a highly complex and customised object, provided over a long time horizon. Not only economic considerations but also political, social and environmental factors play a major role in its procurement. Over recent years procurement has gathered renewed momentum following a slowdown in private sector participation and the re-emergence of the state in infrastructure development.

To deliver public infrastructure services to citizens or taxpayers, there are a series of decisions that a government needs to make. First, it needs to decide whether to produce these services in-house or arrange with private firms for their provision. Under what conditions should provision (or production) be delegated to the private sector?⁵⁴

When delegating the provision of infrastructure services to the private sector, yet another question arises: when should the government maintain ownership of the assets (for example, facilities) used to provide the services, and when should ownership instead be given to the private sector? If ownership is held by the private sector – and private providers of public infrastructure are commonplace – then another question must be addressed at the end of a provision contract: should the private provider retain ownership or should the assets be transferred to the public sector?

On top of these matters, practitioners must recognise the multiple dimensions of most infrastructure services – for example, the design, financing, building and operation of a water network. When should these tasks be delegated to different agents, and when should they be bundled together (that is, delegated to

53 See, for example, the comprehensive study of Laffont and Tirole (1993).

54 There is an even more fundamental question that we will leave aside in this chapter: in a context of scarce resources, which infrastructure project should be carried out in the first place?

a single agent)? Answering these questions necessarily implies allocating risks to different parties.

The next challenge is choosing the agent (or agents) that will carry out the planned tasks. This raises a series of questions, most notably: How will the agent be chosen? For instance, through an auction or a beauty contest? Further, how should the selected mechanism be designed to minimise cost, avoid collusion, encourage entry, ensure efficiency, and so on?

Finally, how does corruption affect choices and outcomes in the process of infrastructure procurement? Corruption is perceived to be widespread and, indeed, opportunities for some form of corruption are present in every step of the procurement process we have just outlined.

The economic literature provides answers to these and related questions. The aim of this chapter is to review such insights and to bring them closer to infrastructure practitioners (policymakers, regulators, and the like) in a clear and understandable manner, devoid of the technicalities that would only obscure the main economic intuitions.

This chapter is not a survey; it aims rather to outline some well-established answers to the above questions by reviewing representative contributions, thus synopsising current thinking on these issues.⁵⁵ Although the main focus is on infrastructure, many lessons apply to the procurement of general goods and services, as will become clear. In what follows, most results and propositions will be stated in italics. We will stress intuition over formal proofs; in fact, proofs will be omitted for ease of exposition.⁵⁶ Each of the above questions will head a section of the chapter, for ease of reference.

Before diving into the analysis, let us conclude this section with a note on terminology. Along the way, we will consider a situation in which a government (or government agency) is willing to buy something from one or more sellers. Depending on the particular question, we will find it useful to refer to the government as a *government agency* or simply *the buyer*. Sellers will also be called *providers*, *suppliers*, or *contractors*, and in Section 5.2 they will be classified as *builders* on the one hand, and *operators* or *managers* on the other. As long as there is no room for confusion, we may use these terms interchangeably.

5.1 PROVIDING A SERVICE IN-HOUSE OR CONTRACTING IT OUT?

Modern economic theory analyses procurement as an agency relationship, wherein the government – acting as a benevolent principal – wants a task to be done, a task that it cannot perform by itself and must thus delegate to an agent (for example, a government employee, a private firm, and so on) in a context of asymmetric information. A seminal contribution to the theory of incentives in procurement is the comprehensive treatment of optimal procurement of Laffont

55 For more comprehensive studies, check recent books edited by Dimitri *et al* (2006) and Janssen (2004).

56 For precise statements and proofs of results, see the cited papers.

and Tirole (1993). In Appendix 5A.1 we briefly summarise the most basic lessons of this theory.

A key assumption of traditional incentive theory is that contracts are complete. When contracts can account for every conceivable contingency – that is, when they are complete – ownership (or the identity of the service provider) is not an issue; the government can achieve the same outcome under any ownership regime when every aspect of the relationship can be controlled through a detailed contract. When contracts are incomplete, however, ownership matters because it determines who has control rights when uncontracted-for events arise. The question of infrastructure ownership can then be separated from that of service provider identity (although not all the literature makes this separation, as we will see momentarily).

The basic idea that contracts are incomplete – and that, for this reason, the *ex post* allocation of power (or control) matters – has been pervasive in economic thought, at least since Simon's (1951) model of the employment relationship. The allocation of residual control rights over assets through ownership, in particular, has received a great deal of attention since the seminal work of Grossman and Hart (1986) and Hart and Moore (1990). These authors pioneered what is now called the property rights approach, which is probably best presented by Hart (1995). The basic ingredients of this theory are outlined in Appendix 5A.2.

The theory of the firm based on incomplete contracting and asset ownership can provide a useful framework for thinking about procurement and the determinants of the boundaries between public and private firms. For instance, nationalisation and privatisation can both be seen as different governance structures – much as the choice between merging and carrying out a transaction within a single firm, and having an arm's-length contract between two independent firms are alternative arrangements in the theory of the firm (see Hart, 2003 on this). Of course, there are differences between the two contexts, as emphasised by Hart (1995), but the similarities warrant a similar approach, as illustrated in the following subsection. Complete contracting theories can also provide useful insights, and we review some representative models in Subsection 5.1.2.

5.1.1 Models with incomplete contracts

A well-known model along the lines of the property rights theory of the firm, applied to the issue at hand, is Hart *et al* (1997). To answer the question of whether a government should provide a good or service in-house or contract out its provision, the authors develop a model that analyses the cost and quality of service under both public and private provision.

In their story, a benevolent government can own a facility and hire a manager (who is thus a government employee) to run it, or can contract with a private manager for the provision of services through a facility owned by the latter (that is, contract out provision). Hence, ownership and provision are tied together;

that is, they are both either public or private.⁵⁷ The government and the manager can sign a contract that specifies some basic characteristics of the service to be provided. But not all the aspects of the good (for example, quality) can be specified in advance and put into a contract that can be enforced by a third party (say, a court of law); thus, contracts are incomplete. In this case, residual rights of control given by ownership of the facility matter when uncontracted-for contingencies arrive.

Once the contract has been signed, the manager (whether a public employee or a private contractor) can propose innovative ways to perform the tasks he has been assigned. Specifically, the manager can make two innovations: one increases quality (or whatever social benefit is provided by the good or service; see below), the other reduces costs but has a negative impact on quality (so there is an externality on quality). Thus, service provision involves multiple tasks, but they cannot be separated; instead, they have to be carried out by a single agent. (We will come back to the issue of bundling tasks in the next section.)

Neither innovation is contractible *ex ante*. Therefore, implementation of an innovation requires the approval of the owner. Thus, for instance, when the manager owns the facility, he can introduce the innovation without government consent and without violating the initial contract.

The government cares about quality; the manager, on the other hand, does not care directly about it, but bears the cost of providing the good or service. Both cost and quality are observable but not verifiable. Private ownership encourages both types of investments. The owner-manager does not need the approval of the government to implement a cost reduction and hence will invest in this type of innovation. But because he ignores the deterioration of quality brought about by cost reduction, he invests too much (see Appendix 5A.3). Since the manager does not care directly about quality, he will not invest in quality improvements unless he can extract a higher payment from the buyer (that is, the government) in return. This means the manager and the government will bargain over quality. Because the manager must share the gains from increased quality with the government through bargaining (see Appendix 5A.2), he does not receive the full benefit of his investment, and will thus rationally underinvest (although he still invests more than the government employee).

Public ownership, on the contrary, encourages none of the investments. The public employee has to bargain with the government for any implementation, and hence tends to underinvest both in quality improvements and cost reductions since he only receives a fraction of the returns on his investments. In addition, he can to some extent be replaced by the government, which further lowers his incentives to make costly (non-contractible) investments.

The trade-off between providing a service in-house or contracting it out to the private sector is now clear: in-house provision (that is, public ownership) provides muted incentives for cost-reducing activities that deteriorate quality, at the expense of low incentives for valuable quality improvements; private

57 Note that ownership might just mean the possession of the right to use the facility

ownership and provision provide stronger incentives for quality improvements, but also for cost reductions that may have deleterious effects on quality. The choice of ownership is driven by the relative importance of these effects (see Appendix 5A.3).

As Hart *et al* (1997) show, *in general, the bigger the adverse consequences of (non-contractible) cost cutting on (non-contractible) quality, the stronger the case for in-house provision.*⁵⁸ When the deterioration of quality from cost reductions is small, incentives for quality improvements and cost cutting are best provided under private ownership, because the costs of private ownership are not significant in that case. As the damage to quality increases, the case for in-house provision, which downplays incentives, strengthens. Moreover, *the efficiency of in-house provision also depends on the strength of the incentives of government employees, and on the importance to the government of generating quality innovations.* If there are small opportunities for cost reduction (and hence damages to quality) and if the incentives given to public employees are weak (that is, they can be easily replaced), private ownership is desirable because the private contractor has more incentive to improve quality.

Hart *et al* (1997) also show that private contracting is generally cheaper, but that quality can be higher or lower under this ownership regime. Since the cost-reducing effort is always stronger under private ownership, costs are correspondingly lower. On the other hand, incentives for quality improvements are higher under private ownership – but so are incentives for cost cutting with adverse effects on quality. Hence, in some cases private contracting will deliver higher quality, while in others it will deliver lower quality than in-house provision by the government.

The above model illustrates an insight offered by Holmström and Milgrom (1991): when performance in one dimension (say, quality) is difficult to monitor (as assumed by Hart *et al*, 1997), the principal (that is, the government) might prefer to provide low-powered incentives for all tasks (including, say, cost-reducing activities, even if these are easily monitored – which is not the case here). Public ownership or in-house provision might be a means through which the principal can achieve precisely this.

‘Quality’ is broadly interpreted in the model of Hart *et al* (1997) to be any government benefit (that is, anything the government cares about) gained from contractor investment. This holds true for the models that we review below, so it is best kept in mind as we move forward. The crucial point is that the government cares to receive this benefit, while the agent does not value it directly (and so the benefit is a private good in this sense). If the agent also cared for ‘quality’, that is, if quality had public good features, other considerations would have a bearing on the ownership decision. Such a context has been analysed by Besley and Ghatak (2001).

These authors discuss a simplified version of Hart *et al* (1997), with the main difference being that both parties care about the quality of the good or

⁵⁸ See also King and Pitchford (2008).

service. The gain from reducing costs is still a private good. In such a setting, optimal ownership depends on the relative importance of the public and private good components. *If the public good component (that is, the non-rival and non-excludable benefits generated by the service) is sufficiently important, the party who values benefits more highly should be the owner even if it is not the investor (that is, the provider); otherwise, the investor should be the owner* (Besley and Ghatak, 2001, proposition 4: 1360).

Concerning the public good component, giving ownership to the most caring party raises the marginal return on investment for both parties. The party with the highest valuation gets a larger pay-off in case of disagreement in bargaining over the joint surplus, irrespective of who the owner is (thanks to the fact that the benefits generated by the service are public goods), and thus obtains a larger share of the joint surplus. This translates into higher investment incentives for the party with the highest valuation (and also for the other part since investments are weak complements) and a larger joint surplus (Besley and Ghatak, 2001, proposition 1: 1352). As far as the private good component is concerned, we know from property rights theory (see Appendix 5A.2) that the investing party should be the owner. Depending on the relative weights of the components, one party or the other could optimally own the asset. The bottom line is that not only do technological factors matter to the ownership decision when the value created by investments is to some extent a public good; the parties' valuations have impact, too.

Schmidt (1996) also analyses the question of whether a government should provide a service in-house (through the nationalisation of assets and the use of public employees) or contract it out (through privatisation) in an incomplete contracting framework. Unlike Hart *et al* (1997), Schmidt emphasises the informational losses (to the government) in contracting, thus identifying an alternative trade-off in the choice of ownership.⁵⁹

In Schmidt's world, a firm produces a good that yields both a social benefit and private revenue. The government cares about the social benefit. It can own the firm (nationalisation), in which case it can directly control production, or it can sell it to a private owner (privatisation) through a competitive auction.

Whoever the owner, it has to hire a manager-employee to run the firm. This employee must make an investment that affects the probability of having high or low (marginal) costs – that is, an investment that reduces the expected cost of production. The manager receives private benefits from higher production levels, and thus fears liquidation of the firm. The owner and the manager are the only ones able to observe the (unverifiable) realised state of the world (high or low costs) before deciding on the level of production – that is, if the government privatises, it loses information since it is no longer the owner. Due to this asymmetry of information, the government must in this case design a contract that induces a given level of production in each announced state of the world. Thus, different

59 Laffont and Tirole (1991) and Shapiro and Willig (1990) also link the privatisation issue to incomplete contracts and asymmetric information.

allocations of ownership rights lead to different allocations of inside information about the firm, which in turn affect both allocative and productive efficiency. The reason is that the right to access inside information about the firm is a residual right of control (after information has been produced, it cannot be verified by an outsider).

Under nationalisation, the manager does not take into account the pay-off to the government (social benefit and revenue) when choosing how to reduce costs. Besides, any threat from the government to cut back on subsidies is not credible, for it is optimal to choose the efficient level of production after observing costs, even if they are high. Anticipating this soft-budget constraint (high costs will be forgiven), the manager has little incentive to save on costs. Hence productive efficiency is poor. Allocative efficiency, on the other hand, is high because the level of output is chosen (almost) efficiently *ex post*, when the government can observe costs before production.

Under privatisation, however, the manager works harder (that is, exerts more effort). In this case, the government cannot observe costs and hence proposes a mechanism that entails an inefficiently low level of production in the high-cost state (shutdown may even be optimal, although *ex post* inefficient, and is more likely than under nationalisation). It is this feature of the optimal scheme that induces the manager to work harder. Productive efficiency is thus higher, although the distortion in production levels implies that allocative efficiency is lower. The reader will recognise here the standard results from traditional incentive theory that we review in Appendix 5A.1.

The optimal ownership regime thus trades off the productive inefficiency (or X-inefficiency) of public firms against the distortionary regulation imposed on private firms.⁶⁰ As Schmidt shows (1996, theorem 1: 16), *the government prefers privatisation to nationalisation if and only if the welfare gain through the more efficient investment decisions of the manager outweighs the welfare loss due to the ex post inefficient low production under privatisation*. A small social benefit of production can give privatisation the edge over nationalisation: a distortion in production is less costly (the costs of privatisation go down), and the government is less willing to pay rents, which hardens the budget constraint of the manager under private ownership and induces more effort (in other words, the benefits of privatisation go up).

Privatisation can be seen in this context as a government commitment not to have precise information on firm costs and profits, in order to avoid (*ex ante*) costly renegotiations. In other contexts, Crémer (1995) and Aghion and Tirole (1997) have also shown that too much information can be bad for the principal. The benefit of privatisation is precisely that the government's choice to be poorly informed hardens the budget constraint of the manager, thus inducing the manager to exert more effort to reduce costs.⁶¹

60 Note that an incomplete contract with a private firm can be interpreted as regulation.

61 See Bental *et al* (2007) for a related argument in the context of the outsourcing/privatisation decision.

An interesting implication of Schmidt's work is that *privatisation can be strictly superior to nationalisation even in the best of all worlds for the government*, that is, even with a benevolent, fully rational, and unitary decisionmaker; no conflicts of interest among politicians, ministries and regulatory agencies; no rent-seeking lobbyists; and no self-interested politicians. Section 5.2 will consider the case of a non-benevolent government – that is, a government that pursues its own agenda rather than maximising social welfare. That section also addresses corruption more generally, so we will postpone discussion of that issue.

5.1.2 *Models with complete contracts*

It is common to assume that contracts are incomplete because it would be too difficult or too costly to specify in a contract all the possible contingencies that could occur during the relationship between contractual parties; that is, some contingencies are left out of the contract because of contracting costs. Levin and Tadelis (2010) question when a local government should provide services in-house and when it should contract them out to private sector providers. Unlike Hart *et al* (1997), they assume contracts are complete, but in that same spirit, they also assume contracting costs. Their basic story is as follows.

A government must arrange for service provision with an agent. It can write a contract that specifies both a minimum time on the job and a set of performance requirements; specifying and enforcing the first is costless, but enforcing the second entails a cost – that of defining the requirements and monitoring compliance. The government cares about service quality and the costs of provision. The agent can split his available time between work for the government (which requires effort) and work for an outside competitive market (no effort required). Effort is not contractible. In-house provision is associated with the use of salaried employees (who need only spend some agreed-upon time on the job), and external contracting with the use of detailed contracts specifying performance requirements. Notice that the identification of in-house provision with time requirements and of private provision with performance requirements limits the scope and applicability of Levin and Tadelis's (2010) analysis to situations that fit that classification.

Levin and Tadelis first show that *an optimal contract must take one of two forms: the government either pays the agent for meeting a minimal time requirement (in-house provision), or for meeting a performance requirement (performance requirement contract), but not both* (2008, proposition 1: 9). The reason is simple. Time and effort are substitutes when producing quality. If the agent just meets the time and quality constraints specified in the contract, he can do better by substituting effort for time: he achieves the same level of quality but at a lower utility cost (by revealed preference, time is less costly than effort). The government could just drop the time constraint and lower the wage accordingly.

The trade-off between in-house provision and private provision is now clear: contracting with the private sector calls for a costly specification of performance requirements, but avoids the low incentives of employees associated with in-

house provision (these employees just satisfy the time constraint and provide only minimal effort). In-house provision is more likely to be optimal when it is harder to write, monitor, or adjust performance standards (that is, if contracting costs are high), or when the principal is more sensitive to the quality provided, as in Hart *et al* (1997).

We have seen in the previous subsection how Schmidt (1996) compared privatisation and nationalisation as modes of provision in an incomplete contracting framework. Auriol and Picard (2009) analyse the same issue, but assume instead that contracts are complete. They also assume away the problem – emphasised by Schmidt – of a soft-budget constraint faced by public firms, and concentrate on allocative efficiency and macrofiscal balancing issues.⁶²

Auriol and Picard (2009) ask when a government should favour privatisation in non-competitive sectors and when it should run a publicly owned firm. Their paper compares a benevolently regulated public firm and a private (unregulated) monopoly (the fixed cost is high enough to make this a natural monopoly).

The government can only offer an incentive contract to a public firm – price regulation cannot be implemented when the firm is privately owned. Since the government is the residual claimant under public ownership, it must subsidise the firm in case of losses. Privatisation is identified with price liberalisation and regulated entry (the government auctions off the right to operate and collects an entry fee). Even though these assumptions may seem extreme, notice that *if privatisation with free price setting dominates state ownership with benevolent regulation, privatisation also dominates in situations where prices are liberalised to a lesser extent and regulation is not benevolent* (Auriol and Picard, 2009: 78).

The main trade-off proposed is between fiscal benefits and consumer surplus; privatisation reduces the need for costly subsidies and rents, and generates sale proceeds, but results in higher prices and the concomitant loss of consumer surplus. Auriol and Picard conclude that *the privatisation decision is a monotonic function of the cost of public funds when the profitability of a market is low (for example, roads or utility services to poor people), and is non-monotonic when profitability is high* (2009, proposition 3: 90).

This result implies that privatisation dominates when the opportunity cost of public funds is high (as in developing countries) in the low-profitability case, but only when this cost is intermediate in the high-profitability case. In addition, for a given (high) social cost of funds, privatisation is more likely to dominate in less profitable market segments – firms in very profitable markets do not require subsidies, and their profits are a valuable source of revenues when the cost of funds is high (the benefits of privatisation go down). Notice, finally, that high technological uncertainty raises informational rents, thereby increasing the appeal of privatisation.

62 See also Auriol and Picard (2009).

5.1.3 *Some remarks on the choice between in-house and private provision*

The issue of public versus private provision has always raised controversy. Advocates of private provision stress that it leads to lower costs, thanks to the higher-powered incentives this mode of provision generates. Critics typically counter that the strong incentives for cost reductions provided by private ownership come at the expense of quality.

As we have seen in models of incomplete contracts, private contracting is generally cheaper, but it does not necessarily follow that quality will be lower under this ownership regime than under government in-house provision when tasks are multiple. A similar argument can be made in traditional incentive theory with multitasking. When quality is unverifiable, the effect of quality concerns on the power of incentive schemes depends on the type of good concerned. For search goods (goods whose quality can be ascertained before purchasing), the principal can use the level of sales (a proxy for quality) as a second instrument to provide incentives (the first being the cost-reimbursement rule), and hence higher-powered incentives are not necessarily in conflict with quality (Laffont and Tirole, 1993, proposition 4.3: 226). In the case of an experience good (whose quality can only be observed after purchasing), the alternative instrument is not available, and the principal is confronted with trying to promote two conflicting tasks with just one instrument (the cost-reimbursement rule); when quality is a concern, optimal contracts are pushed toward lower-powered arrangements. Reputation and the fear of losing future sales can provide a counter effect.

Even though a definitive answer to the question ‘Should a government provide a service in-house or contract out provision?’ is hard to give, a general consensus seems to emerge from the existing literature (Bental *et al*, 2007): tasks that are both hard to control (that is, have high contracting costs) and important (in the sense of generating large social benefits) should remain in public hands.

5.2 BUNDLING VERSUS UNBUNDLING TASKS

Up to this point we have reviewed some work that made use of the multitask framework. The question of whether to assign the multiple tasks to multiple agents was not raised, however. We turn now to this issue. This section is especially motivated by infrastructure services – or, generally, services for which fixed assets are very important.

Several tasks are typically involved in the provision of an infrastructure service – designing, financing, building, and managing/operating an infrastructure asset – and these multiple tasks need to be borne in mind when delegating a project to the private sector. As long as there is some interaction between the different tasks, there is the question of whether these tasks should be delegated to different agents or bundled together (that is, delegated to a single agent). In what follows, and for the sake of simplicity, we will focus on just two tasks that we will label generically, ‘building’ and ‘operating’.

Work in this area has been motivated by the uprising of a new form of government procurement, which typically goes by the name public-private partnership (PPP). Such an arrangement can be broadly characterised by two basic features: bundled tasks (building and operating the infrastructure are the responsibility of a single firm or consortium of firms) and private ownership (the consortium owns the infrastructure used to provide services).⁶³ Traditional procurement (TP), on the other hand, is characterised by public ownership of the infrastructure and unbundled tasks (separate firms in charge of building and operating).

In the preceding section, the theory of the firm based on incomplete contracting and asset ownership was adapted to provide a framework to analyse procurement and the determinants of the boundaries between public and private firms. The same framework can be enriched to analyse the bundling decision, as in the models of Hart (2003) and Bennett and Iossa (2006). As in the preceding section, complete contracting models also deliver interesting messages, and we devote Subsection 5.2.1 to representative contributions.

5.2.1 Models with incomplete contracts

Hart (2003) assumes all provision is private and ignores the choice between public and private ownership. The only choice is between bundling the tasks of building and running a facility (identified with a PPP), and unbundling them (attributed to TP or conventional provision). In Hart's story, the government can contract with a builder to build and run a facility, or it can contract first with a builder to build the facility and then with another private party to run it (the government auctions off the contract to operate the facility). The contract specifies the basic characteristics of the facility and the services provided with it. The contract is incomplete in that the builder may modify the nature of the facility or of the services provided without violating the contract. Only the builder invests, and his investments have an impact on both the benefits and costs of running the facility (much as in Hart *et al*, 1997). One investment is productive – it increases social benefits (for example, quality) and reduces operating costs; the other is unproductive – it reduces costs at the expense of quality. Investments, benefits and costs are all unverifiable.

The builder invests as little as possible under unbundling, because he internalises neither the social benefit nor the operating cost. Under bundling, on the other hand, the agent still does not take into account the social benefit, but cares now about the cost of service provision; hence, the builder invests more in productive activities that improve quality and reduce cost, but also invests more in unproductive activities (that is, cost reductions that deteriorate quality). Thus, it is easy to see that if cost reductions have large deleterious effects on quality, we should see unbundling more often – the costs of bundling are higher. On the

63 The interested reader can check IMF (2004) for a detailed account of PPP schemes and modalities.

other hand, if cost-reducing activities do not have a large impact on quality (or if quality can be closely monitored), bundling is more likely to be optimal.

As in Levin and Tadelis (2010), Hart emphasises relative contracting costs as a key issue. The main conclusion is that *the choice between PPPs and conventional provision turns on whether it is easier to write contracts for service provision than for building provision: conventional provision (unbundling) is good if the quality of the building can be well specified, whereas the quality of the service cannot be; PPP is good if the quality of the service can be well specified in the initial contract (or, more generally, there are good performance measures which can be used to reward or penalise the service provider), whereas the quality of the building cannot be.* To understand this, notice that underinvestment in quality improvements is not a serious issue when quality can be well specified, and incentives to invest in the unproductive task are lower under unbundling (there would be overinvestment under a PPP). Notice also that, in the case of bundling, overinvestment in cost reduction is not a serious issue, whereas underinvestment in quality may be. Grout (1997) reaches similar conclusions.

Hart's model takes the length of the contract as given; who owns the asset at the end of the period is not an issue. Both the contract length and the end-of-contract owner are interesting choice variables, though. Bennett and Iossa (2006) incorporate them in a similar framework. In their story, the government (principal) has to delegate to the private sector the tasks of building and operating an infrastructure asset used to supply a public service, and has the choice of delegating each task to a different firm (agent) or both tasks to a consortium of the two firms. Each task requires specialised skills, so that a single agent cannot perform both tasks. The government also has the choice of retaining ownership of the facility or transferring it to the private sector, both during the building and managing phases and after the contract period ends. The facility has a residual value for both public and private use (these values may differ).

As in Hart (2003), there are some basic standards that can be contracted upon, and the firms can make investments at each stage to discover innovative ways to improve upon these standards. Actions (research into innovations) at the building stage improve social benefit (for example, quality) and have an impact on the costs at the management stage and on the residual value. Actions are non-contractible *ex ante* but verifiable *ex post*; once the innovation has been discovered, its implementation is verifiable. But any implementation requires the agreement of the owner of the facility – hence, if the government is the owner, it has a say on inputs (innovations), whereas if ownership is with the private consortium, the government cares only about outputs.

The work of Bennett and Iossa (2006) emphasises that synergies across stages play a central role in the bundling and ownership decisions. Bundling is always optimal in case of a positive externality – thus, ownership by either firm is always dominated by government ownership or ownership by the consortium. Unbundling may be optimal when the externality is negative. The reason for this is that bundling allows internalisation of a positive externality, while non-

internalisation of a negative externality through unbundling may be optimal (if the externality is weak).

In both cases the goal is to attenuate an underinvestment problem, which results from partial internalisation of the positive effects of investments.⁶⁴ Under private ownership, the consortium cares about cost reductions and the residual value of the facility, but does not take the social benefit into account. Under public ownership, the consortium only partially takes into account the effect of its actions, since the gains from any innovation must be shared with the government through bargaining. The comparison between these effects drives the choice between ownership structures. For example, *with a weak negative externality, provided the cost effect is small, a large residual value effect favours ownership by the builder (plus unbundling), and a large social benefit effect favours ownership by the government (plus unbundling, that is, TP)* (Bennett and Iossa, 2006, lemma 1: 2153).

As for the use of PPPs, Bennett and Iossa (2006) show that *a PPP is more likely to be optimal if the externality is positive, if the effect of innovation on the social benefit is relatively small, and if the effect on residual value is relatively large. A PPP is also more preferable the lower the specificity of the facility for public (rather than private) use at the end of the contract, and the more likely that the private residual value will be higher than the public residual value.*

Bennett and Iossa also endogenise the length of the contract, and find that *with a weak negative externality, provided the cost effect is small, the relative case for public, rather than private, ownership improves if the period of time over which the service is to be provided is lengthened for a given project* (2006, proposition 2: 2154). If the time of provision is longer, the residual value effect has a smaller present value, whereas the social benefit effects are greater (enjoyed over a longer period of time). By the previous measure, government ownership is favoured.

5.2.2 Models with complete contracts

Another study that highlights the role of externalities across tasks (a technological factor) in the bundling decision is that of Martimort and Pouyet (2008). Their basic model, however, assumes complete contracting and thus favours agency costs over ownership in explaining optimal procurement regimes. Their story also focuses on a government that has to delegate to the private sector the tasks of building and operating an infrastructure asset, and has the choice of delegating each task to a different firm (agent) or both tasks to a single (merged) firm. As in Bennett and Iossa (2006), each task requires specialised skills; thus, a single agent cannot perform both tasks. Actions by the builder improve quality and affect the realised costs of the operator; actions by the operator reduce operating costs. Hence, there is a one-sided externality (that is, from building to operation) in this context. Actions are unobservable and agents are risk averse. Realised

64 Overinvestment might apply in case of a strong negative externality.

quality and costs, on the other hand, are observable and verifiable – although they are imperfect indicators of actions taken.

Similar to Bennett and Iossa's (2006) incomplete contracting model, *bundling is the optimal organisation structure if and only if there is a positive externality, and efforts on both tasks are higher under bundling in this case* (Martimort and Pouyet, 2008, proposition 1: 399). When the externality is positive, the builder invests too little in quality improvements (that also reduce operating costs) under unbundling. The cost-reducing effort by the operator, on the other hand, does not depend on the sign of the externality. Hence, incentives are best provided (as efforts come closer to first-best levels) under bundling.

Ownership does not matter in the basic, complete-contract setting. When quality cannot be specified in advance, however, ownership matters, and the government has to choose whether to keep ownership of the asset or give it to the private firm(s). Hence, a contract with the builder can only specify an allocation of ownership rights. Notice that, contrary to previously reviewed models, cost is observable and contractible here – a feature of many real-life provision contracts. Thus, the government can still specify a cost-reimbursement rule in contracting with the operator.

Since quality is non-contractible, under public ownership and a negative externality, the agent (whether the single builder or the merged firm) has no incentive whatsoever to exert (costly) effort toward quality improvements since it will then be held up by the government when the latter has property rights over the asset, and since any quality-related effort will yield higher operating costs when the externality is negative. Hence, *under government ownership, bundling and unbundling yield the same outcome when there is a negative externality between building and operating assets* (Martimort and Pouyet, 2008, proposition 4: 402).

When the externality is positive (but small in absolute value), however, *bundling strictly dominates unbundling under government ownership* (Martimort and Pouyet, 2008, proposition 5: 402). Under unbundling, the builder has no incentive to invest in quality improvement, as above. But under bundling the merged firm still has an incentive to improve quality, even though it does not own the asset, since this reduces operating costs. *Bundling also dominates unbundling when the marginal private returns from holding the assets are low enough and the externality is positive* (Martimort and Pouyet, 2008, proposition 6: 402). The opposite is true when the returns are high; in this case, the builder has a strong incentive to improve quality, an incentive that is exacerbated under bundling because the merged firm internalises the positive externality. To avoid this effect, unbundling is preferred.

Concerning the optimality of procurement methods, *bundling and builder ownership (PPP) is the optimal organisational form when there exists a positive externality between tasks, and the private benefits from ownership are small enough* (Martimort and Pouyet, 2008, proposition 7: 402). When private benefits are small and there is a positive externality, giving ownership to the builder and bundling the tasks provides the best incentives for quality. Besides, when

uncertainty is small it is not too costly to induce the builder to participate as an owner of the infrastructure, because the risk premium is small (recall that agents are risk averse here).

Traditional procurement (that is, public ownership and unbundling) is the optimal organisational form when *there exists a negative externality between tasks, the private benefits from ownership are adequately large, and uncertainty over quality is adequately significant* (Martimort and Pouyet, 2008, proposition 8: 403). When there are large private benefits from ownership, the builder has too strong an incentive to improve quality if he owns the asset. To mute these incentives, ownership has to be given to the government. In this case, we already know that bundling and unbundling yield the same outcome.

Another interesting study that focuses on complete contracts is that of Bentz *et al* (2005). These authors discuss when a government should opt for a PPP (buy services) and when it should stick with conventional procurement (buy assets); as in Martimort and Pouyet's (2008) basic model, an explanation of PPP is sought that does not rely on ownership but on asymmetric information. In their story, the government contracts with a builder and a service provider (the last two are merged in a PPP) to build and operate a physical asset used to provide services. There is competition for the building contract.

Under conventional provision the government contracts with each private firm separately, buying the asset from the builder and then contracting out services provision with the asset. Under a PPP, the government purchases the services from the merged firm that builds, owns and operates the infrastructure.

The three players have private information. At the building stage there is moral hazard: whether the builder has invested in quality improvements that reduce expected operating costs is known only to the builder. At the operational stage there is adverse selection: whether costs are high or low is the private information of the service provider. There is a setup cost associated with using the asset; this is the private information of the government, which has to choose whether to share this information (and offer a refined contract) or not (and offer a generic contract) with the service provider. The government maximises net consumer surplus.

In this context, *PPPs are the optimal mode of delivery when quality-enhancing investments at the building stage are relatively cheap and the set-up costs at the service provision stage are low*. When set-up costs are low, the choice between PPP and TP is driven by the cost of quality-enhancing investments. For sufficiently small costs, the government will prefer to buy services, that is, contract with the consortium. By contracting with a single agent for both tasks, the principal (government) can use the informational rent it pays at the service-provision stage to provide incentives for quality improvements (this rent is greater the more often costs are low, and costs are more often low the higher the quality-enhancing investment), provided the cost of doing so is not too high for the consortium.

Conversely, when the costs of quality-enhancing investments and set-up are high, conventional provision is either optimal or at least as good as a PPP. Under

TP, the government would have to reimburse expected investment costs on top of the informational rent. But when costs are high, under PPP the informational rent has to be increased. Depending on the size of these costs, TP might become the cheapest arrangement. When the cost of quality-enhancing investments is relatively high, it becomes more and more expensive to use rents in the second stage to motivate actions in the first. Eventually, conventional procurement (two separate agents) becomes superior because it allows the principal to tailor incentives to each of the two tasks separately. When set-up costs are high, the government receives the same pay-off under both modes of provision (since the government reveals no information, the private firms infer set-up costs are high, but learn nothing else, and hence information is symmetric).

5.2.3 *Some remarks on the choice to bundle or unbundle*

The economic literature reviewed in this section seems to warn us that, in spite of their recent popularity, PPPs are far from a panacea; they may be an attractive procurement method for some sectors and types of projects, but not for all. In informing this choice, the literature has highlighted the existence of positive externalities or complementarities across tasks as a key factor in tilting the balance toward a PPP arrangement.

Other factors favouring PPPs include:⁶⁵

- *Contracting costs and quality concerns.* PPPs make more sense when it is relatively easy to write and enforce contracts specifying the quality of the service, but it is relatively hard to do the same for building contracts.
- *Competition for the contract.* Bidding for a PPP contract can force bidders to lower costs and improve quality in a way that is not possible with public provision (see Section 5.3 for a detailed discussion).⁶⁶
- *Financing.* In the standard PPP model, the private sector funds the project, which makes this mode of provision particularly appealing to cash-constrained or debt-laden governments.
- *Risk sharing.* A PPP is an attractive option when the private sector can do a better job of managing the major risks involved in a project than the government can.⁶⁷

⁶⁵ See De Bettignies and Ross (2004) for additional factors not discussed here.

⁶⁶ Notice, however, that bundling can sharply reduce the number of qualified bidders, thus jeopardising the benefits from competitive tendering.

⁶⁷ For a discussion of the correct pricing of risk in this context, see Grout (1997).

5.3 AWARD MECHANISMS: ASSIGNING TASKS TO AGENTS

Once a decision has been made to delegate the production of a good or the provision of a service – we will sometimes refer to this generically as a ‘project’ – to the private sector (Section 5.1) and after the different tasks or bundles of tasks have been delineated (Section 5.2), there comes the challenge of choosing an agent (for example, a firm) from which to procure. One of the most common mechanisms to award a procurement contract is through some kind of auction (or competitive bidding or competitive tendering). The advantages of a competitive auction have long been recognised, and since government agencies are often required to conduct competitive bidding to award a procurement contract, we will devote Subsection 5.3.1 to the design of auctions.

As will become clear in moving forward, the message conveyed in this section is that one size does *not* fit all. Indeed, in spite of the well-known advantages of conducting competitive bidding, award mechanisms other than auctions can be the best-performing option in non-trivial situations. Therefore, in Subsection 5.3.2 we explore other mechanisms and the circumstances under which they can dominate an auction.⁶⁸

5.3.1 Issues in auction design

An auction is ‘a market institution with an explicit set of rules determining resource allocation and prices on the basis of bids from the market participants’ (McAfee and McMillan, 1987).⁶⁹ A basic feature of an auction is thus the explicit comparison of bids. It is a very ancient institution and its widespread use has been extensively documented.⁷⁰ It is generally (and strongly) advocated by governmental and international agencies for the procurement of goods and services in the public sector (see, for instance, the World Bank’s Procurement Guidelines and the US Federal Acquisition Regulations). By taking a close look at the proclaimed benefits from conducting some kind of auction, one can easily understand why.

Auctions are generally advocated as mechanisms that stimulate and promote competition, resulting in low prices and thus yielding the most value for the money. They are also acknowledged as an efficient mechanism to allocate resources. Auctions are typically seen as simple and transparent mechanisms, which makes them less prone to favouritism and corruption. They are also regarded as fair, in the sense of providing equal opportunity to bidders. As

68 See Janssen (2004) for an extensive discussion of award mechanisms for public assets. Check also Yvrande-Billon (2006) for a discussion of the limitations of competitive tendering from a transaction cost economics perspective.

69 For example, the rules of a standard first-price, sealed-bid (buy) auction specify that each potential seller (bidder or market participant) submits a sealed bid and that the project is allocated to the lowest bidder at a price equal to its bid.

70 For example, in the period 1985–2002, over 80% of concession contracts in transport (roads, airports, rail and ports) in Latin America had been awarded through some kind of auction; see Estache *et al* (2004).

opposed to simply posting a fixed price, an auction allows for a price to be put on items that have no standard value (Cassady, 1967), or for which the buyer is uncertain about the bidders' valuations.

A standard assumption in auction theory is that the buyer (the government in our case) can commit in advance to the explicit set of rules defining the auction, in such a way that it will stick to these rules even if *ex post* it is not in the buyer's best interest to do so (McAfee and McMillan, 1987).⁷¹ Commitment, however, is not the end of the story. Asymmetric information is also an important ingredient: if the government knew the bidding firms' costs (or whatever relevant piece of information a firm held), it could just offer the contract to the lowest-cost bidder for a price slightly above this bidder's cost, refusing to buy at a different price. Given an assumption of commitment, this threat is credible and the government's offer is accepted. Typically, the government does not observe the firms' private information, but can exploit competition among bidders in the auction to drive down the price (although normally not as far down as the lowest cost). A well-designed auction will thus extract information from the bidders that would otherwise be unavailable to the government.

Suppose then that the government is, for some reason, on the verge of conducting an auction to procure from the private sector. Assume the only relevant piece of private information is each firm's cost of production. Assume also that the main interest of the government is to pay the lowest possible price (we will nevertheless make reference to efficiency, even if only in passing).⁷² The first question we need to ask is which types of auction this government can run.

Four basic types of auctions are typically used, though one can find (infinite) variations of these basic types: the English auction (EA), the Dutch auction (DA), the first-price auction (FPA), and the second-price auction (SPA). Although if the details might differ, the essential features of these auction types are:

- In the EA, the auctioneer calls successively lower prices until only one bidder remains.
- In the DA, the auctioneer calls an initially low price that is successively increased until one bidder claims to be willing to provide the good at that price.
- In the FPA, potential sellers submit sealed bids; the bidder with the lowest bid wins and receives a contract for the amount it has bid.

71 For instance, government officials are often required to follow a prespecified set of public rules in conducting a procurement auction, and this can be seen as a means to achieve commitment.

72 Firms can of course be invited to place bids concerning other variable(s). Results need not be equivalent – see Verhoef (2007) for an application to highway franchising. Estache *et al* (2004) document, in their study of transport infrastructure in Latin America, a higher probability of a contract being renegotiated when it has been awarded through an auction based on the lowest tariff or the lowest duration than when the award criterion is the highest price, the lowest subsidy, or the highest canon.

- In the SPA, potential sellers submit sealed bids; the project is awarded to the bidder with the lowest bid, who then receives a contract for the amount of the second-lowest bid.

Under the assumptions that define the independent private value (IPV) model (see below), the answer to the question of what kind of auction to run is surprisingly simple: it doesn't matter! *All the four basic auctions yield the same average price for the buyer*; this is the celebrated revenue equivalence theorem.⁷³ Moreover, all auctions result in an efficient allocation and, provided the costs of bid preparation are negligible, *increasing the number of bidders reduces the average price* (Harris and Raviv, 1981).

What is even more interesting is that, *coupled with a suitably chosen (maximum) reserve price, any of the basic auctions is the optimal award mechanism* (Myerson, 1981) – that is, the government can do no better by relying on more complex strategies, such as, for instance, holding several rounds of bidding or charging entry fees. Notice, however, that the government should be able to credibly commit not to buy above the reserve price. Besides, the outcome of the auction can now be inefficient under the optimal mechanism, as there is a chance that the government does not buy even though some seller is willing to supply at a price below the maximum price the government is actually willing to pay – this bidder would have (optimally) bid more than his true costs.

The IPV is based on the following premises: there are N symmetric, risk-neutral sellers, each of whom know their own costs, but not other bidders' costs; the costs are independently drawn from a common distribution; bidders behave competitively; and payment is a function of bids alone (McAfee and McMillan, 1987). Such a setting would apply to procurement-contract bidding when each bidder knows what its own production cost will be in the case of winning, and when firms' production costs differ only because of differences in their production capabilities or in their alternative opportunities (see again McAfee and McMillan, 1987). In many other cases, however, these assumptions are less likely to be satisfied, and a different framework is needed.⁷⁴

Non-independent values. A common element of uncertainty over the production technology would violate the assumptions of the IPV. Milgrom and Weber (1982) develop a general auction model (that is, one in which valuations can have any degree of interdependence) for risk-neutral bidders in which the common and private value models emerge as special cases. All their results are driven by the assumption that the bidders' costs are affiliated. The assumption means roughly that the low value of one bidder's estimate makes it more likely that others' estimates will be of low value. Hence, affiliation implies a positive correlation, but is an even stronger assumption.

73 This result is sensitive to changes in the underlying assumptions; see the discussion below and check Maskin and Riley (1985) for further details. But Vickrey (1961) has shown that the DA and FPA yield the same outcome, regardless of the assumptions about the degree of bidders' risk aversion and the interdependence of valuations.

74 See the arguments in Milgrom and Weber (1982).

Several predictions arise from such a setting, most notably that when bidders are uncertain about costs and their cost estimates are statistically dependent, revenue equivalence is broken and the four basic auctions can be ranked according to the price they generate: *the EA leads to the lowest expected price, followed by the SPA, and then by the DA and FPA* (Milgrom and Weber, 1982). Introducing reserve prices does not alter this ranking. The fact that the EA results in the smallest price is due to the fact that in this open bid, bidders can obtain valuable information by looking at others' behaviour during the course of the auction – information that is not available under the alternative formats.

Milgrom and Weber (1982) also show that when the buyer can commit itself to any policy of reporting information, honesty (always report all information completely) is the best policy (in that it minimises the expected payment).

Risk aversion. With independent private values, if the sellers are risk averse, then *the buyer will strictly prefer the FPA or the DA over the EA or the SPA, since the former produce a lower expected price* (Harris and Raviv, 1981). This result, however, does not necessarily hold in the case of interdependent valuations (see Milgrom and Weber, 1982). Risk aversion is likely to be important in procurement contracts in which the bids are likely to be large relative to any bidder's assets, and might explain the popularity of sealed-bid auctions in that context (McAfee and McMillan, 1987). When faced with risk-averse sellers, the government can reduce the expected price in an FPA by concealing the number of bidders, which actually increases the competitiveness of the bidding (Matthews, 1987).

Asymmetric bidders. If bidders are asymmetric (for instance, if they fall into different cost categories), revenue equivalence breaks down (although the ranking of auction types is ambiguous) and the outcome can be inefficient since the lowest-cost bidder does not necessarily win (even with no reserve price). *If resale can be prevented, then the government should discriminate in favour of high-cost bidders* (McAfee and McMillan, 1987). This pushes the low-cost suppliers to bid more aggressively – although such a practice may sacrifice efficiency.

Non-competitive behaviour. Another important assumption in the analysis of auctions is that bidders behave competitively. In many situations, this may not be a reasonable assumption, and it is well recognised that bidder collusion is a serious problem in many auctions. Since collusion can be seen as an instance of horizontal corruption, we will defer a fuller treatment of this issue to Section 5.4.

Yvrande-Billon (2006) highlights some of the potential pitfalls of competitive tendering in procurement, namely, problems associated with a lack of transparency in the award criteria (especially prevalent for complex services), and execution problems (it may be difficult to enforce and adapt the terms of the contract after it has been awarded). One final problem that we would like to stress in the design of a procurement auction is that of abnormally low bids (ALBs) or tenders. This phenomenon arises when, by submitting a very low bid, a firm in a difficult financial position 'gambles for its resurrection', or aims at winning the contract and then renegotiating it once it becomes too costly for the government to replace the firm. Therefore, a very low bid may not be necessarily good news for the buyer, as there is the risk of having awarded the procurement

contract to an insolvent supplier. Gambling for resurrection may occur when the bidder is protected by limited liability, since a firm in a near-bankruptcy situation has little to lose by employing such a strategy. Calveras *et al* (2004) analyse this case, and show that surety bonds are a potential remedy to the problem of ALBs. A surety company is a specialised firm that guarantees that the procurement contract will be respected. In case of non-compliance, both the supplier and the surety company are liable. Hence, the surety company can help the contractor finish the project, or it can compensate the buyer up to the amount of the surety bond.

5.3.2 Negotiations, beauty contests, and other award mechanisms

Another common way to award contracts is through direct negotiation or bargaining between the buyer and one or more selected sellers. Milgrom (1985) compares these two award mechanisms and explains the popularity of auctions vis-à-vis bargaining, in particular a bargaining process in which the buyer negotiates one by one with a sequence of sellers.⁷⁵ Among other things, Milgrom shows that an auction can be the best way to procure even when the government has weak commitment ability (that is, when the government is in a relatively weak bargaining position relative to the potential suppliers), if the awarded contract can be resold. To understand why, consider a simple example adapted from Milgrom (1985). A buyer is in a weak bargaining position vis-à-vis two potential sellers: firm A, who can produce the item being bought at low cost, and firm B, whose cost is higher. If the buyer conducts an auction with a high maximum price (such that both firms are willing to participate), it can expect to buy the good from firm A at approximately the same price that firm B would obtain by reselling the contract to firm A – even though firm B may be in a much better position to bargain face to face with firm A. *The ability to conduct an auction allows a weak bargainer (the buyer) to benefit from the abilities of any stronger bargainers who may be present (firm B), forcing the player with the lowest cost (firm A) to bid just as if it were bargaining with a stronger player* (Milgrom, 1985: 19).

Bulow and Klemperer (1996) also compare an auction to a negotiation and analyse the case of weak commitment ability. Consider the following situation. There are two buyers. Buyer A has one potential seller, but has all the bargaining power, including the ability to make binding commitments, and can choose any mechanism to buy the item; the seller's cost is private information. Buyer B, on the other hand, has two potential sellers, each with independent (private)

⁷⁵ These sellers make short-lived offers, so the buyer has no opportunity to compare offers. Milgrom (1985) actually focused on a situation in which a seller is dealing with several buyers; the reinterpretation in terms of our context is straightforward.

costs, but buyer B has no bargaining power and can only hold an absolute EA.⁷⁶ Bulow and Klemperer show that in many situations buyer B is better off than buyer A, in spite of buyer B's limited options. It is always more valuable for the buyer to have one extra seller than more bargaining power: *An absolute English auction with $N + 1$ bidders is more profitable in expectation than any negotiation with N bidders* (Bulow and Klemperer, 1996, corollary: 189). Put differently, competition may be more important than bargaining power.

Therefore, competitive bidding for a procurement contract will yield lower average prices than negotiating with a smaller number of contractors. The result could be even more striking in real life, where the buyer does not have the ability to make the kind of credible commitments envisioned in the work of Bulow and Klemperer (1996), and where sellers have some bargaining power in the negotiations (as opposed to what was assumed here). Milgrom (1985, proposition 3) also shows that a buyer in a strong bargaining position may optimally choose to conduct some standard auction instead of selecting another exchange mechanism.

In a procurement problem, nevertheless, negotiations can also outperform auctions, for example (i) when there is uncertainty about the quality of the good or service, or (ii) when the government must provide the contractor with (costly) designs and specifications describing the project, and *ex post* adaptations to the project are needed.

The first case is analysed by Manelli and Vincent (1995), who assume that the buyer does not know the quality of the goods or services *ex ante* and that a court cannot verify it *ex post*.⁷⁷ In their story, a government agency (the buyer) procuring goods and services of uncertain quality may seek bids from different potential suppliers or simply bargain with a given seller (making a credible take-it-or-leave-it offer). The sellers have private information on their 'quality' (an adverse selection parameter), which affects the reservation value of the seller and the value that the buyer derives from the good.

Under the former assumptions, Manelli and Vincent (1995) show that *an auction may be suboptimal both for the buyer and for society*. The model postulates a positive relationship between cost and quality: a higher adverse selection parameter means higher costs for the seller, but increases the benefits of the buyer (and can be thus interpreted as the quality of the good). If the buyer

76 An absolute EA is an English auction with no (maximum) reserve price – that is, the highest price at which the buyer is willing to buy. The price decreases continually until all the bidders but one drop out. This last bidder is awarded the item at the last price called, and the buyer cannot refuse to accept this bid. Bulow and Klemperer (1996) analyse the case of a seller dealing with several buyers, but the reinterpretation in terms of our context is straightforward.

77 Asker and Cantillon (2005) compare auctions and negotiations for the procurement of a good for which both price and quality matter. In their set-up, negotiations do less well than a simple scoring auction, in which firms bid on multiple dimensions (here, price and quality), and prespecified scoring rules reduce these to a single dimension for which bids are compared. In an empirical study, Estache *et al* (2004) find that for transport infrastructure in Latin America, negotiated contracts have performed worse than bidding mechanisms in terms of the percentage of contracts that had to be renegotiated *ex post*.

decides to procure by auction, in many situations the trade will be allocated to the lowest bidder, who will be the seller with the lowest cost – and hence the lowest quality. Thus, expected social surplus will tend to be small. In environments in which auctions are inefficient, a negotiation is desirable: *if the potential gains from trade are large, and if the buyer values marginal quality more than the sellers, then arbitrarily selecting a seller and tendering a take-it-or-leave-it offer maximises expected social surplus* (Manelli and Vincent, 1995, theorem 3).⁷⁸

The second case is discussed by Bajari *et al* (2009).⁷⁹ Rather than focusing on *ex ante* asymmetric information, their model highlights costly *ex post* adaptations. The government wants to procure a customised good ('the project') from a seller/contractor. The government must provide the contractor with (costly) designs and specifications describing the project in the contract, thereby choosing the level of contractual completeness of the project's design. A more accurate design reduces the need for *ex post* adaptations. The costs of design increase with the complexity of the project. The government also has to choose the fraction of costs that the contractor will bear, that is, the power of the incentives provided (this is modelled as a 0-1 decision, that is, a pure cost-plus contract or a pure fixed-price contract).

If modifications to the project are needed *ex post*, these are less costly (in terms of surplus reduction) under a cost-plus contract, since a fixed-price contract might entail costly renegotiations due to incomplete information. As we know from Appendix 5A.1, however, a fixed-price contract provides better incentives for cost reduction than a cost-plus contract. The authors identify cost-plus contracts with negotiations and fixed-price contracts with auctions; thus, they tie contractual choice and the award mechanism.

The trade-off faced by the government is now clear. A negotiated cost-plus contract can incorporate *ex post* adaptations more easily, thus saving on design costs, but provides weak incentives to keep costs low. Then, for instance, if the complexity of the project is high, the benefits of conducting a negotiation are higher, and cost-plus contracts are more likely to be optimal; simpler projects, on the other hand, are more likely to be fixed-price contracts awarded through an auction. Auctioning off a very complex project may also be a bad idea if more complex projects imply fewer bidders because of a lack of 'deep pockets'.

For a given level of complexity, and if the benefits of an auction are increasing with the number of bidders (as they do in many cases), an increase in this number makes auctions more desirable (as in Bulow and Klemperer 1996). Conversely, if the number of available bidders is reduced, the government might be better-off negotiating with a reputable contractor than conducting an auction.

Another advantage of negotiations relative to auctions – as pointed out by Bajari *et al* (2009) – is communication: during discussions between seller and buyer, information held by the seller may become available to the buyer before

78 Similar results are presented in Calzolari and Spagnolo (2009), in the context of repeated interaction between the buyer and sellers. As they show, negotiation with a single supplier is preferred when non-contractible quality is crucial – where an open auction would generate inefficient outcomes.

79 See also Bajari and Tadelis (2001, 2006) and Bajari *et al* (2006).

the plans and specifications are completed, thus allowing for a better project design and reducing the need for *ex post* adaptations.⁸⁰ This kind of information cannot be disclosed in a simple auction where all information is subsumed in a single indicator – for example, price.

The European Commission, for instance, encourages this kind of communication between buyer and sellers through what it calls ‘competitive dialogue’. This procedure can be used ‘in the case of particularly complex contracts’, where ‘the use of the open or restricted procedure will not allow the award of the contract’ (Directive 2004/18/EC). This competitive dialogue is meant to allow the procurement authorities ‘to identify and define the means best suited to satisfying their needs’, and may be conducted ‘in successive stages in order to reduce the number of [bidders]’. Once the dialogue is concluded, the buyer invites bidders to submit their final tenders based on the solutions specified during the process. Doni (2007) identifies two necessary conditions for a competitive dialogue to be the optimal awarding mechanism: (i) a sufficient number of bidders to ensure effective competition for the contract, and (ii) a low risk of corruption.

The work of Bajari and Tadelis (2006) also sheds some light on other award mechanisms such as limited bidding, in which only some invited bidders can submit a bid. This practice can be justified when the project is rather complex and preparing a bid is costly, since it may deter qualified bidders from entering the auction (that is, investing time and money in preparing their bids) if they fear losing to less qualified bidders who are willing to tender lower bids. In such cases, inviting a small set of qualified bidders can be optimal.

Ye (2007) also shows that, in a model in which it is costly for bidders to learn their valuations, limiting the number of bidders may be in the best interest of the buyer, since it induces efficient entry. Notice that asking for price quotations from several suppliers (a practice sometimes referred to as ‘shopping’) can also be interpreted as a limited auction.⁸¹ In addition, Calzolari and Spagnolo (2009) show that in a dynamic procurement setting, a buyer may optimally conduct recurrent auctions with a restricted number of qualified suppliers to encourage the provision of non-contractible quality.

Another common award mechanism in the procurement of goods and services is a beauty contest. In a beauty contest, firms have to submit detailed bids whose ‘beauty’ is judged in terms of a varying set of attributes (typically involving price and quality).⁸² The design of a beauty contest involves the determination of the criteria on which to assess bids, and the weights, if any, assigned to each criterion. The distinguishing feature is that at least one item is scored in a subjective way. Therefore, as auctions, beauty contests involve a comparison of bids; unlike auctions, the award criteria are (at least to some extent) unquantifiable or subjective. Beauty contests are advocated in some circles, and have been used

⁸⁰ This communication can nevertheless facilitate corruption. See Section 5.4.

⁸¹ Comparison of bids is the key.

⁸² For a detailed discussion on beauty contest design, see Dykstra and van der Windt (2004).

in some major sales (for example, the sale of the British 2G and the Spanish and Swedish 3G telecommunications licences).

Auctions are generally preferable to beauty contests, as Binmore and Klemperer (2002) have forcefully argued in the case of allocating radio-spectrum licences.⁸³ In a context of asymmetric information, an auction is best suited for extracting useful information from potential sellers, thus leading to an efficient allocation of resources (contracts go to those who value them the most) and to lower average prices. Even if the government is concerned solely with efficiency, and counts on a later resale (by the initial winner) to achieve it, a beauty contest cannot be relied upon to achieve an efficient final allocation; it is precisely in a context of asymmetric information that reselling is generally inefficient (see Myerson and Satterthwaite, 1983, for instance).

Moreover, the discretion and subjectivity of government bureaucrats involved in beauty contests make them the subject of political and legal controversy, and of suspicions of favouritism and corruption.⁸⁴ Specification and evaluation of criteria in a beauty contest can be time consuming – though designing and conducting a good auction might take just as much time.

Beauty contests can be a valid option in cases in which the object to be procured cannot be defined in advance in any sensible manner (for example, a research project), or for which the government wants to extract innovative proposals from the market participants (as in the selection of an architect for a museum).⁸⁵

We finish this section by mentioning a few other mechanisms that may be used to allocate tasks (Janssen, 2004): (i) those that allocate on a ‘first-come first-served’ basis, awarding the contract to the first firm that expresses interest; (ii) those that award contracts based on ‘grandfather rights’ stipulating that a supplier will continue to perform a task into the future; and (iii) lotteries, which assign contracts randomly. It is pretty clear that all of these are bested by any of the mechanisms discussed above – at least from the government’s perspective.

5.3.3 Some remarks on award mechanisms

The message conveyed in this section is that one size does not fit all. In auction design, details matter:

- Under the assumptions of the IPV, a government can use any of the four basic auctions: they all yield the same result.
- If values are non-independent, the four auctions can be ranked: the EA leads to the lowest expected price, followed by the SPA, and then by the DA and FPA (but this ranking is reversed under collusion, as discussed in Section 5.4).

⁸³ See also the introductory chapter in Janssen (2004) for a comparison of both mechanisms.

⁸⁴ As we discuss in Section 5.4, these problems can also appear in competitive auctions.

⁸⁵ These examples come from Janssen (2004).

- The FPA or the DA is preferable when bidders are risk averse.
- If bidders are asymmetric, the ranking of auctions is ambiguous.

Moreover, in spite of the well-known advantages of auctions, other award mechanisms outperform them in some situations:

- When there is uncertainty about quality, or when ex post adaptations to the project are likely, negotiations and limited biddings can be superior to auctions.
- When the number of bidders is reduced, or when communication with the seller is important, the government might be better-off negotiating with a reputable contractor than conducting an auction.
- When the object to be procured cannot be defined in advance in any sensible manner, or when the government wants to extract innovative proposals from the market participants, a beauty contest can be an option.

5.4 CORRUPTION

Favouritism, fraud, cronyism, patronage, embezzlement, bribes, capture, collusion, extortion – call it what you like, corruption matters.⁸⁶ Corruption in procurement is not only found to be significant but is also perceived to be widespread.⁸⁷ Auriol (2006) estimates the cost of corruption to be between 4% and 10% of procurement spending – which in turn stands at around 15% of the gross domestic product (GDP) of developed countries, according to OECD (2005). Indeed, opportunities for some form of corruption are present in every step of the procurement process that we have touched upon in this chapter (see Subsection 5.4.1). As we saw in Section 5.3, auctions are a much-utilised award mechanism in procurement, and we will devote Subsection 5.4.2 to discussing the problem of corruption in auction design and implementation.

5.4.1 *Opportunities for corruption in procurement*

To begin with, corruption may unduly bias the decision between in-house provision and private contracting. Hart *et al* (1997: 1145) consider the case of a self-interested government, that is, one that does not necessarily act in the best interest of society. They consider as a corrupt politician one that is ‘willing to use his control rights to extract money (or campaign contributions) from the

⁸⁶ This extensive list of concepts is borrowed with slight modification from Estache (2004).

⁸⁷ See the views expressed during the conference ‘Fighting Corruption and Promoting Integrity in Public Procurement’, held in November 2004, organised by the OECD Global Forum on Governance, and compiled in OECD (2005).

contractor'. The model is the same as in Section 5.1, except that the ownership structure is now chosen by a politician willing to take bribes. They show that such a politician will always prefer to privatise, even if public ownership is in society's best interest, because he can extract a higher bribe when privatising. Hence, their conclusion that *to the extent that corruption is a serious problem, the case for privatisation is weaker*.

For instance, a corrupt politician may be able to avoid competitive bidding for a facility, charging instead an artificially low price and demanding a bribe in return. If the politician can extract higher bribes from privatising the facility, he will choose privatisation more often than optimally needed, thus weakening the case for privatisation.

On the other hand, Hart *et al* (1997) show that a different type of corruption (political patronage) leads to a *stronger* case for privatisation. In related works, Boyco *et al* (1996) also emphasise the private benefits to politicians of keeping service provisions inside the government. The link between corruption and the privatisation decision is further discussed by Coolidge and Rose-Ackerman (1997), Shleifer (1998) and Laffont and Meleu (1999).

Corruption might also take place after the mode of provision (that is, public or private) has been decided. For instance, Bjorvatn and Søreide (2005) analyse corruption opportunities once the decision to privatise has been taken. Focusing on the sale of a public asset (for example, an infrastructure facility), the authors analyse the impact of corruptible government officials on the outcome of the privatisation process. They show that corruption affects the choice of buyer, and leads to a highly concentrated and inefficient market structure.

Corruption also affects the decision whether to bundle or unbundle tasks. Martimort and Pouyet (2008) provide some insights into the political economy of the bundling and ownership decisions. Adding private information on operating costs to their basic framework (discussed in Section 5.2) generates a rent for the operator that is the stake of corruption. Assume further that the sign of the externality is observed by the firm and a non-benevolent government official, but can be hidden from the general public. Bundling then increases the scope for capture. But the bundling decision is unchanged under the threat of capture (proposition 9); the incentives provided to the builder are modified to reduce the collusive stake. When the social cost of collusion is considered, the relative desirability of bundling may be reduced.

Auriol (2006) has analysed corruption in the selection of an award mechanism, and discussed how rules for decisions should be set to respond to the threat of corruption. Her basic story is as follows. A principal (for example, a government) wants to buy a fixed amount of goods and services (what she calls 'the market size') from an agent (for example, a private firm) through a delegate (for example, a procurement agency), and has to devise a procurement rule such that a purchase is made under the best possible conditions (that is, the lowest price or the highest value for money).

Depending on the number of firms, the procurement agency can run a competitive auction at cost K or it can negotiate with a single provider (or a

limited number of providers). The number of potential bidders is unknown to the government, but the procurement agency can learn of it. It can also hide this information from the government, but it cannot lie about it (information is said to be ‘hard’ in such a situation). After learning the information about the number of bidders, the procurement agency can meet with one of them to offer a particular choice of procurement method (sole sourcing instead of competitive bidding) in exchange for a side payment; corruption is possible at this stage. The maximum bribe the delegate can get is what a firm would be willing to pay to obtain a monopoly position.⁸⁸

Conducting an auction raises the probability of a small acquisition cost, a benefit that increases with the number of bidders and the size of the market. On the other hand, there are procedural costs involved in the organisation of an open tender (both monetary and nonmonetary).⁸⁹ Hence, *for small markets or large procedural costs, sole sourcing is optimal, whereas for large purchases or small procedural costs, competitive bidding is the best choice* – regardless of the delegate’s information. In intermediate cases, however, the choice of the optimal procurement rule depends on the information held by the procurement agency, and hence there is an incentive for corruption.

Auriol (2006) further distinguishes between two forms of corruption. Capture, on the one hand, occurs when a firm takes the initiative of bribing a government official to obtain an advantage. Extortion, on the other hand, happens when it is the official who demands a bribe from a firm, threatening to exclude it from the procurement procedure (such bribes are sometimes referred to as ‘facilitation payments’). These two forms are not equivalent, at least not in terms of the cost they impose on taxpayers: capture entails a deadweight loss on top of the bribes, while extortion does not involve any distortion in allocative efficiency (the total purchase cost for the government remains the same – only the distribution of rents between the supplier and the delegate is affected).⁹⁰

Since fighting extortion entails costs and yields no benefits, the optimal delegation scheme does not prevent it. To cope with the effects of capture, on the other hand, *public purchasers should receive incentive payments to resist capture, and these payments should increase with the size of the purchase*.⁹¹ But it is not necessarily optimal to eliminate capture altogether, nor to reduce the level of discretion of the procurement agency – especially when the corruptibility of the procurement official is unknown.

As we have discussed in previous sections, competitive tenders are praised on the basis of being less prone to corruption; however, room for corruption remains in auction design and implementation – see Subsection 5.4.2. Corrupt

88 Søreide (2004) provides survey data that show that obtaining the contract through direct negotiations (abandoning the auction mechanism) is the main motivation for offering a bribe.

89 These costs could be reduced by as much as 20% through the growing practice of e-procurement; see, for example, Auriol (2006) and Falvey *et al* (2007) for additional figures.

90 The total cost of capture is estimated to be between 1.20 and 2.88 times the amount of the bribes, or between 4% and 10% of procurement spending (see Auriol, 2006, for details).

91 This reasoning is familiar from the work of Tirole (1986).

practices are also found in other award mechanisms.⁹² For instance, a limited tender (or ‘shopping’) raises the issue of the selection of the (limited) number of bidders. Abuses can occur when there is collusion between procurement officials and contractors. In sole-sourcing or direct negotiations with a single supplier (an extreme case of shopping), the problem can be worse. Such a mechanism is sometimes invoked for reasons of ‘urgency’, but such urgency can be created by delaying procurement for purposes of personal gain. Meanwhile, requests for goods and services can be (unnecessarily) split into several small packages to justify the use of limited shopping or sole sourcing.

5.4.2 Collusion in auctions

We will divide the analysis of collusion in auctions according to the participants in the collusive agreement: (i) a bidder and a government official, or (ii) a group of bidders. Boehm and Olaya (2006: 432) describe the first case as one in which ‘a bidder or potential bidder approaches the auctioneer (or vice versa) to propose a corrupt side-agreement in order to gain an advantage over other bidders’. Bajari and Summers (2002: 143) define the second case as ‘an agreement among a group of firms . . . designed to limit competition among the participants.’

Collusion between a government official and a bidder

Sørreide (2006) argues that large and complex contracts (such as those in infrastructure services) provide opportunities to bypass, manipulate, or cheat on auction rules – even if these were conceived to ensure efficiency and fairness in contract awarding. The author classifies these opportunities as (i) hidden violations of procurement rules (in other words, rules appear to have been respected), and (ii) legitimate deviations from procurement procedures (abuses of rules of exception). An example of the former is a poor response rate to the tender invitation (which is due to the procurement agency making it difficult for legitimate bidders to submit their bids in order to award the contract to a predetermined bidder). An example of the latter would be unfounded disqualifications of the lowest bidders.⁹³

Burguet and Che (2004) show how corruption affects the allocation of contracts when firms bribe a government official to manipulate the assessment of some dimension of the offers. Interestingly, they show that *if the official has little manipulative power, corruption does not disrupt allocative efficiency but simply makes the efficient firm compete aggressively*. In this case, allowing some degree of corruption amounts to handicapping in favour of the high-cost (inefficient) bidder, and benefits the buyer. Higher levels of corruption, however, lead to inefficient outcomes and call for modifications in the design of the selection rule: the buyer may need to handicap the *inefficient* firm and de-emphasise the manipulable dimension in the scoring rule.

92 See World Bank (2006).

93 The interested reader can also check Boehm and Olaya (2006) for more.

In Compte *et al* (2005), the government official in charge of the auction can also be bribed, but this time in exchange for a bid readjustment after initial bids have been submitted. A key insight from their work is that the existence of a corrupt official facilitates collusion in prices among bidders. The ability of firms to collude is not impaired by increased controls on the government official (it might even be facilitated). More effective remedies in this context are controls on efficient firms (who need to compete more aggressively on price to compensate for their disadvantage in bribe competition), and the entry of sufficiently efficient outsiders (who lack connections and thus find it more difficult to bribe) (see Compte *et al*, 2005, proposition 6: 8).

Collusion among bidders

As we saw in Section 5.3, an important assumption in the analysis of auctions is that bidders behave competitively. In many situations, this may not be a reasonable assumption, and the costs of ignoring the phenomenon of collusive (or cooperative) behaviour on the part of bidders can be important (see, for instance, Marshall and Marx, 2007 and Sherstyuk, 2002). For instance, if bidders know one another (for example, they are members of a suppliers' association) and expect to meet again in future auctions, collusion (whether explicit or tacit) is more likely.⁹⁴

It is well recognised that bidder collusion is a serious problem in many auctions: it has been documented in auctions for frequency spectrums; used machinery; the procurement of construction works; timber; treasury securities; and so on (McAfee and McMillan, 1987; Aoyagi, 2003, 2007). Porter and Zona (1993) argue that bidder collusion accounts for 50% of all cases filed by the US Justice Department's antitrust division.

A government facing a sellers' cartel should set a reserve price (Graham and Marshall, 1987). Literature indicates that *the anticartel reserve price is lower than the optimal reserve price with no collusion*, and that *the anticartel reserve price decreases with the number of cartel members* (see McAfee and McMillan, 1987, and the references therein).⁹⁵ As Milgrom (1985) observes, auction forms differ in their degree of immunity to collusion; in particular, *ascending-bid auctions are more susceptible to collusion than are sealed-bid auctions*. According to repeated-game analysis, collusion is easier to sustain when it is fairly simple to detect deviations, as in an open-bid auction (such as the EA) where bidders can observe the bids placed by other members of the collusive agreement. This observability is not present in sealed-bid auctions; thus, detection is more difficult, and collusion is harder to sustain.⁹⁶ Moreover, repeated interaction implies that a deviator can be punished in subsequent auctions, making deviations less profitable.

94 To fight collusion, collusive behaviour must first be detected. Bajari and Ye (2001, 2003) and Porter and Zona (1993), among others, have developed statistical tests of such behaviour. See Bajari and Summers (2002) for a review of existing tests and a discussion of their applicability and limitations.

95 Making the reserve price secret can also make bidder collusion more difficult to sustain. Notice, however, that too low a reserve price might deter entry to the auction.

96 As bidding rings are usually illegal, such a collusive agreement cannot be enforced by a court of law!

Of sealed-bid auctions, first-price auctions are less susceptible to collusion than second-price auctions; hence we rank auctions in the exact reverse order of a ranking by expected price: *the FPA is the least vulnerable to collusion, followed by the SPA, and then by the EA* (see the discussion in Börgers and van Damme, 2004). In spite of the general superiority of the EA in a one-shot competitive situation, the possibility of collusion might make an FPA more desirable to the government, especially when the bidders have a long-term relationship.

5.4.3 Some remarks on corruption

Corruption in procurement is significant and widespread. Opportunities for some form of corruption are present in every step of the procurement process:

- A corrupt politician – one who is willing to use his control rights to extract money from the contractor – will always be inclined toward privatisation if he can extract a higher bribe when privatising; but a politician who derives private benefits from keeping service provisions inside the government will bias the choice toward in-house provision.
- A non-benevolent government official who has private information about the externalities between tasks may unduly bias the choice to bundle or unbundle toward bundling – where the scope for capture is greater.
- When the number of potential bidders is unknown to the government, a corrupt procurement agency that can learn of it and hide this information from the government can approach one bidder and offer a particular choice of procurement method (sole-sourcing instead of competitive bidding) in exchange for a bribe.
- Shopping, sole-sourcing or direct negotiations can lead to abuses in the selection of the limited number of bidders when there is collusion between procurement officials and contractors.
- Large and complex infrastructure contracts provide ample opportunity to bypass, manipulate, or cheat on auction rules. Corruption can facilitate price collusion among bidders in auctions, but it may also make some bidders bid more aggressively, thus benefiting the government.
- If bidders know one another and expect to meet again in future auctions, collusion among them is more likely. Auctions differ in their immunity to collusion; in particular, ascending-bid auctions are more susceptible to collusion than are sealed-bid auctions – which might explain to some extent why, in spite of the general superiority of the EA, an FPA is more frequently chosen by governments.

5.5 CONCLUSION: WHAT HAVE WE LEARNED?

Infrastructure – a necessarily customised object involving complex economic, political, social and environmental considerations and a long time horizon – poses particularly difficult challenges for public procurers. To deliver public infrastructure services to citizens and taxpayers, governments have to make several key decisions, as addressed in this chapter: (i) whether to provide the services in-house or through contracts to private firms, (ii) whether to bundle or unbundle the different tasks that go into the provision of infrastructure services (such as building and operating), (iii) how to select providers (that is, how to assign contracts to them), and (iv) how to deal with corruption and collusion at every step of the process. For every decision, this chapter has argued, economic theory can guide governments in wise decisionmaking.

Theory suggests that, in general, tasks that are both hard to control (that is, that have high contracting costs) and important (in the sense of generating large social benefits) should remain in public hands. Regarding the decision to bundle or not (especially with regard to PPPs), the literature has highlighted the existence of positive externalities or complementarities across tasks as a key factor in tilting the balance toward bundling and private sector involvement, but other considerations appear to be relevant also, such as contracting costs, competition for a given contract, financing constraints, and risk sharing. In spite of the widespread use of auctions in public procurement, the economic literature warns us that, in terms of award mechanisms, one size does *not* fit all. Indeed, in spite of the well-known advantages of conducting a competitive auction, other selection mechanisms can outperform auctions in non-trivial situations.

Corruption is a very significant and widespread phenomenon in public procurement. As we have discussed, opportunities for some form of corruption arise in every stage of the procurement process. To fight, and by so doing, deter corruption in its various manifestations, it is important to identify those opportunities. In this chapter we have tried to outline these and to suggest how procurement policies can be adapted to face the threats posed by corrupt behaviour.

APPENDIX 5A.1 TRADITIONAL INCENTIVE THEORY

This theory assumes that the government, acting as a benevolent principal, wants a task to be done, a task that it cannot perform by itself and must thus delegate to an agent. In the simplest case, the agent produces a fixed output of a single good that has value for the principal. The costs of production depend in a deterministic manner on the intrinsic technology (called the agent's type) and the effort exerted by the agent. Realised costs are observable and can be made part of an enforceable contract.

If the government knew the type or could observe the effort of the agent, it could simply mandate the optimal level of effort from each known type. To make a more interesting problem, the theory includes some asymmetric information between principal and agent. The basic story envisions a principal that is unable to monitor the agent's cost-reducing effort (thus, there is a *moral hazard* or *hidden action* problem) and who has less information about the technology than the agent (an *adverse selection* or *hidden knowledge* problem). In other words, even though the government can observe costs, this observation does not allow it to disentangle the type of the agent and its effort.⁹⁷ Since the government can no longer mandate an effort level, it must induce the agent to provide it.

Assuming there are just two possible types of agents (which we may call 'efficient' and 'inefficient'), the optimal incentive scheme proposed by the government is characterised by (i) an efficient level of effort and a positive rent for the efficient type, and (ii) an inefficiently low level of effort and no rent for the inefficient type. The rent obtained by the efficient agent comes from its ability to mimic the inefficient type. Put differently, to ensure participation when costs are high, the principal must offer a payment that leaves a rent to the agent when its costs are intrinsically low. To reduce this rent, the principal optimally distorts the level of effort requested from the inefficient agent.

The basic trade-off highlighted by this theory is that between incentives for cost reduction and rent extraction. Fixed-price contracts (no cost is reimbursed) and cost-plus contracts (all costs are reimbursed) are two commonly considered and opposite cases of cost reimbursement rules. Under a fixed-price contract the agent is made a residual claimant for its cost savings, which induces it to provide effort but leaves large rents to the agent. Under a cost-plus contract, on the other hand, the agent does not bear any of its costs, and thus cannot appropriate any savings from cost reductions; hence, all rents are extracted but little incentives for cost reduction are provided. To extract the firm's private information, the principal must offer a menu of incentive contracts that optimally balances the incentives provided and the rents left to the operator (that is, incentive schemes are pushed away from fixed-price contracts and toward cost-plus contracts).

Before it was assumed that the value of a good or service is so high for the government as to make its production even by an inefficient firm worthwhile. In some circumstances, however, it may prove optimal to shut down production

97 These have been termed as models with 'false moral hazard'. See Laffont and Martimort (2002).

altogether if costs turn out to be too high. In this case, the efficient agent gets nothing by mimicking the inefficient agent, and the government extracts all the rent.

APPENDIX 5A.2 THE PROPERTY RIGHTS APPROACH

The property rights theory starts from two basic premises: (i) contracts are incomplete and (ii) the parties are somewhat locked in relationship with one another (for example, one of the parties may have performed an investment specific to the relationship, thus finding itself in a bilateral monopoly of sorts, vis-à-vis the other party).⁹⁸ Given the second premise, there are *ex ante* quasi-rents because the value of trading within the relationship turns out to be higher than that of trading outside.

The incomplete contract necessitates *ex post* bargaining to allocate the surplus (that is, the quasi-rents) generated by the relationship; the standard property rights theory typically uses the Nash bargaining solution at this point, a solution that assigns each party a disagreement pay-off plus half of the surplus created. The disagreement payoff is what each party receives in case no agreement is reached during the negotiations – that is, it represents the value of trading elsewhere.

A simple example will help illustrate the basic argument. Suppose a seller and a buyer are in a bilateral trading situation. The seller uses an asset to produce a good that is both valuable to the buyer (with value Q) and in an alternative use (P). The asset is specific in the sense that $Q > P$. Assume also that ownership of the asset conveys ownership of the good.

At time 0, the parties decide who will own the asset. Asset ownership is taken to be the defining characteristic of the firm; thus, the time 0 decision effectively delineates the boundaries of the firm. Following Grossman and Hart (1986), consider a transaction integrated when the buyer owns the asset, and non-integrated when the seller owns it. Since the good cannot be described in advance, no further decision can be agreed to at this time.

At time 1, the seller may choose to make an investment $i \geq 0$ with costs $c(i)$, an increasing and convex function. The value of the good to the buyer, Q , is an increasing function of the level of investment, that is, $Q'(i) > 0$. The chosen investment level is not observed by the buyer. The realised value of Q and the value P , on the other hand, are observable by both parties at time 2 but non-verifiable (for instance, by a court).⁹⁹ Therefore, contracts based on i , Q , or P cannot be enforced by a third party. Assume further that $c(0) = 0$ and $Q(i) > P$ for all i . The optimal level of investment i^* is the one that maximises $Q(i) - c(i)$, and is that which solves $Q'(i^*) = c'(i^*)$.

⁹⁸ See Whinston (2003).

⁹⁹ A variable is verifiable if its level can be (costlessly) described *ex ante* in a contract and ascertained *ex post* by a court (Laffont and Tirole, 1993).

At time 3, the joint surplus has to be divided. Under integration, the buyer can simply take the good – without any payment to the seller – once production starts. In anticipation of this, the optimal choice for the seller is to take no costly action at time 1, that is, to choose $i = 0$. This choice by the seller illustrates an insight repeatedly emphasised in property rights theory: the cost of control is the loss of initiative.

Under non-integration, since $Q > P$ for all i , there will be bargaining over the ownership of the good after production takes place. This will involve the buyer paying the seller a (bargained) price $\rho = \frac{1}{2}[Q(i) + P]$ for the good. Since Q and P are observed by both parties, bargaining takes place under complete information and the outcome is *ex post* efficient. The Nash bargaining solution assigns each party a disagreement pay-off plus half of the surplus generated by the agreement. The disagreement pay-off of the seller is given by P , since it can always put the good to alternative use in case of disagreement. We assume the buyer has no option to get the good other than from this seller; hence, the disagreement pay-off is 0.

The seller's *ex ante* pay-off (before choosing its investment) is given by $\rho - c(i) = \frac{1}{2}[Q(i) + P] - c(i)$, and it will choose i at time 1 to maximise this expression, that is, it will choose i^{**} such that $\frac{1}{2}Q'(i^{**}) = c'(i^{**})$. Given the convexity of the cost function, the latter implies that $i^{**} < i^*$, that is, that the seller underinvests since it must share the gains of its investment with the buyer through bargaining. We can follow this line of reasoning repeatedly throughout the chapter.

APPENDIX 5A.3 COST REDUCTION AND QUALITY DETERIORATION

Basic economic theory postulates that an individual will choose an action x if its benefits, which we may represent by $B(x)$, exceed its costs – let us call them $C(x)$. The probability of observing a given choice x is then given by the probability that the benefits of choosing x exceed the costs of doing so, that is,

$$Pr(\text{observe } x) = Pr[B(x) > C(x)]$$

Hence, the probability of observing x can go up with increases in the benefits, but also with decreases in the cost. For the literature surveyed, we can identify the costs and benefits of a particular x , for example, $x =$ public ownership or $x =$ bundling, by taking a close look at the particular trade-off highlighted by each work. For instance, consider the case of Hart *et al* (1997). Take $x =$ in-house provision; from the discussion in the text, we have $B(x) =$ muted incentives for cost-reducing activities that deteriorate quality, and $C(x) =$ low incentives for quality improvements. Then, we can see that if cost-reducing activities have a large deleterious effect on quality, it is more likely for in-house provision to be optimal because $B(x)$ increases.

The same framework can be used to understand why in the presence of externalities or indirect effects the individual might choose x more (or less) often

than optimal. Let $B(x)$ denote the individual's benefits and $S(x)$ the benefits to society. Assume there is a positive externality; in this case $B(x) < S(x)$. We can easily see that the individual will choose x less often since it does not take into account all the benefits that accrue from the action:

$$Pr[B(x) > C(x)] < Pr[S(x) > C(x)]$$

An analogous reasoning applies to the case of a negative externality (individual costs are lower in this case, that is, $C(x) < Z(x)$, where Z denotes the social cost of action x). The individual can be made to choose the socially optimal action only by making it bear the full costs and benefits of actions. Consider again the case of Hart *et al* (1997). Make x = cost-reducing activities. We have seen that the owner-manager ignores the deterioration of quality brought about by cost reduction, which amounts to $C(x) < Z(x)$. Hence, it chooses x more often than optimal, that is, it invests too much in cost reduction.

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Public Procurement: Learning from the Experience of Developing Countries

ATSUSHI IIMI

Infrastructure is among the most important driving forces behind vigorous economic growth (see, for example, Antel, 1983; World Bank, 1994; Canning, 1998; Calderón and Servén, 2004a). Every year developing countries invest as much as 10% of their gross domestic product (GDP) in public infrastructure development. For instance, China, Thailand and Vietnam, which have exhibited strong growth performance in the two past decades, are estimated to have spent more than 7% of their GDP on infrastructure (ADB *et al*, 2005). Even in the Latin American region, where some countries marginalised public infrastructure investment due to fiscal constraints in the 1990s, infrastructure spending accounts for 1 to 6% of GDP (Calderón and Servén, 2004b).

In addition to concern over the size of the investment needed, there has long been concern about efficiency in public procurement, in particular in developing countries where governance remains relatively weak. A significant amount of public resources are lost in procurement due to inefficiency, corruption and collusion (see, for example, Olken, 2005; Francisco and Pontara, 2007). In FY 2006, 150 cases of misprocurement, totalling \$76.4 million, were identified in World Bank operations alone (Table 6.1). According to another estimate, one-fourth of GDP might be lost due to corruption in Africa every year (Thachuk, 2005). Certainly, this is not a problem unique to the infrastructure sector, but infrastructure contracts are particularly vulnerable to fraud spurred by the high transaction values involved.

Table 6.1 *Misprocurement cases in projects financed by the World Bank*

| FY | Number of countries | Number of projects | Number of contracts | Contract amount (US\$ million) |
|------|---------------------|--------------------|---------------------|--------------------------------|
| 2004 | 5 | n.a. | 9 | 17.6 |
| 2005 | 6 | n.a. | 22 | 1.2 |
| 2006 | 10 | 25 | 150 | 76.4 |
| 2007 | 9 | 9 | 130 | 36.8 |

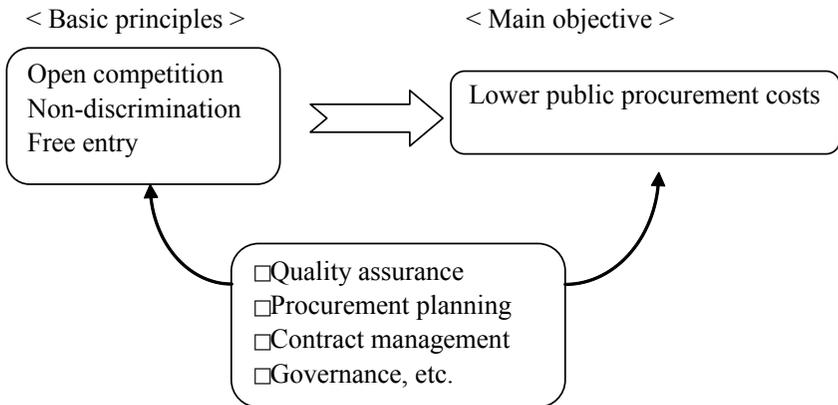
Notes: n.a. = Not applicable.

Source: World Bank (2008b).

Procurement reforms can improve efficiency in public spending by saving more public resources and creating fiscal space (Heller, 2005; IMF, 2005). Importantly, public financing is estimated to account for approximately 80% of total infrastructure investment in the developing world (World Bank, 2005). The ultimate objective is simple: to procure public infrastructure of good quality at the lowest cost possible in the market. But achieving efficient procurement practices remains a challenge in spite of recent marked developments in contract and auction theory. There are many factors that could distort and complicate procurement outcomes (Figure 6.1). Note that even a small flaw in designing public procurement systems can result in a significant waste of public resources, particularly in the case of infrastructure spending.

This chapter aims to review what we know – or what we think we know – about traditional public infrastructure procurement in developing countries. It then casts light on the issues that we are still unaware of and discusses recent experience and evidence from the existing literature. In addition, it analyses new data collected from public infrastructure projects in developing countries. Section 6.1 provides an overview of standard public procurement practices in developing countries and summarises the theoretical rationale behind them, focusing on competitive bidding for official development projects. Section 6.2 discusses operational issues that are still debatable in practice and proposes possible solutions by reviewing both earlier evidence and new data collected from infrastructure projects financed through official development assistance (ODA). Section 6.3 concludes.

Figure 6.1 *Main objectives and principles of public procurement*



Source: Author

6.1 PUBLIC PROCUREMENT PRACTICES IN DEVELOPING COUNTRIES

The main principle in public procurement is to facilitate open and non-discriminatory competition with free entry. But there is a wide range of public procurement systems available to governments, from direct negotiation to a competitive process among short-listed firms to international competitive bidding (ICB). In addition, new sophisticated procedures are becoming available, such as the simultaneous ascending format adopted by the US Federal Communications Commission (FCC) spectrum auctions (see, for example, Klemperer, 2002) and the competitive dialogue process introduced by a European Union (EU) Directive in 2004 (NAO, 2007). This section primarily focuses on the traditional procurement system used for public infrastructure projects financed by international financial institutions (IFIs) such as the World Bank. Although there remain some discrepancies in procurement guidelines among IFIs and other donor agencies, their guidelines have been converging considerably since the Paris Declaration in 2005. Meanwhile, the objectives behind the various guidelines may not be so inconsistent (OECD, 2008).

6.1.1 *Open competition*

‘Open competition is the basis for efficient public procurement’ (*Guidelines: Procurement under IBRD Loans and IDA Credits*, clause 1.3, World Bank). ODA-financed infrastructure procurement normally follows ICB in a first-price sealed-bid format. This is because competition is believed to improve efficiency in procurement by lowering government expenditure on public works. When governments aim to contract out their public works, a fundamental obstacle they face is not knowing the underlying true costs of private contractors. If they knew, they could negotiate and contract directly with the most efficient contractor. In theory, intense competition in public tendering is expected to induce private contractors to reveal their true costs, thus achieving the lowest possible prices (Milgrom and Weber, 1982; Wolfstetter, 1996).

From the theoretical point of view, one may think that the equilibrium bid might *increase* with competition because of the ‘winner’s curse’. In empirics, whether the competition effect is realised depends on the underlying characteristics of auctions. Under the common value paradigm, in which no bidder *ex ante* knows the true value of an object being sold, the winner’s curse may take effect (Kagel and Levin, 1986; Klemperer, 1998). This is the case when uncertainties common across bidders such as political instability, regulatory unpredictability, and demand fluctuation are significant, as in public-private partnership (PPP) auctions (NAO, 2001; Guasch, 2004; Athias and Nuñez, 2008).¹⁰⁰ But traditional

¹⁰⁰ Even in the context of traditional public procurement, Hong and Shum (2002) use data on *ex post* payments, which are often unavailable to the public, and show that public tendering for highway and bridge construction in New Jersey may be characterised as a common value auction.

infrastructure procurement contracts are relatively free of these common uncertainties, though not completely.

6.1.2 Non-discrimination and free entry

'To foster competition the Bank permits firms and individuals from all countries to offer goods, works, and services for Bank-financed projects' (*Guidelines: Procurement under IBRD Loans and IDA Credits*, clause 1.6, World Bank). In general, any contractor should be allowed to participate in competitive bidding, as long as it provides assurance that its capabilities and resources are adequate to successfully perform a given contract. Governments may open up competitive bidding to a limited group of participants, but only when foreign bidders are not expected to be interested, for instance, when contract values are small or the works under consideration are fairly labour intensive. Procurement authorities may also seek to favour local companies by providing a margin of preference under certain conditions.¹⁰¹ This may be of particular importance in the context of sustainable economic development, because competitive public procurement can contribute to not only building public infrastructure at low costs but also fostering local businesses. In general, however, an internationally competitive process with free entry remains the most common, particularly for infrastructure procurement contracts, which tend to be large in contract size.

In connection with free entry, potential applicants are allowed to communicate and collaborate with one another voluntarily.¹⁰² Joint bidding practices may be procompetitive in theory, since potential contractors whose experience and financial and technical resources are limited can pool their resources together and jointly remove barriers to entry. This is called the resource restriction view, because the reason for joint bidding is assumed to be the fact that individual firms are restrained by their limited resources. Even if joint bidding results in a smaller degree of competition, bids submitted by consortia may still be competitive (Krishna and Morgan, 1997; Cho *et al*, 2002).¹⁰³ But concerns over spontaneous bidding coalitions remain, especially when several qualified contractors agree to form a coalition during the selection process, as this might facilitate collusion (Saijo *et al*, 1996). Some aid agencies allow prequalified bidders to form a coalition only if joint bidding will not distort competition. The standard procurement guidelines, however, seem to expect the positive effects of free entry and free collaboration to overcome any adverse effect of collusion.

101 For World Bank projects, '[f]or contracts for works to be awarded on the basis of ICB, eligible Borrowers may, with the agreement of the Bank, grant a margin of preference of 7.5 percent to domestic contractors' (*Guidelines: Procurement under IBRD Loans and IDA Credits*, appendix 2, World Bank), subject to several conditions.

102 But the World Bank's guidelines prohibit executing agencies from requiring mandatory joint ventures or other associations from contractors.

103 Cho *et al* (2002) show that potential bidders will voluntarily form two bidding consortia, but not a grand coalition, in equilibrium.

6.1.3 Prequalification for quality assurance

Despite their interest in facilitating wide open competitive bidding, procurement authorities are still responsible for ensuring that applicants are well qualified for performing public contracts and have the appropriate financial and technical resources. In this regard, a common practice is to use staged-bid evaluation methods, such as prequalification and the two-envelope procedure. Under the prequalification process, only firms who meet basic financial, technical and experiential criteria are allowed to bid. In the two-envelope procedure, all potential bidders are requested to submit both price and technical proposals, and an auctioneer opens the price bids submitted by firms whose technical proposals satisfy the required standards.

These staged-bid evaluation systems are commonly used for infrastructure procurement and are consistent with theory. Quality competition is considered more important than price competition for highly heterogeneous goods or services, such as national defence systems and television programmes (Cabizza and De Fraja, 1998). In theory, it is known that the optimal two-stage bid evaluation system is implementable (Che, 1993; Cripps and Ireland, 1994; Branco, 1997). It is suggested that in a two-dimensional auction (that is, focusing on both price and quantity), a procuring entity should first select the highest scorer and then negotiate the level of quality to be achieved.

The prequalification process also encourages prospective bidders who may be insufficiently qualified on their own to assess their eligibility carefully and form joint ventures that might give them a better chance of success. As a result, participants can be more confident that inexperienced solo firms that could dump public contracts at below-fair prices are excluded from the competition. The facilitated collaboration among local, small enterprises also contributes to fostering competition (ADB, 2006).

6.1.4 Procurement planning

Procurement planning is fairly flexible in practice. The World Bank's guidelines, for example, stipulate that '[t]he size and scope of individual contracts will depend on the magnitude, nature, and location of the project. For projects requiring a variety of goods and works, separate contracts generally are awarded for the supply and/or installation of different items of equipment and plant' (*Guidelines: Procurement under IBRD Loans and IDA Credits*, clause 2.3, World Bank). At the same time, however, '[i]n certain cases the Bank may accept or require a turnkey contract under which the design and engineering, the supply and installation of equipment, and the construction of a complete facility or works are provided under one contract' (clause 2.5). Therefore, how to design a procurement plan is left to the executing agencies. If several works are naturally separable in technical terms, as in the case of water treatment plant construction and water distribution network rehabilitation, they are most likely to be contracted out under different

contracts. But it may be less clear how many lots are necessary when a 100 km highway is to be constructed: a single contract or two 50 km contracts?

Whether to bundle or unbundle relevant contracts being auctioned is one of the most important policy choices faced by governments seeking to enhance competition and lower public costs. In theory, if there are only two bidders for an arbitrary number of contracts, the auctioneer should bundle all the contracts to facilitate their competition against one another. Conversely, given a relatively large number of bidders, the auctioneer has a tendency to prefer to unbundle its contracts, which of necessity become relatively smaller (Palfrey, 1983). The choice of (un)bundling is also related to the cost of entry for bidders, which is interpreted as the extent to which two components are technically different. If the cost of entry is sufficiently large, separate auctions are more likely to be preferable (Chakraborty, 2006).¹⁰⁴ Thus, the literature tends to favour unbundled procurements as long as competition is secured.

6.1.5 Governance and information disclosure

Current procurement operations vary in the efficacy of their information disclosure and governance across different levels. In general, good governance, including the efficient implementation of public procurement, is essential. While governance has many dimensions and definitions (Kaufmann *et al*, 2008), there is general consensus that a number of developing countries lag the rest of the world. It is estimated that, on average, firms in sub-Saharan Africa offer bribes of 3.5% of the public contract value; this figure is 1% for the rest of the developing world (Figure 6.2). The problem is not unique to developing countries, but these figures are much higher than those estimated for the members of the OECD.¹⁰⁵

Transparency, accountability and effective monitoring are among the most important elements of good governance. The World Bank's guidelines underline this point, and name transparency as one of the most important Bank requirements. Without transparency, procurement authorities can easily abuse discretionary powers in designing procurement plans and evaluating price and technical bids, provoking disqualified or losing contractors to dispute the technical specifications and/or evaluation methodologies in court. In fact, contractors' complaints to the World Bank centre on these issues (Table 6.2). Arbitration is a lengthy process resulting in significant project delays. Economic theory also suggests the risk of excess discretion on the part of procuring authorities; the scoring rule has a

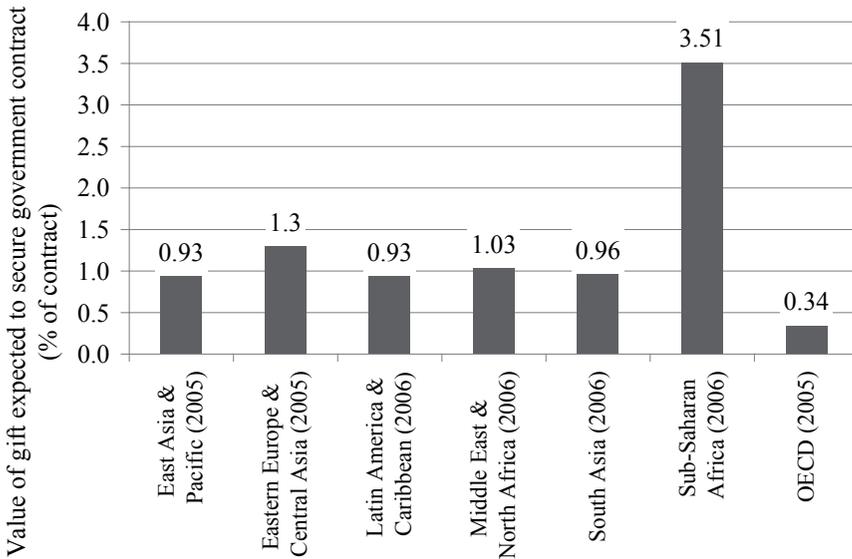
¹⁰⁴ It is worth noting that these propositions cannot be overemphasised, since they hold only if there are two symmetric bidders. No general model has yet been developed with more than two players. In addition, infrastructure procurement contracts may not be perfectly identical, though they are often closely related. Finally, these models may not be dynamic in the sense that the fixed-n setting is still presumed.

¹⁰⁵ The figures may underestimate the problem to the extent that some firms may pay a considerable amount of money to officials (and win the contract), while the majority of companies do not pay anything. In Nigeria, for instance, two-thirds of survey respondents claimed that they did not pay any unofficial fee to win government contracts. But 16% of the respondents claimed to have paid 10% in contract fees, while about 9% paid 15%, and about 8% paid 20% (World Bank, 2008b).

tendency to induce a downward distortion of quality from the socially optimal level. Therefore, it is essential for governments to strongly commit to the scoring rule in advance to ensure quality (Che, 1993).

Lack of transparency and accountability also affects competition in a negative way and damages public credibility. As per the World Bank (2008b), 60% of survey respondents in Nigeria stated that they had decided not to submit expressions of interest in recent public tenders because they did not trust the selection process. About 40% of the respondents stated a belief that government procurement policies and procedures favour only large and medium firms. Theory is consistent – if a corrupt agent has power to manipulate the proceedings, bribery and other corrupt practices make it difficult for the best candidate to win the contract (Burguet and Che, 2004). Accordingly, poor governance environments are likely to deter efficient contractors from entering the public procurement market.

Figure 6.2 *Corruption in public procurement*



Source: Business Environment and Enterprise Performance Surveys, various years.

Table 6.2 *Nature of contractors' complaints about development project procurement, FY2007*

| | Number of complaints | Percentage of companies |
|--|----------------------|-------------------------|
| Qualification of other firms | 41 | 11.8 |
| Technical evaluation | 39 | 11.3 |
| Application of evaluation criteria | 37 | 10.7 |
| Disqualification of bids | 29 | 8.4 |
| Contract administration | 25 | 7.2 |
| Allegation of fraud and corruption | 22 | 6.4 |
| Payment | 20 | 5.8 |
| Combined financial and technical rating | 14 | 4.0 |
| Irregularity before bid opening | 14 | 4.0 |
| Own qualification issue | 14 | 4.0 |
| Quality of bidding document | 14 | 4.0 |
| Bid security | 11 | 3.2 |
| Technical specifications | 10 | 2.9 |
| Bid and proposal submission | 8 | 2.3 |
| Eligibility | 6 | 1.7 |
| Short listing | 6 | 1.7 |
| Irregularity in bid evaluation | 4 | 1.2 |
| Performance security | 3 | 0.9 |
| Contract award | 2 | 0.6 |
| Prequalification | 2 | 0.6 |
| Transparency issue | 2 | 0.6 |
| Conflict of interest | 1 | 0.3 |
| Domestic preference | 1 | 0.3 |
| Irregularity in bid opening | 1 | 0.3 |
| Terms of reference | 1 | 0.3 |
| Other | 19 | 5.5 |
| Total | 346 | 100.0 |

Source: World Bank (2008b).

There are several areas where current practice and theoretical propositions diverge. In general, competition can be enhanced by providing more information on the object to be procured – for example, through engineering cost estimates and predetermined award criteria. But to secure confidentiality, such information may not always be disclosed. In addition, from a strategic point of view, governments may prefer to conceal some information to contain their procurement costs. According to theory, under certain conditions the procurer can expect to lower costs by concealing how many contenders are participating

(McAfee and McMillan, 1987).¹⁰⁶ This is the reason why several European countries, such as Germany and Italy, did not announce the number of licences to be issued in the third-generation (3G) mobile telecommunications spectrum rights auctions (Klemperer, 2002). Consequently, bidders were left unsure about the effective level of competition (per licence) that they were facing.

6.1.6 After-the-fact adjustments

Public infrastructure projects have long incurred massive cost overruns and delays in completion. Nine out of 10 transport (rail and road) projects in 20 developed and developing countries experienced some cost overruns in 1915–95 (Flyvbjerg *et al.*, 2002). In Africa the actual spending on public road projects is on average 7% higher than the original contract amount (Table 6.3). Furthermore, projects in Africa are likely to be delayed for more than 10 months (Alexeeva *et al.*, 2008).

Table 6.3 *Average cost overruns in World Bank financed road projects in Africa (%)*

| | Bid | | Original contract | | Actual payment | |
|-------------------------------|---------------|-------|-------------------|------|-------------------|------|
| | Cost estimate | | Cost estimate | | Original contract | |
| | Obs. | Mean | Obs. | Mean | Obs. | Mean |
| All | 344 | 46.1 | 73 | 16.6 | 100 | 7.4 |
| Congo, Democratic Republic of | 7 | 62.2 | 1 | 15.0 | 8 | 3.0 |
| Congo, Republic of | 22 | 26.9 | 7 | 21.4 | 6 | 12.9 |
| Ethiopia | 36 | 46.8 | 9 | 21.8 | 11 | 0.1 |
| Ghana | 37 | 0.9 | 7 | -9.2 | 9 | 20.4 |
| Kenya | 15 | 19.7 | 4 | 2.2 | 4 | 3.1 |
| Madagascar | 21 | 28.7 | 5 | 7.8 | 6 | -3.5 |
| Malawi | 11 | 26.3 | 4 | 11.6 | 7 | 0.5 |
| Mauritania | 7 | -1.6 | 2 | 3.1 | 3 | -5.3 |
| Mozambique | 56 | 108.2 | 9 | 46.5 | 10 | 16.5 |
| Nigeria | 58 | 60.1 | 9 | 21.7 | 13 | 22.5 |
| Tanzania | 43 | 27.8 | 7 | 9.7 | 9 | -0.4 |
| Uganda | 19 | 53.6 | 6 | 24.8 | 7 | 1.0 |
| Zambia | 12 | 14.0 | 3 | -5.1 | 7 | 1.9 |

Source: Author’s calculation based on Alexeeva *et al.* (2008).

¹⁰⁶ This holds if the procurer is risk averse. In general, however, whether the information is concealed or revealed has no effect on the number of bidders participating.

Certain after-the-fact adjustments may be unavoidable, because infrastructure projects are often large and technically complex, involving geological, environmental and social uncertainties. In theory, there is a trade-off between providing the right incentives to contractors and reducing *ex post* renegotiation costs (Bajari and Tadelis, 2001). Rigid fixed-price contracts can incentivise contractors to contain costs, but if the parameters are found to be incomplete or incorrect, the adjustment cost could be significant. By contrast, under a more flexible regime, such as that of cost-plus contracts, adjustments may be less costly though there is no incentive to reduce costs up front. Deciding which contract type is best depends on the costs of preparing a complete contract beforehand and adjusting it afterwards if necessary.

One of the major problems with current procurement practices is the general lack of an effective system for communication between the budget planner (for example, the ministry of finance) and procuring entities (that is, executing agencies). Despite longstanding recognition of the large cost overruns and delays inherent in infrastructure projects, governments still fail to incorporate the anticipated costs of these overruns and delays into the budgetary formulation. In some African countries, the original contract amounts of public road contracts are already 17% higher than their engineering cost estimates, with another 7% being added during the implementation period (Table 6.3).

There are a number of reasons for this chronic failure to properly estimate official development budgets (Flyvbjerg, 2005). A key problem is that rebidding is very costly. Thus, governments have little bargaining power over contractors once a project is launched. Potential contractors may anticipate this and strategically submit unrealistic bids, often referred to as ‘low-balling’, expecting renegotiation after the contract is granted (Ware *et al*, 2007). In such case, efficiency is very difficult to achieve and cost overruns are likely. For World Bank funded projects, participants must seek the Bank’s prior approval of any extensions, change orders, or contract modifications if such changes would, in aggregate, increase the original amount of the contract by more than 15%.¹⁰⁷ Otherwise, borrowers can freely negotiate and agree to smaller change orders with contractors, though they are still obliged to furnish a copy of all contract amendments to the Bank. Thus, post-award amendments are possible, and small ones are particularly easy to make.

6.2 EXISTING EVIDENCE AND NEW DATA FROM DEVELOPING COUNTRIES

Evidence of the above-mentioned practices in public infrastructure procurement systems may or may not be bolstered by the existing literature. Some practices are fairly obvious, others require further research. The following discussion relies on recent empirical auction literature (most focusing on developed countries) as well as on recently collected data from infrastructure projects in

¹⁰⁷ See the World Bank’s *Guidelines: Procurement under IBRD Loans and IDA Credits*, appendix 1, clause 2.3.

developing countries. The new data come from 211 procurement auctions for 69 large infrastructure projects in 29 developing countries from 1997 to 2007. These projects were assisted by the Japan International Cooperation Agency (formerly Japan Bank for International Cooperation [JBIC] ODA Operations) and the World Bank.

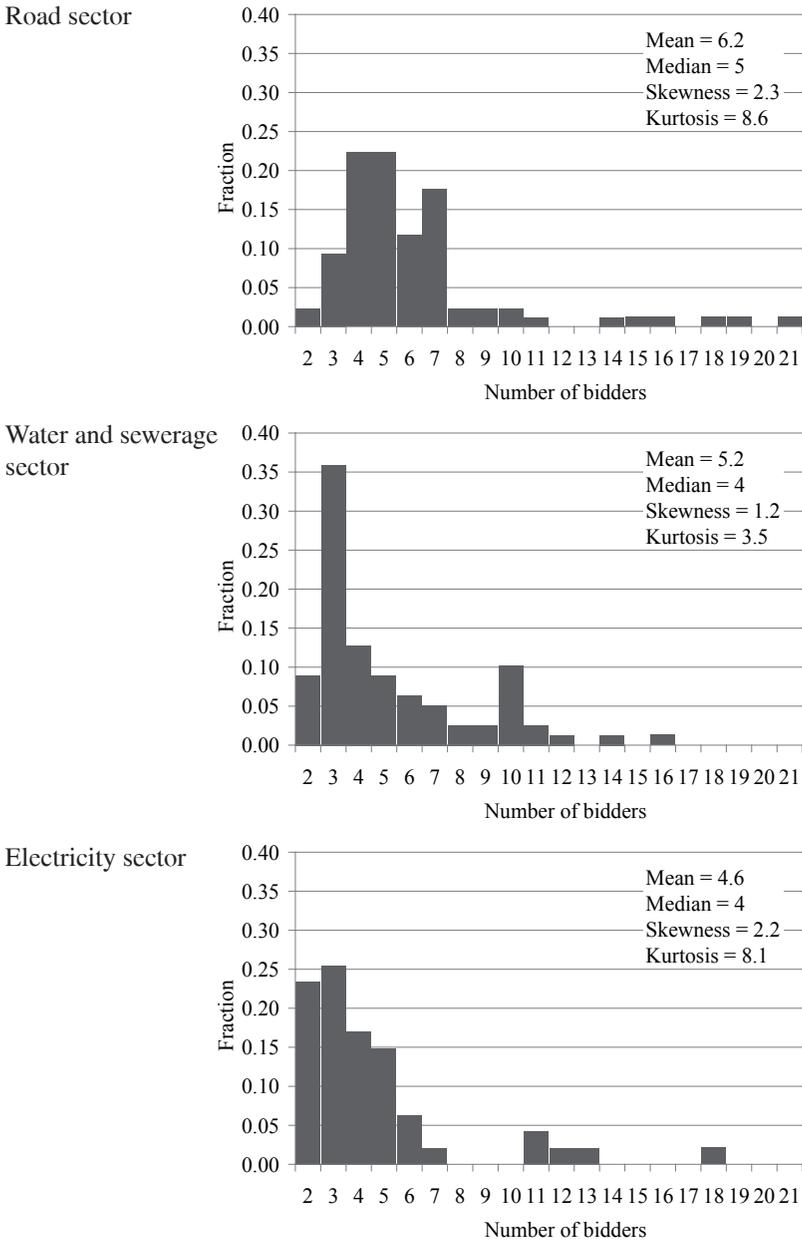
6.2.1 *Insufficient competition in practice*

Two facts are evident about competition in public procurement. First, the competition effect is significant in many cases. Gupta (2002) examines about 1,900 highway construction auctions in Florida and shows that the equilibrium bid has a significantly negative coefficient of -0.012 to -0.021 on the number of bidders. Both are defined in logarithm; thus, these figures are considered to be the elasticity with respect to competition. In the case of California highway contracts, the elasticity is estimated at -0.01 to -0.03 (Bajari *et al.*, 2006). As per De Silva *et al.* (2008), the normalised bid on asphalt road projects is affected significantly by the number of bidders – on the order of -0.018 to -0.03 – and the coefficient for bridge projects is about -0.02 . In sectors other than infrastructure, the existing evidence also suggests a significant competition effect in public procurement (Kessel, 1971; Brannman *et al.*, 1987; Brannman, 1996).

Second, regardless of the general acceptance of open competition in principle, the level of actual competition varies across markets and sectors. For large-scale infrastructure projects, all the indications are that competition is limited. For a set of highway construction auctions in Florida, the average number of bidders was about 5, though the actual numbers ranged widely from 2 to 19 per auction (Gupta, 2002). In a study of road construction in Oklahoma, it was found that only 3.3 firms participated on average (De Silva *et al.*, 2003).

The new data from ODA-financed infrastructure projects confirm that competition is limited in developing countries and also varies by sector. In road procurement auctions, on average, 6.2 bidders participate in competitive bidding. The average number of bidders is 5.2 in the water and sewerage sector and 4.6 in the electricity sector, respectively. Apparently few contractors apply for power project procurement. The majority of electricity works have attracted only two or three firms (Figure 6.3).

Figure 6.3 Degree of competition in ODA-financed infrastructure projects



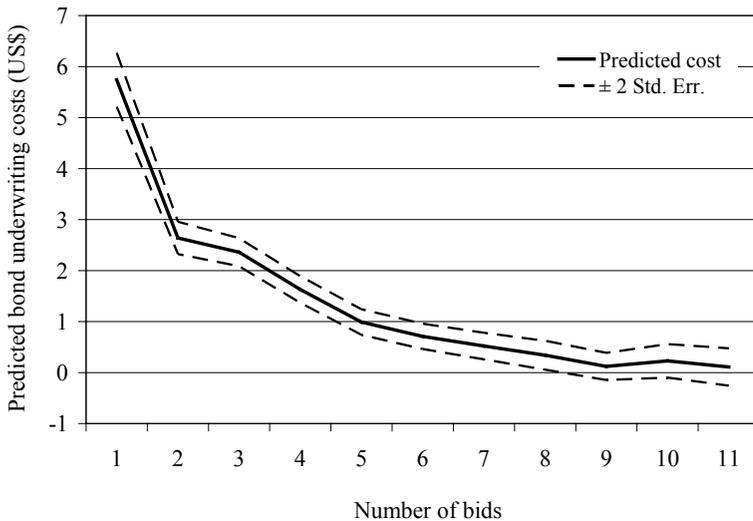
Source: Estache and Iimi (2008a).

6.2.2 A general view of the positive competition effect

Are current levels of competition adequate for infrastructure procurement to be efficient? In other words, how many bidders are required for an infrastructure auction to be sufficiently competitive? This issue can be addressed through empirical exercises. Both Kessel (1971), investigating the US bond issuance market, and Gupta (2002), applying the piecewise linear regression model to highway construction procurement data for Florida, provide some insight. As depicted by Figure 6.4, the financial cost of issuing bonds approaches zero as competition becomes more intense, and becomes statistically identical to zero at a certain point.

When applying the same method to new data on infrastructure procurement in developing countries, it can be seen that the current levels of competition are not sufficient. The number of bidders required is around seven for road and water projects; for the power sector it is much lower, at three (Table 6.4). See Estache and Iimi (2008a) for further details.

Figure 6.4 Predicted costs of underwriting general obligation and revenue bonds



Source: Author's interpretation based on Kessel (1971).

Table 6.4 *Estimated competition elasticity of bids in ODA-financed infrastructure projects*

| | Elasticity of bids with respect to the number of bids | | Required number of bidders for sufficient competition |
|----------------|---|-----------|---|
| Roads | -0.85 | (0.27)*** | 7 |
| Water & sewage | -1.07 | (0.63)* | 7 |
| Electricity | -0.45 | (0.20)* | 3 |

Note: The elasticity is estimated based on the instrumental variable estimation. The standard errors are shown in parentheses. * and *** indicate the 10% and 1% significance levels, respectively.

Source: Estache and Iimi (2008a).

6.2.3 *The procompetitive effects of openness and non-discrimination*

The existing evidence clearly indicates that open competition is preferable to restricted. Specifically, favouring local contractors may be rather costly. Hyttinen *et al* (2006) find that Swedish municipalities with a substantial number of left-wing councillors are more likely to procure cleaning services from contractors other than the lowest-price bidder. This favouritism is estimated to increase the cost of public procurement by 38%. As per Marion (2007), road procurement costs under bid preferences are 3.8% higher in California. In such case, citizens may benefit from local employment but will have to bear a heavier tax burden in the future.

Open and non-discriminatory practices can be reinforced by a public e-procurement system, as introduced in many developed and developing countries. E-procurement helps open up the market and mitigate corruption risks (Cohen *et al*, 2007). About 20,000 people access the Mexican Web-based public procurement system, Compranet, and 7,000 tender documents are downloaded every day (OECD, 2005). In Andhra Pradesh, India, an e-procurement system has increased bidder participation by about 25% (Government of Andhra Pradesh, 2007). E-procurement also reduces the administrative costs of procuring agencies.

But are the public infrastructure procurement markets really open in developing countries? Local companies comprise the vast majority of bidders in the road and water sectors (Table 6.5), but only one-third in the electricity sector. This difference may be attributable to the fact that road and water projects are relatively labour intensive and call for relatively low skill levels, while electricity projects generally require high levels of technical expertise and experience. Though local companies in developing countries may not be able to meet such requirements by themselves, their participation is not prohibited. They are awarded certain public contracts in the electricity sector, such as for power transmission and distribution network erection. Thus, the table appears to support openness and free entry based on firms' self-evaluation of advantages and disadvantages, conditional on the size and scope of contracts (see below for further discussion).

Table 6.5 *Foreign versus local bidders in auctions for ODA-financed infrastructure projects*

| | Number of auctions | Number of bidders | Share (%) | |
|----------------|--------------------|-------------------|-----------|---------|
| | | | Local | Foreign |
| Road | 86 | 394 | 70.3 | 37.6 |
| Water & sewage | 78 | 329 | 79.6 | 29.2 |
| Electricity | 47 | 139 | 35.3 | 71.2 |
| Total | 211 | 862 | 68.2 | 39.8 |

Note: The shares of bidders involving at least one local or foreign firm are shown. Figures do not add up to 100% because some joint ventures involve both local and foreign companies.

Source: Estache and Iimi (2009d).

6.2.4 *The risks of free communication and the benefits of joint bidding*

Related to the above points, how do potential contractors participate in public tenders? First of all, according to the existing literature, it is clear that free, voluntary communication could increase the risk of collusion among bidders (Ware *et al*, 2007). An experimental study concludes that subjects, i.e., bidders, easily formed very robust cartels and the winning bids approached a predetermined ceiling price, regardless of the number of bidders (Saijo *et al*, 1996). For the same reasons, the proximity of firms could facilitate collusive agreements (Price, 2008); firms located close to each other can communicate easily. Porter and Zona (1999) find that three large local suppliers of public school milk in Ohio appear to have conducted a complementary bidding scheme in the area close to their plants. Evidently, proximity as well as high market concentration enable potential bidders to easily identify and communicate with one another, resulting in collusion.

But free communication is not always inappropriate in public procurement and can, in fact, facilitate procompetitive bidding coalitions. In ODA-financed infrastructure projects, about three-fourths of bidders are solo (Table 6.6). Firms are slightly more likely to collaborate with one another in electricity projects, possibly for technical reasons. Even if free communication is allowed, large coalitions composed of more than two firms are unlikely. In most cases, the collaboration involves only two companies, leaving more than two bidding entities in the market. This seems to violate the two-coalition hypothesis by Cho *et al* (2002). While local joint bidding is dominant in the road and water sectors, foreign companies are more likely to work together in power projects. Local–foreign cooperation still seems to be rare in the context of infrastructure procurement in developing countries.

Table 6.6 *Joint bidding practices in infrastructure project auctions in developing countries*

| | Number of bidders | Percent of total | | | | | | | | | | |
|-------------|-------------------|------------------|-------|---------------------------------|------|-----|-----|-----|-------------|---------|------|-----|
| | | Solo | Joint | By number of consortium members | | | | | By locality | | | |
| | | | | 2 | 3 | 4 | 5 | 6 | Local | Foreign | Both | |
| Road | 394 | 76.6 | 23.4 | 20.8 | 2.3 | 0.3 | | | | 11.7 | 3.8 | 7.9 |
| Water | 329 | 74.2 | 25.8 | 17.3 | 3.0 | 4.6 | | 0.9 | | 13.1 | 4.0 | 8.8 |
| Electricity | 139 | 68.3 | 31.7 | 18.7 | 11.5 | 0.7 | 0.7 | | | 2.9 | 22.3 | 6.5 |
| Total | 862 | 74.4 | 25.6 | 19.1 | 4.1 | 2.0 | 0.1 | 0.3 | | 10.8 | 6.8 | 8.0 |

Source: Estache and Iimi (2008b).

The existing empirical literature on joint bidding indicates that bidding coalitions have a positive effect on public costs.¹⁰⁸ For example, Moody and Kruvant (1988) find positive net effects on the prices of offshore continental shelf (OCS) oil and gas leases. Hendricks and Porter (1992) also show that the most profitable bidding strategy in the OCS lease market is a joint venture of large and fringe bidders, particularly because oil developers have to use local information for successful discoveries and pool their financial and technical resources to deal with the great risks involved. There is little evidence of this in other sectors, however.

In the context of infrastructure procurement in developing countries, joint bidding appears procompetitive. Iimi (2004) found local joint bidding particularly procompetitive in ODA-financed social and infrastructure projects. This is especially so in the road sector; the average joint bid – relative to engineering cost estimates – is lower than the average solo bid for road projects (Table 6.7). Joint bids by local and foreign firms have been found to be systematically low for road projects, as have local joint bids in the water and sewerage sector. Controlling for certain observable variables, regression analysis indicates that some, but certainly not all, forms of joint bidding could be procompetitive. But there is no evidence that joint bidding promotes competition or lowers procurement costs in the electricity sector.¹⁰⁹

108 A counterexample is the Swiss third-generation (3G) spectrum rights auction in 2000, for which 10 bidders initially registered their intention to enter tenders. But the lineup dropped to four – the same number as the licences being issued – after the qualified bidders created several mergers and partnerships. As the result, the licence fee per potential customer was much lower than in other European countries (Klemperer, 2002).

109 Note that the decision of whether to bid solely or jointly is an endogenous variable in the bid function, as pointed out by Moody and Kruvant (1988). This is controlled by a treatment-effect technique. See Estache and Iimi (2008b) for further details.

Table 6.7 Average normalised bid by solo and joint bidders in infrastructure projects

| | Road | Water & sewage | Electricity |
|-----------|----------------|----------------|----------------|
| Solo bid | 0.97 (0.35) | 0.98 (0.32) | 1.03 (0.42) |
| Joint bid | 0.84 (0.36) | 1.12 (0.28) | 1.10 (0.29) |

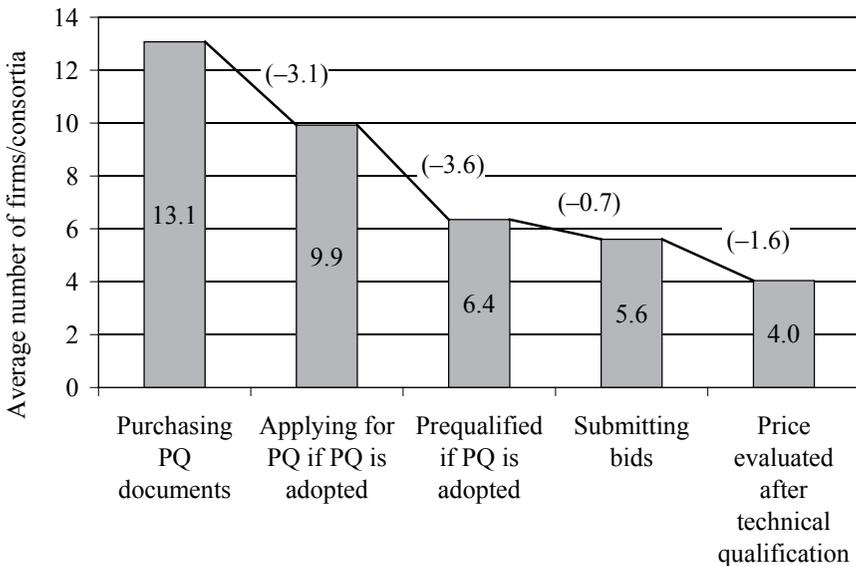
Note: The standard deviations are shown in parentheses. Several apparent outliers are excluded.

Source: Author.

6.2.5 The effects of project quality assurance

One of the main factors to influence the degree of competition in infrastructure procurement markets is technical qualification. As shown in Figure 6.5, the level of competition is determined endogenously by both auctioneers and contractors. Even if a competitive number of firms are initially interested in an object being sold, their numbers may shrink rapidly as potential bidders decide not to enter the competition because of required preconditions. In tandem, auctioneers may disqualify some applicants for technical reasons.

Figure 6.5 Change in the number of potential bidders in road projects



Note: PQ = prequalification.

Source: Estache and Iimi (2009c).

There is little sound evidence of how the quality requirements imposed on infrastructure projects affect competition, in small part because of the difficulties inherent in measuring ‘quality’ and in large part because such requirements have multiple complex effects. First, quality is costly to produce and deliver – for purely technical reasons – and pushes up bid prices. Second, high quality requirements limit bidder participation by inflating procurement costs. Finally, auctioneers’ endogenous decision to balance quality against costs by lowering technical prequalification criteria may further induce firms to change their entry and bidding behaviour.

Using empirical evidence Ohashi (2008) shows how the removal of a discretionary prequalification procedure saved 3% of public procurement costs in the Japanese prefecture of Mie. Given an imperfect ability to exclude potentially incompetent contractors from the market, it is possible that the staged-bid-evaluation process with multiple criteria is less transparent and more vulnerable to corruption and collusion than other processes; authorities can easily exploit their discretion by weighting one criterion over others (Klein, 1998; Andersson *et al*, 2005; Torta, 2005; Estache *et al*, 2009). Rigid preconditions may also be used in corrupt schemes to designate particular contractors (Ware *et al*, 2007); and, worse, dispute and investigation may result in lengthy court processes and delay development projects significantly (see Table 6.2).

In the case of infrastructure procurement in developing countries, the introduction of substantial technical evaluations in the bidding process will likely reduce the average number of bidders as potential contractors are discouraged from participation by experiential, financial and technical requirements that exceed their capabilities. Also, normalised average bids are higher when technical thresholds are introduced (Table 6.8). An endogenous regression model can separate the direct and indirect effects of a prior examination of technical responsiveness. In the case of electricity, higher quality standards might push up procurement costs for purely physical reasons, while significantly deterring bidder entry and thus further increasing costs (Estache and Iimi, 2009a).

Table 6.8 *Effects of quality evaluation on competition and normalised bids*

| | Without technical evaluation | | | With technical evaluation | | |
|----------------------|------------------------------|------|--------------------|---------------------------|------|--------------------|
| | Observations | Mean | Standard deviation | Observations | Mean | Standard deviation |
| Number of bidders | | | | | | |
| Road | 38 | 6.50 | 3.76 | 45 | 6.02 | 3.47 |
| Water and sewage | 27 | 5.44 | 3.21 | 51 | 5.14 | 3.18 |
| Electricity | 15 | 4.93 | 2.89 | 29 | 4.59 | 3.67 |
| Bid / estimated cost | | | | | | |
| Road | 185 | 1.01 | 0.55 | 195 | 1.41 | 1.61 |
| Water and sewage | 105 | 0.92 | 0.28 | 224 | 1.37 | 1.36 |
| Electricity | 43 | 0.95 | 0.23 | 88 | 1.18 | 0.58 |

Note: The information about whether or not each public tender adopts the technical evaluation system is limited in our sample.

Source: Estache and Iimi (2009a).

6.2.6 Economies of scale and diseconomies of scope in public infrastructure procurement

Planning is another important factor that may encourage or discourage competition in public procurement systems and thus influence procurement outcomes. Some existing literature casts light on the significant economies of scale in public infrastructure procurement. These have purely technical explanations: it is more expensive on a unit-cost basis to procure a small volume of materials, machinery, or equipment because of indivisibility and the scale economies in production. For instance, the unit investment cost of conventional combined-cycle power generation is estimated at \$0.91 million per megawatt (MW) (EIA, 2009), but it declines as the size of installed capacity increases (Table 6.9). Based on detailed contract data from Africa, public road procurement is also found to exhibit significant economies of scale, especially in terms of the costs of asphalt concrete and crushed stone base (Table 6.10). A study (World Bank, 2008a) shows that the cost of infrastructure procurement in small eastern Caribbean states is significantly higher than that of a large country, Argentina (Table 6.11). The National Water Commission in the Caribbean had contracts with more than 34,000 suppliers, most with low-value invoices, resulting in significant scale diseconomies, large administrative costs, and a risk of miscoordination among public contracts.

Table 6.9 *Combined-cycle turbine price by installed capacity*

| Country | Type | Installed capacity (MW) | Winning bid amount (US\$ million) | Unit price (US\$ million / MW) |
|------------|----------------|-------------------------|-----------------------------------|--------------------------------|
| Tanzania | Combined cycle | 105 | 122 | 1.17 |
| Albania | Combined cycle | 122 | 113 | 0.93 |
| China | Combined cycle | 128 | 51 | 0.40 |
| Azerbaijan | Combined cycle | 400 | 224 | 0.56 |
| Malaysia | Combined cycle | 750 | 401 | 0.53 |
| Malaysia | Combined cycle | 750 | 340 | 0.45 |

Source: Author.

Table 6.10 *Unit price of inputs/materials in road procurement in Africa*

| \$ per m ³ | Length of road in each contract | | |
|--------------------------|---------------------------------|------------|-----------------|
| | Less than 25 km | 25 ~ 75 km | More than 75 km |
| Total unit cost | 936,332 | 311,671 | 211,629 |
| Earthworks (soft) | 5.2 | 4.8 | 4.9 |
| Gravel subbase | 8.2 | 8.1 | 11.4 |
| Crushed stone base | 36.9 | 37.0 | 32.2 |
| Portland cement concrete | 118.6 | 155.4 | 185.1 |
| Asphalt concrete | 215.7 | 161.5 | 146.5 |
| Double surface treatment | 4.2 | 4.0 | 4.4 |

Source: Author's calculation from Alexeeva et al (2008).

Table 6.11 *Infrastructure procurement costs in the East Caribbean States*

| | Labour | Materials | Equipment |
|----------------|--------|-----------|-----------|
| Argentina | 1 | 1 | 1 |
| East Caribbean | 1.79 | 2.55 | 3.75 |

Note: The East Caribbean includes Dominica, St Vincent, Grenada and St Lucia.

Source: World Bank (2008a).

Whether to bundle some relevant components in a project is another important decision to be made by planners (Grimm *et al*, 2006). If a single company is able to undertake more than one public work, using different skills and knowledge, the expected bid can be reduced by bundling the works into a single contract (and thus capitalising on economies of scope). But a possible adverse effect of this would be to limit bidder participation. Such an effect is evident in the infrastructure procurement data from developing countries. In the water and sewerage sector, if a treatment plant work is auctioned separately from any distribution work, more contractors will apply and the resultant procurement costs are likely to be lower. In the case of electricity network contracts, bundling also limits competition, but the effects on cost are less conclusive (Table 6.12).¹¹⁰

¹¹⁰ See Estache and Iimi (2009b) for a more detailed empirical discussion.

Table 6.12 Economies of scope in ODA-financed infrastructure projects

| | Number of bidders | | | Bid / estimated cost | | |
|--------------------------------|-------------------|------|--------------------|----------------------|------|--------------------|
| | Observations | Mean | Standard deviation | Observations | Mean | Standard deviation |
| Water and sewage projects | | | | | | |
| All | 78 | 5.24 | 3.17 | 329 | 1.23 | 1.15 |
| Only treatment plant work | 21 | 5.43 | 3.37 | 90 | 1.19 | 0.32 |
| Only distribution network work | 41 | 5.68 | 3.36 | 185 | 1.05 | 0.40 |
| Both | 8 | 3.13 | 1.13 | 24 | 2.28 | 3.28 |
| Electricity projects | | | | | | |
| All | 44 | 4.70 | 3.39 | 131 | 1.10 | 0.51 |
| Only transmission/distribution | 9 | 8.00 | 5.66 | 22 | 0.88 | 0.48 |
| Only power substations | 6 | 4.83 | 3.25 | 23 | 1.40 | 0.75 |
| Both | 3 | 4.67 | 1.53 | 10 | 1.20 | 0.20 |

Source: Author.

6.2.7 The imperative of better disclosure

One important measure to mitigate the possible adverse effects of quality requirements and procurement planning is to disclose more information and increase transparency and accountability in public procurement systems. This is also a powerful tool in preventing corruption and drawing more potential contractors to public procurement markets. Brazil began to publish prices paid for publicly procured pharmaceuticals on the Internet in order to contain drug prices and preclude price manipulation (Cohen *et al.*, 2007). Intensive road shows prior to auctions also help to attract more bidders. In Ghana the government intends to offer public workshops to potential companies well in advance of auctions, in response to complaints that tender documents are often superficial and the submission deadlines are too close for applicants to prepare the required bids (World Bank, 2008c). Publicity is particularly useful where public contracts are presumed less profitable, as in the case of solar power projects in remote areas of Bolivia (Reiche *et al.*, 2007).

At a more specific level, existing literature supports the disclosure of reservation prices. In Oklahoma highway auctions, the publication of government engineering cost estimates lowered road procurement costs by 4.6% (De Silva *et al.*, 2008). The evidence for sectors other than infrastructure is similar. In French timber auctions, the announcement of the optimal reserve prices resulted in twice-higher winning bids than the random reservation price model (Li and Perrigne, 2003). The City of Montreal is also using reserve prices as a strategic instrument in auctions for snow removal (Flambard *et al.*, 2007). In general, disclosing more

information about procurement procedures and past project results can foster price competition and reduce the risk of collusion and corruption.

The level of achievement, however, varies from country to country. For instance, the Brazilian public procurement system excludes the discretionary powers of procurement officials, while Ecuador is still struggling to establish a rule-based procurement system (Table 6.13). If discretion is allowed, governments may overspecify prequalification or contract conditions. In an Asian country, applicants were required to have built two dams of similar size in the past five years without any clear reason given, regardless of the fact that no dam had been built in the country in more than a decade (Ware *et al*, 2007). In another Asian country, a corrupt bidder and the chairman of the bid evaluation committee rigged the original bid by allowing the bidder to increase his offer, part of which appears to have been paid to the chairman (Ware *et al*, 2007).

Table 6.13 *Measures for limiting discretionary power in public procurement, as of 2005*

| | Argentina | Brazil | Chile | Colombia | Ecuador | Mexico | Peru | Venezuela |
|---|-----------|--------|-------|----------|---------|--------|------|-----------|
| Tender notice including detailed specifications of the object | Yes | Yes | No | No | Yes | Yes | Yes | Yes |
| Prequalification requirements articulated in a solid and explicit way | Unclear | Yes | No | No | No | No | No | No |
| Selection method stated in tender notice | Yes | Yes | Yes | Yes | No | Yes | Yes | Yes |
| Selection method based on objectively measurable factors | No | Yes | No | No | No | Partly | No | No |
| Negotiation with the winner after adjudication | Yes | No | Yes | Yes | No | No | Yes | Partly |

Source: OECD (2005).

6.2.8 *Cost Overruns and Project Delays*

In addition to information disclosure, public contracts must be traceable to contain public infrastructure procurement costs. To date, there is little evidence on how to rationalise the relationship between intended and actual contractual performance. Meanwhile, infrastructure procurement projects in developing countries continue to incur massive cost overruns and project delays (see Table 6.2). Whether the *ex ante* adjustments are justifiable remains open to discussion.

What is clear is that *ex post* adjustments are costly. The incurred implicit cost of accommodating *ex post* adjustments is estimated at about \$2.70 per \$1 of expected contract adjustment in US highway contracts (Bajari *et al*, 2006). Blanc-Brude *et al* (2009), examining road construction in Europe, find that roads constructed by PPPs are 24% more expensive than traditional public road procurement. This

gap is interpreted as a risk premium of the likely cost overruns taken into account only in PPP transactions.¹¹¹ In Africa such implicit costs are estimated at 93 cents per \$1 of contract adjustment in the road sector (Iimi, 2009).

To avoid costly and unnecessary *ex post* renegotiations, several measures can be taken. First, governments can explicitly strengthen contract enforceability. For instance, in the defence procurement market, the French government has reinforced the principle that those who are responsible for a cost overrun should pay for it themselves (Kapstein and Oudot, 2009). In highway contracts in the state of Minnesota, explicit time incentives were recently introduced to prevent contractors' opportunistic delays (Bajari and Lewis, 2009).

Second, output-based aid (OBA) is a way of giving contractors (or operators) more incentive to stay within their cost estimates, and is particularly relevant to the ODA context. Unlike traditional contract approaches, the amount of OBA is directly linked to the delivery of a specific service or output (GPOBA, 2008). Finally, governments can choose to make contracts more flexible so that any modifications are allowed but at a lower cost. Examples are the indefinite delivery/indefinite quantity (IDIQ) contracts used by the US General Services Administration, and the periodic benchmarking of public contracts done for UK public finance initiative projects (NAO, 2001). It remains unclear, however, which is the best way to contain the cost of *ex post* adjustments.

6.3 CONCLUDING REMARKS

As previously stated, infrastructure is among the most important driving forces behind vigorous economic growth. Despite recent marked developments in contract and auction theory, implementing efficient procurement remains a challenge particularly in developing countries where governance remains relatively weak. And so concerns about efficiency in public infrastructure procurement persist.

The main principle of public procurement in ODA-financed infrastructure projects is consistent with theoretical propositions. Open and non-discriminatory competition with free entry would bring down the government costs of public works, with other conditions held constant. In practice, however, procurement operations may or may not be consistent with theory. In developing countries, the degree of competition in infrastructure procurement auctions continues to be insufficient to meet objectives. To enhance openness and non-discrimination, possibly by introducing an e-procurement system, will help foster competition. Disclosing more information on procurement procedures and the results of past projects is also useful. Better procurement planning, especially whether to bundle or unbundle public contracts, is an important step toward efficiency. Project quality assurance is essential, but it may increase costs significantly.

¹¹¹ The problem of *ex post* contract renegotiation is more prominent in PPP infrastructure transactions. Guasch (2004) shows that about 30% of PPP infrastructure transactions underwent renegotiation within two years after being awarded in Latin America. Also see NAO (2001) and Athias and Nuñez (2008).

Governments have to weigh such costs against the benefits of imposing higher quality standards.

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Regulatory Capture: Risks and Solutions

LIAM WREN-LEWIS

It is indisputable that an effective regulatory regime is necessary for network infrastructure to be operated efficiently and equitably. A large and growing body of economic theory explores what an optimal regulatory regime should aim to achieve and the best means for doing this. Meanwhile, on-the-ground experience reveals that weaknesses in the institutional environment can undermine the objectives of regulatory policy. One major weakness is the inability of society to ensure that regulatory agencies are acting in their interest and not being captured by special interest groups. Such regulatory capture is a focus of economic theory. This chapter aims to take stock and evaluate the risks and solutions discussed in the relevant literature.

The chapter is divided into four sections. We begin in Section 7.1 by discussing alternative definitions and types of capture and considering the principal ways that capture has been modelled in economic theory. Section 7.2 follows with a broad discussion of the potential problems that capture might spur, as well as potential positive effects. In Section 7.3 we review the ways suggested in the literature to either reduce capture or mitigate its effects. We consider four areas where decisions regarding policy and institutions can affect capture: (i) choosing a market structure, (ii) designing a regulatory structure, (iii) appointing regulators, and (iv) shaping regulators' careers. Finally, Section 7.4 concludes by attempting to draw lessons from the solutions suggested. We show that each policy recommendation can be categorised in one of two broad approaches to reducing capture and note that these approaches can be contradictory and their practice incomplete. We therefore conclude with suggestions for future research that might improve our understanding of proposed solutions.

In recent years, there has been a dramatic increase in the economic literature studying capture and corruption, and this has included a number of surveys. This chapter focuses on the institutional tools that policymakers have at their disposal to reduce capture or mitigate its damaging effects. In this way it takes a more policy-orientated view than the survey of regulatory capture provided by Dal Bó (2006). When considering such solutions, we focus on those that are

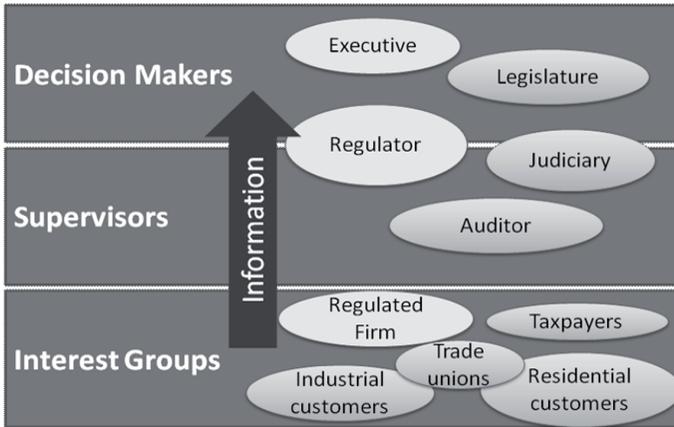
specific to regulatory capture in the context of network industries. For a broader discussion of policies that reduce corruption in infrastructure procurement, see Boehm (2009) and Kenny (2009a, 2009b).

7.1 WHAT DOES ‘CAPTURE’ MEAN?

The economics literature provides no precise (and consistent) definition of regulatory capture. Dal Bó (2006) argues for two definitions: a broad and a narrow. Broadly, ‘regulatory capture is the process through which special interests affect state intervention in any of its forms’; narrowly, ‘regulatory capture is specifically the process through which regulated monopolies end up manipulating the state agencies that are supposed to control them’. In this chapter, we use a definition of regulatory capture that lies somewhere between the two extremes. In particular, we focus on special interests’ manipulation of government agencies regulating network industries. We take a broad view of the potential special interest groups involved while concentrating on a particular type of government agency. It is important to note that our discussion does not encompass the influence of special interest groups over democratic institutions more generally (for a discussion of such issues, see Grossman and Helpman, 2001). Moreover, we do not consider the ‘capture’ of a regulatory agency by politicians when it is in the general interest of society – in particular, when politicians wish to reverse a time-inconsistent policy (i.e., a policy which was, but no longer is, in society’s interest). This issue is best discussed in the context of government commitment (see, for example, Estache and Wren-Lewis, 2009). Finally, we do not consider the personal interests of government bureaucrats to be those of special interest groups, and so we do not discuss the extortion of regulated firms by government agents (for an example of this, see Shleifer and Vishny, 1994).

Given our definition of capture, there are a large number of actors that may be involved in regulatory capture. Figure 7.1 shows some of the different possible actors and categorises them into three groups: interest groups, supervisors and decisionmakers. The primary interest group, and our main focus, is the regulated firm itself (and the main purpose of the regulator is to control the firm’s actions). Meanwhile other groups may also wish to manipulate the regulatory agency. Trade unions may desire more labour than is optimal for society, while taxpayers may desire a smaller than optimal network expansion if public subsidies are required. Different customer groups – for example, residential or industrial – are likely to have competing interests and concerns about prices they pay.

In Figure 7.1, we can see that government actors have been split into two groups – supervisors and decisionmakers. In this model, supervisors do not directly decide regulatory policy, but instead just transmit information from the interest groups (particularly the regulated firm) to the decisionmakers. Decisionmakers, on the other hand, are in charge of policies such as the type of regulation, the prices a firm is allowed to charge, and any subsidies that may exist. Auditors are therefore supervisors, while executive and legislative actors

Figure 7.1 Actors potentially involved in capture

are clearly decisionmakers who do not gather information directly. Other actors – in particular, the regulator – may play a dual role, both collecting information and making decisions. However, within the regulatory agency itself, these roles are likely to be split.

Categorising actors in this way allows us to distinguish between two sorts of capture. The first essentially ignores or abstracts from the supervisor category and concentrates on the direct influence of interest groups on decisionmakers. We label this form of capture the *capture of decisions*. This would, for example, include the regulated firm bribing a regulator to set a higher price in a rate review or to not enforce a particular regulatory statute. We then label the second type of capture as *capture of information*. This, for example, would include the regulated firm bribing an auditor to hide the fact that it is in fact making a larger profit than it claims.

This division can approximately be mapped to two different ways of modelling capture. The capture of decisions is generally the focus of traditional ‘capture’ or ‘interest group’ theory. This was originally developed by Stigler (1971), who argued that regulation would in fact be developed in the interests of the regulated firm. This theory was then extended by, among others, Posner (1974), Peltzman (1976), and Becker (1983), who argued that there was likely to be a range of interest groups each with competing interests. Levine and Forrence (1990) provide a survey of this literature and others. This theory stresses that regulatory policy is to be determined by the relative power of the interest groups involved, which in turn might be determined by factors such as the size of each group. This concept relates to more recent models such as those of Bernheim and Whinston (1986) and Grossman and Helpman (1994, 1996), who apply similar ideas to the influence of special interest groups on politics more generally. Typically, these models do not explicitly consider the relationships among actors within the governmental process, nor the mechanisms by which the actions of regulators are made to conform to the desires of organised subgroups.

The second approach to modelling capture emphasises the importance of asymmetric information in determining capture. This approach takes a principal-agent framework and specifically considers the relationship between some kind of supervisor and its principal, in which the supervisor may have access to information that the principal does not. A pioneering model in this field is that of Laffont and Tirole (1991, 1993), which considers a case in which a supervising agency learns information about a firm's cost structure that it can then hide from a decisionmaker. The firm then has an incentive to 'bribe' the agent not to pass this information on, since the principal will now have to pay the firm directly to discover this information. In the model, the supervising agency is motivated by private pay-offs, and therefore will take the bribe if the principal does not offer a suitable incentive scheme. The key difference between this approach and the first one mentioned is that information asymmetries between the supervising agency and the decisionmaker offer the potential for capture, even if the decisionmaker itself is benevolent.

This second approach can be adapted to a variety of contexts. Other interest groups besides the firm may have an incentive to prevent information being revealed to the decisionmaker, such as environmentalists (see Laffont and Tirole, 1991, 1993) or taxpayers (Estache *et al*, 2006). We might also consider different actors in the role of principal and agent – for example, they might both be members of the same regulatory agency. Furthermore, we can relax the extent to which the principal is non-benevolent, such as in Spiller (1990).

Since the distinction between the capture of decisions and the capture of information has been most pronounced in the literature, we will use this distinction in our discussion of capture's implications and potential solutions. Nonetheless, it is worth noting that there are other ways to categorise capture that would help us to understand the breadth of potential mechanisms and the limitations of solutions. One such categorisation is the distinction between *ex ante* and *ex post* capture. In *ex ante* capture, the interest group's objective is to influence the design of regulation or laws. For example, an incumbent firm may attempt to block a reform that would introduce competition. *Ex post* capture, on the other hand, occurs within the existing legal framework – for example, the distortion of cost information to gain a better rate. Hellman *et al* (2003) show that whether a firm attempts to capture *ex ante* or *ex post* depends on characteristics such as its political connections.

It is also useful to note that capture occurs in both *legal* and *illegal* ways. Legal capture includes lobbying as well as more subtle forms of capture such as capitalising on the career concerns of regulators. Illegal capture consists not only of bribery, but also the use of favours and coercion. Dal Bó (2006) discusses in detail the various instruments used in capture, while Dal Bó and Di Tella (2003) examine the differences between capture by threat and by bribe. Awareness of the existence of both legal and illegal forms of capture is important when considering policy to ensure that one type is not simply replaced by another.

Finally, it is useful to distinguish between *direct* and *indirect* capture. We are considering capture to be the 'manipulation of government agencies', but the

interest group has the option of manipulating these agencies themselves or via an alternative power. For example, Holburn and Vanden Bergh (2004) develop a model showing how, in certain circumstances, it is optimal for firms to attempt to capture authorities who hold power over a regulatory agency, rather than the agency itself. If the firms are successful, these authorities may then be able to exert sufficient pressure on the agency such that it does not need to be captured directly.

Overall, in this section we have shown that there are several types of capture and many ways of modelling it. This will help us as we consider how capture, in any of these forms, might affect the outcomes with which we are concerned.

7.2 WHAT ARE THE IMPLICATIONS OF CAPTURE?

We now turn to consider the crux of why regulatory capture is of such concern to economists. First, we consider the potential implications of capture revealed by theoretical models. These implications can be categorised into two main effects: redistribution of rents and changes to efficiency. We then consider how these two broad effects will manifest themselves in practice, and examine relevant evidence in the empirical literature.

The general objective of capture is to redistribute surplus to the capturing party and thus away from some other party. In the case of the regulated firm, for example, this could be an increase in producer surplus that comes through higher prices at the cost of reduced consumer surplus. A redistribution of surplus occurs in all models of regulatory capture and in all the types discussed in the previous section. For instance, in an interest-group model of capture, a firm may persuade a government agency not to carry out a rate review that would result in a lower regulated price. In a principal-agent model of capture, the firm wants the supervisor to hide cost information in order to generate an 'information rent' for the firm. The fact that the firm now has information that the regulator does not means that the regulator has to provide a transfer of funds to the firm to incentivise the revelation of this information.

Other interest groups (that is, not firms) that attempt capture are also seeking a redistribution of surplus. If a particular group of consumers (for example, industrial consumers) capture the regulator, they may seek a change to a cross-subsidy regime that benefits them (for example, higher residential prices and lower industrial prices). Alternatively, consumers that are already connected to the network may seek to prevent further network expansion if such expansion would involve a transfer away from the connected to subsidise the unconnected (see Estache *et al*, 2006, for more details). Since regulated network industries are often full of opportunities for cross-subsidies or transfers, there is great potential for surplus to be redistributed in many different channels.

We can thus be sure that a redistribution of surplus would take place following any successful instance of regulatory capture. In some cases, this may be the only implication. If the surplus being redistributed is a relatively unimportant economic rent, then it is possible that capture will simply result in some efficient

transfer from one group to another. For example, if one firm wins a contract instead of an alternative identical firm simply because it has bribed the regulator, then the only consequence of this capture may be the benefit accruing to the shareholders of one firm over another. If this were the case generally, economists might be relatively unconcerned about capture, or would only consider it within a context where they could make judgments on the distribution of income. Judging whether or not regulatory capture is bad in a particular case would involve analysing how the redistribution of income affects social welfare. For example, we could imagine that capture might be a good thing if the capturing interest group was generally under-represented in polity. However, most instances of capture are likely to imply more than just an efficient transfer of surplus; they are likely to impact the overall efficiency of the sector being regulated.

Regulatory capture may impact economic efficiency in a number of ways. Some of these ways may, in fact, improve efficiency. One commonly cited example of this is where capture helps to mitigate problems of commitment where the optimal policy is time inconsistent. Such problems plague regulated industries since, wanting the firm to invest, the government would like to promise the firm an appropriate reward *ex ante*. However, once the investment has been made, the government will not actually want to grant such a reward *ex post*. For instance, Evans *et al* (2008) show that, when the government cannot commit to allowing the firm a sufficient return on investment, capture can improve efficiency. In this model, the effect of commitment problems are removed if direct lobbying of the decisionmaking executive is allowed, or if decisionmaking is devolved to a sufficiently 'pro-industry' regulator. One way in which regulators may be made sufficiently pro-industry is through their openness to capture. More generally, capture might mitigate inefficiencies that arise elsewhere in the regulatory process, such as through the election of politicians (see Besley and Coate, 1998, for a discussion of such inefficiencies).

Overall, however, models of regulatory capture have generally focused on instances where capture, or the potential for capture, decreases efficiency. This generally occurs in three ways: the direct distortion of prices, the cost of the capture itself, and the measures taken in reaction to the capture.

The nature of regulatory capture means that the redistribution of surpluses does not typically take the form of direct lump-sum transfers. This is either because the regulator does not have the power to make such transfers (perhaps because this would increase the effect of capture) or because such transfers would expose an otherwise covert arrangement. As a result, the redistribution of rent that occurs will often result in the distortion of various prices away from their optimal values. For example, in the simplest case of monopoly regulation, a firm that captures the regulator will seek a higher price than desired by society, resulting in under-consumption. In another case, where consumer groups capture a cross-subsidy regime, this will frequently be through changes in relative prices. We would therefore expect to see overconsumption by the group that captures and underconsumption by other groups. Finally, in the case where surplus is transferred from the government to a firm or interest group, the transfer itself

may not be distortionary. However, since the government pays for the transfer out of taxation that is itself distortionary, this leads to inefficiency.

A further source of inefficiency arises from the costs of capture itself, and this is true for both legal and illegal capture. In legal capture, costs might include over-spending on election campaigns or the allocation of jobs to inferior candidates. When capture is illegal, time and money will be spent on keeping any transfers covert or in enforcing threats. As Tullock (1967) showed, these costs may be high, since the large surpluses present in network industries justify a large amount being spent on trying to obtain the rents. When opportunities for capture abound, managers will spend more time attempting to capture than improving their firms' performance, as illustrated in the model of Dal Bó and Rossi (2007).

A final cause of inefficiency is changes in policy designed to prevent or mitigate the damages arising from capture. This is demonstrated clearly in the models of information capture of Laffont and Tirole (1991) and Estache *et al* (2006). In these models, capture is costly to prevent, since the regulator has to be given a sizeable incentive not to be captured. These costs are directly related to the gain that an interest group receives through capture. There is thus an incentive for the principal to reduce these potential gains, even if doing so is costly for other reasons. Hence it may be optimal to offer a lower-powered incentive regime that does not sufficiently reward effort, if this also decreases the information rent a firm can obtain through feigning inefficiency.

In sum, regulatory capture – or the threat of such capture – is likely to both cause a redistribution of surplus and to increase costs overall. In the context of network industries, there are three main effects that will impact at least some groups: increased prices, increased subsidies and decreased quality. These effects may occur directly or through decisions over potential reforms that interest groups attempt to influence. For example, a monopoly may capture a regulator to prevent sector liberalisation that would have lowered prices.

Empirical evidence of the effect of capture on outcomes is extremely limited by difficulties measuring capture's extent. Legal capture – in particular, lobbying – is frequently overt and therefore potentially measurable. This is true, for example, of private campaign contributions to elected state legislatures, which de Figueiredo and Edwards (2007) use to measure the effect of firms' lobbying. They find increased lobbying by an established utility significantly increases the access price it is allowed to charge competitors.

Other economists attempt to infer the scale of capture from other variables. Duso (2005) uses price differentials to proxy for capture, and then finds that capture significantly reduces the probability of a cellular market being regulated in precisely those markets where regulation would lead to a reduction in general prices. Taking a different approach, Bonardi *et al* (2006) argue that several factors increase the probability of capture, including rivalry with competing interest groups, the resource base of regulatory agencies, and a firm's recent experience with policymakers. They then find evidence that these factors indeed decrease the rate of negative rate reviews.

One alternative approach used with cross-country data is to assume that capture is more commonplace where general rates of corruption are higher. Using indices of national corruption, Dal Bó and Rossi (2007) find that firms are less efficient when national rates of corruption are higher, and argue that this is due to an increased amount of managerial time being spent on capture. Wren-Lewis (2010) finds a similar result. Moreover, he finds that firms are most inefficient when corruption is high and there is no independent regulatory agency, suggesting that capture is most prevalent in corrupt countries with weak regulatory governance.

Other researchers attempt to explore the effects of capture on market reform in network infrastructure. Looking at electricity unbundling within the European Union (EU) states, van Koten and Ortmann (2008) find that it is less likely to occur in more corrupt countries. They argue that in such countries the incumbent is better able to capture the decisionmaking process. Li *et al* (2005) take a different approach when considering cross-country differences in regulatory reforms in telecommunications. They support the interest-group theory in showing that reforms are more likely when ‘pro-reform’ interest groups are large and less likely when incumbents have strong incentives to oppose reform. They also find that democracy appears to facilitate this interest-group effect. Similarly, Knittel (2006) finds that regulation of the US electricity industry started earlier where interest groups that stood to benefit from such regulation were strongest.

In sum, theory suggests that capture and the threat of capture are likely to be significantly damaging for a number of reasons. Though the empirical evidence is severely limited in its ability to measure capture, it does support this view. So, what can policymakers do to reduce capture and its effects? In the next section, we consider a range of solutions suggested by the theoretical literature, using the results of empirical work where available.

7.3 WHAT SOLUTIONS DOES THEORY SUGGEST?

Having established the potential risks of regulatory capture, let us now turn to consider potential solutions that derive from the theoretical literature. Since network industries are the focus of this chapter, we consider only those solutions that are sector specific. While it may be useful to pursue broader policies that affect the economy and government more generally – such as decreasing corruption and improving governance – this is not within the scope of this chapter. We divide this section into four subsections that each deal with a different area of policy related to network industry regulation. First, we consider how decisions about market structure, such as whether to privatise or liberalise, may affect capture. Second, we explore alternative regulatory structures. This includes decisions on the number of regulatory agencies and the level of government at which regulation takes place. Third, once the regulatory structure is in place, there are a variety of options for appointing regulators, and this decision may influence future capture. Fourth, we examine how policies relating to regulators’ careers once in office, such as their term length, may affect capture.

7.3.1 Industrial structure

Privatisation

One major reform that has significantly changed the structure of network industries in many countries over the past three decades has been the privatisation of incumbent monopolies. Although reducing capture was not the primary aim of such reforms, it has been argued that this may be a positive secondary effect.¹¹² Indeed, since the regulation of public enterprises has often been managed together with their operation, ‘capture’ might have been seen as an odd thing to talk about. Nonetheless, to the extent that public enterprises have different objectives from the government, there exists the potential for capture.

In the model of Boycko *et al* (1996), privatisation reduces the effect of capture and hence improves efficiency. However, these authors focus on capture by interest groups other than the firm – notably labour unions – and assume that the government itself is captured. Privatisation therefore decreases the effect of capture by making it more difficult for the captured government to influence the firms’ decisions. Shleifer and Vishny (1994) extend this idea by arguing that privatisation is likely to be successful in reducing captured politicians’ influence only if the firm is profitable enough not to depend on subsidies. Of course, if we do not believe that the entire government is captured by damaging interest groups, then it is not so clear that distancing the government from the firm will mitigate the effects of capture. In particular, these models do not consider potential capture by the regulated firm, which is generally the focus of the relevant literature.

Martimort and Straub (2009) take a different angle to investigate the impact of privatisation on capture by the firm. They use a model of informational capture and consider privatisation to be the prohibition of transfers between the government and the firm. They then argue that the effect of capture depends on the firm’s ownership. If the firm is publicly owned, the threat of capture results in a greater public subsidy funded through taxation, while a privately owned firm profits instead from higher prices. The relative cost of capture therefore depends on how distortionary taxes are relative to higher prices. Taking the model one step further, they argue that privatisation will therefore make capture more transparent, since higher prices are easier to link to the firm’s actions than increased taxation. This transparency may aid in the prevention of capture. However, if we consider the relative power of interest groups, it may be that a large electorate is relatively powerless to prevent such capture compared with a ministry of finance that wishes to stem the loss of funds.

Overall, the effect of privatisation on capture is ambiguous. If we are concerned about interest groups other than the firm capturing regulation, then privatisation may succeed in improving efficiency. Wren-Lewis (2010) provides evidence

¹¹² It is worth noting that capture and corruption are also likely to impact a government’s decision to privatise (or not). Laffont and Meleu (1999) and Bjorvatn and Søreide (2005), for instance, provide models examining how corruption might influence this decision to privatise.

for this in showing that private ownership reduces corruption's negative effect on productive efficiency. However, if one is concerned about potential capture by the firm, then the effect of capture is likely to vary. This is consistent with empirical evidence presented in Estache *et al* (2009), who show that privatisation and corruption interact in a number of ways.

Liberalisation

Another reform of industrial structure that has often accompanied privatisation is the liberalisation of the market to allow new entrants to compete with the incumbent. The interest-group theory of capture would suggest that such a reform is likely to reduce capture since firms find coordinating on capture more difficult in a less concentrated market (Olson, 1965). Since each firm gains only a fraction of the total benefit of a price rise, then, as the number of firms increase, the incentive for individual firms to capture decreases. That said, this argument only applies to capture that will result in benefits for all firms in the market. The flip side is that incentives for the incumbent to capture may increase if it needs the regulator's help to beat the competition.

Models of information capture also tend to suggest that liberalisation is likely to have positive effects. On one side, competition may lower the regulator's need to amass information if competition provides an alternative downward pressure on prices. To the extent that information retrieval is still required, a greater number of firms in the market may provide alternative information sources. Laffont and N'Guessan (1999) show that such additional information is likely to reduce the damage caused by information, but note that such a reduced dependence may not in fact reduce the prevalence of capture. Instead, since the government may see capture as less problematic, it may choose to spend less on preventing capture.

Overall, therefore, liberalisation is unlikely to be a panacea when it comes to reducing the risk of regulatory capture. But it is fair to say that both theories of capture support liberalisation as an anti-capture measure over privatisation. Of course, this also helps to explain why we expect to see incumbent firms using regulatory capture to prevent such reform from occurring at all!

7.3.2 *Regulatory structure*

The number of actors

Models of information capture focus on the key role of supervisors who collect cost information from the firm. Laffont and Martimort (1999) show that one way of reducing capture in these models is to increase the number of supervisors.¹¹³ This relies on the assumption that each supervisor is aware of the signal that the other receives but that they cannot collude.¹¹⁴ In this model, capture remains a problem if only one of the supervisors receives information from the firm, but is

113 See McCubbins *et al* (1987), Spulber and Besanko (1992), and Dixit (2003) for how the interaction of multiple actors in government is influenced by processes and structures.

114 See Laffont and Meleu (1997) for analysis of a case in which regulatory agents can collude with one another.

removed as a threat when more than one supervisor receives information. This is because if several regulators receive informative signals, each will anticipate that the other will reveal it, and hence any collusion would be ineffective. Estache and Martimort (2000) argue additionally that if supervisors are not aware of the information received by others, separation is still likely to reduce capture. Since each supervisor is now only partially informed, the ability to extract bribes from the firm is reduced.

In practice, this insight could be applied on a number of levels. It may work through the creation of two separate agencies, or perhaps (a less costly alternative) through the involvement of a government body besides the regulator, such as the judiciary. At a micro-level, it may simply suggest that individual supervisors within the regulatory agency work in pairs rather than independently.

Increasing the number of supervisors may well accompany increasing the number of decisionmakers. This would be the case if, for example, separation was achieved through dividing roles among agencies. This may also decrease capture if we believe that it is more costly to capture two decisionmakers than to capture one. On the other hand, Estache and Martimort (2000) argue that, when different principals are affected by the activities of the regulator, the latter can play one principal off another. The regulator may then become less accountable and the principals unable to constrain its actions. Whether or not the existence of multiple principals is a curse or blessing for accountability depends on the regulatory process and structures in place.¹¹⁵ For example, one way to increase accountability is to expose the regulatory bureaucrat by making available private information on the effectiveness of the bureaucrat's behaviour. Simple institutional rules, such as the public release of regulatory information, may allow this kind of information sharing among multiple principals.

Of course, increasing the number of actors will certainly impact a number of other aspects of regulation, as discussed in Estache and Martimort (2000). Indeed, Laffont and Meleu (2001) argue that it is in precisely those circumstances where the role of separation in capture reduction is most important that the costs are highest. We are not aware of any empirical work that attempts to test the impact of the number of actors on capture. However, current theoretical literature appears to generally favour increasing the number of actors to reduce the risk of capture.

Consumer advocates

One way to increase the number of actors is to involve consumer advocates in the regulatory process (Ugaz, 2003). This aligns closely with the interest-group theory of capture, since it may help to improve the power of consumers. By increasing the power of this particular interest group, which typically is seen as the victim of capture, the relative power of other groups – in particular, the regulated firm – will decrease.

115 See McCubbins *et al* (1987), Spulber and Besanko (1992), and Dixit (2003) for how the interaction of multiple actors in government is influenced by processes and structures.

While this theory is sound in principle, two potential problems arise. First, from an interest-group perspective, there remains a concern that the consumer advocates themselves may be captured. In particular, some consumer groups may use the advocates to favour themselves over others. Holburn and Spiller (2002) provide empirical evidence for this concern by showing that in US electricity regulation, the creation of consumer advocates has benefited industrial consumers but not residential ones. Second, Laffont and Tirole (1993) argue that if one takes an information perspective, consumer groups will be of no help unless they can provide an additional information source and hence act as an alternative ‘supervisor’. These concerns should therefore be borne in mind when involving consumer advocates by ensuring representation and giving the advocates enough resources to enhance their ability to gather information.

Decentralisation

The relationship between decentralisation and the broader issues of corruption and accountability has received a significant amount of attention in the literature (Bardhan and Mookherjee, 2000; Bardhan, 2002). Clearly, regulatory capture can be viewed as an aspect of this relationship. From an interest-group perspective, the proposed advantage is that regulation at a more local level is likely to be more accountable. In other words, consumer groups and/or local taxpayers are likely to be able to organise themselves more effectively to influence the regulator’s decisions. Evidence to support this view is found in Boyes and McDowell (1989), who find that elections for regulators are effective in reducing consumer prices only when held at a sufficiently decentralised level. But the flipside, from an interest-group perspective, is that local firms and other groups might also find capture to be easier at a local level. For example, Boehm and Olaya (2006) argue that regulation at the local level is likely to lead to more frequent interactions, encouraging capture.

Models focused on information capture are also ambiguous as to the effect of decentralisation on capture (see Laffont and Aubert, 2001, for an overview). Laffont and Pouyet (2004) show that when decentralisation induces competition between regulators, this competition may reduce their discretion and hence their potential to be captured. On the other hand, Besfamille (2004) shows that a local government may have an incentive to collude with a local firm against the national government if this results in greater subsidies heading to the local area. In China, for example, local governments have been known to collude with small-scale, inefficient coal power plants to prevent them from being shut down by the central government since these plants provide jobs and tax revenue – and so working for their survival will benefit local officials’ personal objectives, such as promotion.¹¹⁶

Overall, however, economic theory presents no clear view of the effect of decentralisation on capture. One question that may be worth further research is the extent to which the benefits of both decentralised and centralised regulation

¹¹⁶ See Laffont (2005: 22–24) for further details.

could be drawn out using a hierarchy involving both levels of government. This might also be a mechanism by which to increase the number of actors involved in regulation, and hence to reduce capture.

Regulatory independence

A final decision that needs to be made when designing regulatory structure is the degree to which the regulatory agency should be independent from the government. Generally, the emphasis of policy advisers has been to push for greater regulatory independence in the belief that this will decrease political interference and hence improve the government's ability to commit to appropriately rewarding the regulated firm (Thatcher, 2002). However, a regulator that is less constrained by the government may be more open to collusion with the firm. In light of this argument, it is worth studying the empirical work on independent regulation more closely. We may, for example, expect to see greater investment under a captured independent regulator, alongside excessive returns. In this case, it should be noted that evidence of independent regulation increasing investment is not necessarily evidence that it enhances welfare.¹¹⁷ Further work is needed to distinguish between productive and unproductive investment, as well as other outcomes, thus allowing us to weigh the costs and benefits of independence more precisely.¹¹⁸

Independence may, however, not increase collusion if the government's limited accountability to its citizens means that capture of politicians or the executive is a greater threat than regulatory capture. Furthermore, in considering the trade-offs of independence, it is worth distinguishing between different components of independence.¹¹⁹ For example, making the regulator's workings transparent to the government and citizens is likely to reduce the risk of capture, while making it transparent to the firm may facilitate capture.¹²⁰

Related to a discussion of the degree of independence is the amount of discretion a regulator should hold. Clearly, the greater discretion the regulator is allowed, the greater the potential for capture. Hiriart and Martimort (2009) show that a greater degree of capture (that is pro-industry bias) calls for a smaller amount of discretion to be given to the regulator. Thus while increasing independence

117 For example, Henisz and Zelner (2006) use cross-country panel data to show that a more powerful industry lobby reduces investment in state-owned enterprises (SOEs) generating electricity, and argue this is evidence that inefficient 'white elephants' are prevented. On the other hand, also using cross-country panel data, Cubbin and Stern (2006) show that independent regulation increases investment in electricity utilities, and they argue that this shows the positive effects of commitment. While both interpretations may be correct, the opposite may also be the case.

118 Faure-Grimaud *et al* (2003) provide a theoretical model in which the principal makes a trade-off between commitment and capture when deciding on independence.

119 Gutiérrez (2003) considers different levels of independence among independent regulators, while Pargal (2003) finds evidence in cross-country regressions that different aspects of independence may have different effects.

120 The difference between regulatory agencies and central banks is that for the latter there is more public scrutiny by way of international comparison and an industry of commentators.

by no means necessarily increases capture, policymakers need to be aware that granting too much discretion carries such a risk.

7.3.3 Appointment of regulators

Elections of regulators

Regarding the appointment of regulators, one idea is to elect regulators directly rather than have them be appointed. In the models of Besley and Coate (2003) and Guerriero (2010), regulators that are directly elected are more responsive to consumers' demands of the regulated sector since this is the sole issue of concern in these elections. They both also find empirical support for this hypothesis in showing that residential electricity prices are lower in those areas of the United States where regulators are directly elected. Smart (1994) finds a similar result for telecommunications prices in the United States. In addition, Atkinson and Nowell (1994) find that elected regulators review regulated prices in a way that is better for society and Guerriero (2010) finds that the election of judges also tends to result in reduced electricity prices. This result is not universal – Boyes and McDowell (1989) find that elections are effective only when carried out at a relatively local level, while Kwoka (2002) finds that only industrial prices are reduced. However, there is little to suggest that the election of regulators increases capture, implying that this is an anticapture policy with relatively strong empirical support.

Joint appointment by executive and legislature

If the direct election of the regulator is not feasible or potentially damaging, one alternative is for the appointment to be made jointly between the executive and the legislature. In the interest-group theory of capture, joint appointment has the advantage of involving more than one actor and therefore diluting the power of any particular interest group. Supporting this theory, Smart (1994) finds that telecommunications rates in the United States are lower when regulators are appointed jointly by the executive and the legislature. However, this effect occurs only when the executive and legislature are controlled by different political parties, suggesting that a true separation of powers does indeed reduce the effect of capture.

7.3.4 Regulatory careers

Term length of regulator

Let us now consider a final policy area – the design of the careers of regulators. In particular, we begin with a variable that has been the focus of a significant amount of work in the area, namely the term for which an individual regulator is appointed. An important work in the study of the regulatory life cycle is that of Martimort (1999), who develops the information-based model of capture of Laffont and Tirole (1991) one step further by considering the contract between the 'capturer' and the 'captured'. In particular, Martimort notes that since

agreements between the capturing firm and the regulator are likely to be illegal, they are not explicit contracts to be externally enforced. Instead, such contracts are implicit, and hence depend on the fact that relationships between the regulator and the firm are ongoing over time. The threat of capture is therefore positively correlated with the frequency of these interactions and the duration of time over which they are expected to last. It can therefore be argued that reducing regulators' term length decreases the potential for collusive implicit contracts between the firm and the regulator.

Based on a similar model, Faure-Grimaud and Martimort (2003) give a different argument for why shorter term lengths may reduce capture. They work on the assumption that the cost of bribes are likely to increase in a convex manner at any given time, which seems reasonable when we consider that passing small amounts of cash under the table will go relatively unnoticed, but larger transfers will require that more time and effort be spent on ensuring secrecy. They also argue that the benefits to the firm are likely to change over time – for example, during a potential rate review it may be particularly important to the firm that the regulator not reveal any information it has on the firm's cost structure. Given these two assumptions, the firm would like to spread out its bribes over time to reduce the total cost. However, if term limits are short, this will not be possible, since a given regulator may only hold the post during a period in capture is not particularly crucial. In this way, decreasing term limits may increase the total cost to the firm of capturing the regulator.

While these two articles suggest shorter term limits will reduce capture, Leaver (2009) does not find evidence for this when she examines the effect of term limits on prices in the US electricity sector. Indeed, she finds the opposite result – longer term limits in fact appear to lead to reduced consumer prices. She explains this by building a model in which regulators are concerned about gaining future employment and hence preserving their reputation. This career concern increases as regulators approach the end of their term, and hence regulators are less keen to challenge the firms they regulate for fear that they might be exposed as being wrong. This can be interpreted as 'capture' in a loose sense of the word, if we consider that one power that firms have over regulators is their ability to damage reputations and thus careers.

Finally, in an event study of electricity regulation in the United Kingdom, Dnes and Seaton (1999) find no evidence for a 'life-cycle' effect related to capture either way – that is, they neither find evidence that regulatory agencies are captured more as time passes, nor that a lack of experience makes them more vulnerable to capture early on. In sum, the theoretical and empirical juries are still out when it comes to the way term lengths should be adjusted to reduce regulatory capture.

The revolving door

A second aspect of regulatory careers that has been studied in the literature is the 'revolving door' that exists between jobs in regulation and jobs with interest groups, particularly the regulated firm. Since the skills required to work for a

regulator are often similar to those required to work for a regulated firm, the movement of people between the two bodies is natural. Unfortunately, it also offers the potential for capture by enabling the firm to easily reward regulators for ‘good’ behavior. This is particularly the case in situations where other sorts of corruption such as bribery are more difficult, since the value to the regulator of a well-paid career in a firm may be sizeable. To reduce this type of capture, restrictions can be placed on who regulators can work for after leaving the agency, although such rules are likely to be ineffective when the regulated firm is part of a large multi-sector consortium. An alternative is to appoint different types of persons to the agency, such as career civil servants, academics, or those close to the end of their careers, since these actors are less likely to seek employment in a firm afterwards.

Empirical work on the existence of a revolving door effect is minimal and inconclusive. Cohen (1986), for example, shows that regulators favour the firm they regulate in the year before they are employed there, but not before this time. The importance of nearing one’s term limit is also found in Leaver (2009), suggesting that careers in industry may act as an incentive only when the prospect of a change in employment is imminent. More work may be required before it can be conclusively argued that closing the revolving door is necessarily worth the costs involved in lost skills.¹²¹ Overall, however, it seems likely that closing the door would reduce regulatory capture.

7.4 CONCLUSIONS

The previous section has shown that economic theory suggests a range of solutions to the problems presented by regulatory capture. From reviewing these solutions, we can see that each policy aims to do one of two things: (i) reduce the power of threatening interest groups to influence decision makers and (ii) reduce the ability of regulatory agents to exploit the information asymmetry between them and their principals. Table 7.1 categorises the various solutions considered in Section 7.3 according to these two objectives.

The first of these two objectives arises from the ‘interest-group’ theory of capture, which argues that regulatory capture is determined by the relative power of rival interest groups. According to this theory, capture can be reduced by decreasing the power of the groups most vulnerable to capture and increasing the power of the groups that suffer from capture. Liberalisation serves to decrease the power of the regulated industry by splitting it up, while closing the revolving door decreases the power that regulated firms have over current employees of the regulator. More generally, increasing the number of regulators and requiring their appointment to be made by two separate powers dilutes the effect of any interest group that has power over a single actor. Consumer advocates and the election

¹²¹ Che (1995) and Salant (1995) argue that keeping the revolving door open may also offer benefits, such as increasing commitment and incentives for regulators to signal their skills through efficient regulation.

Table 7.1 *Effects of policies on aspects of regulatory capture*

| | Reduces interest-group power | Reduces agents' exploitation of asymmetric information |
|---------------------------------|------------------------------|--|
| Privatisation | + / - | + / - |
| Liberalisation | + | + |
| Increasing number of regulators | + | + |
| Consumer advocates | + | |
| Decentralisation | + / - | |
| Greater regulatory independence | + / - | - |
| Elections | + | |
| Joint appointment | + | |
| Shorter term length | | + |
| Closing the revolving door | + | + |

Note: A '+' indicates a positive relationship predicted by theory (for example, liberalisation reduces interest group power) while a '-' indicates a negative relationship (for example, greater regulatory independence increases agents' exploitation of asymmetric information). A '+/-' indicates that the theory predicts that there will be an effect, but this could go in either direction (for example, privatisation will either reduce or increase agents' exploitation of asymmetric information). An empty box indicates there is currently no theory that suggests how the policy may be related to this aspect of regulatory capture.

Source: Author's analysis of the literature.

of regulators then aim to increase the power of consumers and taxpayers, who are generally the victims of capture. Other policies may serve to either reduce or increase the risk of capture. Decentralisation is likely to increase the power of both local consumers and local interest groups, and hence the overall effect will be context dependent. Similarly, privatisation and increasing regulatory independence have ambiguous effects. If an interest group holds power over politicians, then distancing them from control of the firm is likely to reduce the effect of capture. On the other hand, if we are worried about the firm capturing government agencies, then distancing it from relatively accountable politicians may increase the probability of capture.

The second objective, which focuses on decreasing an agent's ability to exploit information asymmetries, comes out of the theory of capture revolving around a principal-agent model. This theory tells us that one way capture can be reduced is by reducing information asymmetries, which may be done through liberalisation if competition is achieved. Increasing the number of regulators may also be useful since it reduces the ability of any individual regulator to hide information – an activity that may be made easier if the regulator is given greater independence. The theory also suggests that shortening the term length of regulators and closing the 'revolving door' may reduce the ability of a firm to make credible implicit contracts with the regulatory agent, and in doing so decrease the risks of capture. Finally, according to this theory, the effect of privatisation on the costs of capture will depend on the relative distortions of higher prices compared with higher taxes.

When we consider the results shown in Table 7.1, we can see that for some solutions, it is possible that one theory suggests that capture will be reduced while another concludes the opposite. Increasing regulatory independence may, for example, decrease the risk of the firm bribing politicians to make favourable decisions, but at the same time increase the risk of the firm bribing the regulator to hide information. However, in the majority of cases, such contradictions are rare. Liberalisation, increasing the number of regulators, and closing the revolving door have at least some support from both theoretical approaches.

This apparent consensus is, however, weakened by the fact that there are gaps in the table, where one theoretical approach has not been analysed using the other theory. In some cases, this gap is relatively harmless – it would seem unlikely that consumer advocates will increase information asymmetries, for example, and more likely they will be ineffective in this regard. In other cases, however, the result is less clear. With decentralisation, for example, the effect of the policy on the amount of information capture is less certain and unlikely to be irrelevant. More research is therefore needed to fill these gaps before economic theory can clarify its policy recommendations. Indeed, this also applies to the cells in Table 7.1 that have been filled in on the basis of rather weak support, such as increasing the number of regulators.

Finally, two further recommendations for future research arise from this survey. First, empirical research on the issue of regulatory capture is patchy and needs further development. Particular attention should be paid to those issues for which current economic theory appears to favour a particular policy, such as increasing the number of regulators. Here there is the potential for a strong policy recommendation if supported by empirical evidence – and great need for re-examination otherwise. Second, our survey has uncovered remarkably few papers that incorporate both the ‘interest-group’ approach of power over decisionmakers and the ‘principal-agent’ approach focusing on information asymmetries. Such a dual approach is likely to be useful in considering the potential interaction between the two types of capture. For example, does the capture of decisionmakers facilitate the capture of supervisors, or are the two forms of capture substitutes? Is it more important to reduce one kind of capture than the other? Answering these questions will help us go forward as we seek to advise those policymakers who want to reduce regulatory capture and the damage it causes.

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Risks of Capture and Independent Regulatory Agencies in Network Industries in Europe: A Political and Institutional Analysis

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The legal and institutional structures for the regulation of network industries in Europe have been transformed over the past 30 years (Thatcher, 2007a). Direct public ownership – which usually implies regulation through a mixture of government-appointed heads and boards, network suppliers and ministerial decisions – has largely been ended through privatisation. State monopolies have been terminated and replaced with rules granting suppliers the right to enter markets and guidelines enforcing competition, from interconnection to the provision of information. New rules have been introduced to better protect the interests of society, such as regulations for universal service. European-level regulation has grown, guided by a series of European directives and overseen by formal and informal networks of regulators. Finally, independent regulatory agencies (IRAs) have been formally established in network industries in most European countries.

These changes have greatly altered the possibilities for capture of various forms. This chapter focuses on the risks of capture faced by IRAs. There are several reasons for this choice. One is that the theoretical literature on capture devotes much attention to IRAs. A second is that IRAs are in many cases the most important regulatory body in a sector since their members have more expertise than elected politicians thanks to specialisation, of prime importance in highly technical industries. They also play a key role in implementing European Community (EC) directives and contribute to the shaping of regulation at both the national and European levels.¹²²

Two risks of capture have become more relevant given recent changes in the structure of network industries. One is capture of IRAs by their regulatees,

¹²² References are to the European Community (EC) as most network regulation is under the EC pillar of the European Union (EU).

notably large suppliers of network services and infrastructure. The other is the politicisation of IRAs, which may represent capture by elected politicians and/or indirect capture by regulatees via these politicians.

Two central arguments are put forward. One is that, in Europe, risks of informal capture are often more important than other types of capture highlighted by the literature. Hence, resource imbalances between regulatees and IRAs or alliances between regulatees and governments may be more significant than ‘revolving doors’ or the use of appointment powers. The second is that capture risks are not new – they were widely present under the previous regime of public ownership and monopoly. Rather, the creation of IRAs and other changes such as privatisation and liberalisation have altered their forms.

The chapter begins, in Section 8.1, by discussing various definitions of capture and by outlining their theoretical treatment in the literature relevant to the focus on IRAs. It then offers, in Section 8.2, a brief summary of capture before privatisation, liberalisation, and the growth of IRAs and EC guidelines, in order to provide a benchmark for assessing the effects of those changes. Section 8.3 briefly outlines institutional changes concerning IRAs before examining different risks of capture in the current framework. Overall the chapter analyses capture from a political and institutional perspective. It is thus not concerned with economic efficiency and does not seek to put forward the normatively ‘best’ institutional framework. Instead, it seeks to understand the effects of institutional change on risks of capture.

8.1 THE CAPTURE OF IRAS: DEFINITIONS AND THEORIES

Capture of IRAs can take at least two forms. One is capture of regulators by regulatees. In this case, regulators are unable to fulfil their regulatory tasks and, more specifically, are unable to act against the wishes of the very firms that they are supposed to be regulating.

Political science discussions of this form of capture have been dominated by US-based literature. A key reason for this is that there are privately owned suppliers and regulatory commissions in key US network industries (for example, utilities and finance). In the literature we find critiques of the pluralist analyses dominant from the 1960s onwards, as well as concern about the power of firms, whether systemic or through lobbying. We also find arguments against the somewhat normative and one might say naive view that regulation (and regulators) act in the public interest.

In earlier analyses, the ability of private firms to capture regulatory commissions was argued to be a process that occurs over time (see, notably, Bernstein, 1955). In this view, IRAs initially operate in the public interest but then lose this impetus over time. This loss is attributed to several factors: (i) public attention switching from those scandals that had caused an IRA to be established in the first place to other issues, (ii) the most skilled staff moving to new bodies where they have more scope to pursue the public interest through regulation, (iii) loss of motivation and interest on the part of existing staff, and (iv) firms gaining

influence through the ‘revolving door’ (through which staff move from regulated firms to an IRA and then back again) and thus develop informal links to IRAs.

Later literature continued to focus on regulatory commissions that serve the interests of regulatees. Those in the ‘original sin’ school argued that from the very start, commissions aided regulatees (Kolko, 1977). But a more sophisticated analysis of rational choice and transaction costs began to explore which types of regulatees were especially capable of capturing regulators (both regulatory commissions and elected politicians). In particular, Stigler (1971) and Peltzman (1976; see also Wilson, 1980) argued that capture was more likely in sectors dominated by a small number of large firms because here the transactions costs of cooperation are lower and potential gains from regulatory capture are large. Meanwhile, a large number of actors – residential consumers, for example – are less likely to cooperate to capture regulators due to higher transaction costs (because of numbers) and smaller potential individual gains.

Transaction-cost-based analyses have sparked fierce debate, notably over their ability to explain the ‘deregulation’ movement of the 1970s and 1980s, which saw the end of the privileged positions held by large firms in several industries (such as telecommunications and banking) through reforms those that ended such as legal monopolies, removed barriers to entry, and restricted tariffs (but see Peltzman, 1989, for a response). Nevertheless, these analyses remain crucial to discussions of capture. One reason is that they continue to be used by rational-choice analysts of regulatory capture, notably in network industries and among formal institutions (Gómez-Ibáñez, 2003; Horn, 1995). The other is that they highlight conditions that expose IRAs to the risk of capture – notably, the revolving door, lobbying and cooperation among firms, and the disproportionately large resources of large firms.

The second form of risk we will discuss is IRA capture by elected politicians. This is linked to both literature on the principal-agent (P-A) framework (see, for example, Thatcher and Stone Sweet, 2002; Bendor *et al*, 2001) and also on work by lawyers and political scientists concerned with protecting regulatory bodies from politicisation (Geradin *et al*, 2005). The P-A analysis points out that elected officials create IRAs and delegate powers to them.

This is an important point. In the context of independent regulatory agencies, ‘independent’ does not imply total separation from elected politicians. On the contrary, politicians decide key elements of the formal institutional framework, including IRAs’ objectives and powers. They also create ongoing formal powers or ‘controls’ over IRAs, which can be important conduits of their influence. Indeed, even in formal terms, ‘independence’ is a variable that depends on the powers delegated to and the controls imposed on an IRA (Thatcher and Stone Sweet, 2002). In addition, formal independence must be distinguished from *de facto* or behavioural independence, which depends on factors such as the expression of formal powers in practice and the informal influence of elected politicians (Thatcher, 2005; Maggetti, 2007). Examining the risks of IRA capture by elected politicians thus involves looking at both the formal institutional structure – as it exists in practice, not on paper – and informal relationships.

Drawing on these analyses, the chapter will look at the ability of firms to capture IRAs and then turn to the relationship between elected politicians and IRAs. First, however, it is important to analyse the risks of capture that existed before the creation of IRAs. This sets a baseline for assessing the effects of the establishment of IRAs in network industries.

8.2 RISKS OF CAPTURE IN EUROPEAN NETWORK INDUSTRIES BEFORE THE CREATION OF IRAS

Until the 1980s, there were very few IRAs in European network industries (taken here to mean those involving public utilities such as telecommunications, energy, railways, water and also stock exchanges). Instead, IRAs were largely a US phenomenon and the term *regulation* was usually found only in discussions of the United States.

In contrast, regulation (in the sense of setting rules and governing markets) in Europe was undertaken by a relatively closed group of national policymakers – namely, governments (both elected politicians and civil servants), suppliers and trade unions. The government held many formal powers; most suppliers of services and infrastructure were publicly owned, sometimes as part of government departments (notably telecommunications and postal services) or in the form of state-owned or ‘public’ enterprises. Typically government ministers held powers over supplies by setting senior appointments, investment plans and tariffs.

Although formally in charge, elected politicians were in fact highly vulnerable to capture by publicly owned suppliers, for several reasons. First, they lacked information and expertise, especially given that suppliers often had monopoly power, and so few comparators were available. Second, senior civil servants were more often generalists than industry specialists. Third, suppliers could easily oppose ministerial desires, for instance, by delaying or by making decisions that were politically costly to ministers. Indeed, ministers found themselves enmeshed in the decisions of publicly owned suppliers, as matters such as tariff changes or strikes rapidly became political. In addition, strong informal linkages between civil servants, suppliers, and sometimes also trade unions made political control even more difficult.

As a result of these factors, state-owned enterprises enjoyed great power over their political ‘masters’. The content of major investment programs (as opposed to their overall cost for state budgets) was rarely subjected to detailed scrutiny by governments, especially with regard to crucial issues such as profitability and financial returns. Some programmes were clearly ‘white elephants’, such as the Anglo-French Concorde project, but problems with others – for example, the UK nuclear industry – were revealed only later, upon attempts at privatisation in the 1990s. Suppliers enjoyed great protection from competition and resisted even limited reductions of their monopoly powers. Their staff benefited from employment security and good pay and conditions; dismissal or sanctions for poor performance were extremely rare. Government attempts

to limit pay or reduce staff were fiercely resisted with the help of strong trade unions. Meanwhile, the state-owned enterprises had close links with privately owned suppliers, with whom they could act in concert if mutual interests were threatened by government attempts to reduce investment or introduce greater competition.

While being vulnerable to capture by state-owned suppliers, elected politicians sought to use them for political advantage. Thus, for instance, ministers used appointments to reward political allies and party supporters. Tariff changes were politically modulated: price freezes often occurred before elections, while tariffs for business services were often kept above costs in order to subsidise services used by residential users (that is, voters). Investment plans varied in size and number according to political and macroeconomic needs, being increased to boost demand and reduced at times of government fiscal problems and excess demand. The distribution of orders from network suppliers to privately owned companies, usually for manufacturing equipment, was a highly political matter. The fact that private companies lobbied for elected politicians meant that most orders went to 'national champion' firms.

Although the term *capture* was not used, especially since suppliers were publicly owned, the factors outlined above resulted in two forms of capture: elected politicians found themselves highly constrained in dealings with publicly owned suppliers, while suppliers were politicised by their dealings with politicians. In sum, an interdependent relationship developed between state-owned suppliers and elected politicians, offering each advantages while implying a fundamental conflict of interest. Formal institutional structures of political control through ownership and powers over suppliers were a far cry from the more complex reality of double capture.

8.3 THE CREATION OF IRAS IN NETWORK INDUSTRIES AND THEIR INSTITUTIONAL PROTECTION FROM CAPTURE

From the 1980s on, IRAs were created for many network industries in most European countries. Their number was uneven across countries and industries; for example, Britain created more IRAs earlier than other countries, and IRAs were typically created earlier for telecommunications than for other sectors such as railways (and indeed few countries have IRAs for water, even today). IRAs have also seen institutional modifications, such as regrouping (for example, the 2005 creation of a single cross-network IRA, the Bundesnetzagentur, in Germany, and regulators for energy and communications in Britain) and the addition of new sectors (for example, postal services in France to the telecommunications regulator in 2005 and railways to the network regulator in Germany in 2008).

Table 8.1 lists the IRAs for key network industries in four major EU countries (Britain, France, Germany and Italy), along with the dates when the first and the current sectoral IRAs were created. Network industries are treated broadly to include traditional utilities but also stock exchanges and the media; general competition authorities with power over network industries are also included.

Table 8.1 IRAs in major network industries

| Domain | Country | | |
|-----------------------|---|---|--|
| | Britain | France | Germany |
| General competition | Competition Commission 1998 (1948) and Office of Fair Trading 1973 | L'autorité de la Concurrence 2009 (1977) | Bundeskartella mt [Federal Cartel Office] 1957 |
| Telecommunications | Ofcom – Office of Communications 2000 (OfTel – Office of Telecommunications 1984) | Arcep – Autorité de régulation des communications électroniques et des postes 2005 (Auto rite de Régulation des Télé-communications 1996) | Bundesnetzagentur 2005 (Regulierungsbehörde für Telekommunikation und Post [RegTP] 1996) |
| Energy | Ofgem – Office of Gas and Electricity Markets 2000 (1989) | Commission de Regulation de L'Energie 2003 (2000) | Bundesnetzagentur 2005 |
| Water | Ofwat – Office of Water Services 1989 | | |
| Railways | Office of Rail Regulator and Strategic Rail Authority 1999 (1993) | | Bundesnetzagentur 2008 |
| Postal services | Postal Services Commission 1999 | Arcep – Autorité de régulation des communications électronique et des postes 2005 | Bundesnetzagentur 2005 (Regulierungsbehörde für Telekommunikation und Post [RegTP] 1996) |
| Media | Ofcom 2000 (Independent Television Commission 1990, 1954) | Conseil Supérieur de l'Audiovisuel 1989 (1982) | Landesmedienanstalt for each land |
| Stock exchange/shares | Financial Services Authority 1997 (1986) | AMF – Autorité des Marchés Financiers 2003 (Commission des opérations de bourse 1967 and Conseil des Marchés de Valeurs 1996) | Bafin (Bundesamt für Finanzdienstleistungen) 2002 (1995) |
| | | | AGCOM (see telecommunications) |
| | | | Consob (La Commissione per le società e la borsa 1974) |

Note: Dates refer to the creation of the IRA; dates in parentheses refer to when an IRA was first created in the domain. In France's railway sector, the Conseil Supérieur du service public ferroviaire lacks sufficient separation and powers to qualify as an IRA.

There is no Europe-wide definition of an IRA. Rather, each country has its own legal doctrines – for instance France has *Autorités Administratives Indépendantes* (Conseil d’Etat, 2001), and Italy has *Autorità Indipendenti* (Giraudi and Righettini, 2001), while Germany lacks a strong judicial doctrine (Döhler, 2002). Even within a single country, different institutional bases can exist; thus, for instance, in Britain, some IRAs are non-ministerial government departments (for example, Ofgem, the Postal Services Commission and Ofwat) while others are set up as companies (for example, the Financial Services Authority, FSA). Given national differences in terminology (for example, in some countries, such as Germany, the word *independent* is rarely used; see Döhler, 2002) and legal doctrine, three *de minimis* institutional conditions are used to decide whether an agency qualifies as an IRA (Thatcher and Stone Sweet, 2002; Thatcher, 2005). These take into consideration (i) the protection granted to the agency against capture by elected politicians, and (ii) whether it can be easily distinguished from other units within government departments, which are also often called agencies.

The first condition is that the agency must have its own powers and duties by public law. This means that an IRA can act without ministerial approval, unlike civil servants. It also means that if elected politicians wish to alter an IRA’s regulatory powers and formal aims, they must pass legislation rather than simply issue instructions. Legal duties typically include promotion of competition but also universal services; often such duties are broad and thus provide the IRA with much discretion. Formal duties provide IRAs with objectives and justification, legitimising actions that may run contrary to the wishes of elected politicians and regulatees.

The second condition is that agency members cannot be dismissed at will by elected politicians; at the very most, they can be ejected only on special grounds such as incapacity. Typically in European countries, the senior members of IRAs have terms of between 4 to 6 years, often set by legislation. This is a crucial protection against control by elected politicians. In many continental countries such as France and Italy, senior IRA members can only serve one term. The effects on capture may be mixed: on the one hand, one-term mandates may reduce temptations for IRA heads to follow the desires of elected politicians who (almost always) hold appointment powers. On the other hand, short term limits may limit experience, expertise and longer time horizons. They may also heighten pressures to prepare for post-IRA employment. These factors may increase the risk of capture both by elected politicians and by regulatees.

That the agency be organisationally separated from government departments and have its own resources is the third *de minimis* condition to qualify as an IRA. In other words, an IRA is not just another unit within a government department. Typically IRAs have their own budget. Sometimes, they even have their own staff, or at least can hire contract staff and experts over and above civil servants who are seconded to them. Financing varies considerably; some IRAs are completely financed within the general state budget while – at the other extreme – others, such as the FSA, are largely funded by a levy on regulatees and can also

decide the levy fee. Between these two ends of the spectrum are those agencies partly financed by a levy that may or may not be decided by the government. The issue of IRA resources – and the ability to deploy them – is obviously important when discussing capture by governments and regulatees.

In addition to these national-level institutional features, IRAs enjoy some EU-level protection from capture. Contrary to many perceptions (including those encountered in policy debates), European Community directives have traditionally not required the creation of IRAs and have said little about them, confining themselves to insisting that regulation and supply be undertaken by different bodies. But since 2000, formalised networks of regulators have been created in increasing numbers (Coen and Thatcher, 2008). These include the European Regulators Group (for telecommunications, in 2002) and the European Regulators Group for Electricity and Gas (EREG, created in 2003). This establishment of networks of regulators has required the Commission to draw up lists of eligible regulators, which in turn has led it to judge whether an agency has sufficient independence from suppliers, a significant increase in its role.

The Commission's regulation of IRAs was greatly extended in 2009 legislation that laid down specific requirements for IRAs in energy (European Council and Parliament 2009; cf. European Commission, 2009). This calls on Member States to guarantee that the regulatory authority be 'legally distinct and functionally independent from any other public or private entity', that the body 'act independently from any market interest', and that it not take direct instructions from governments (Article 35). The legislation also lays down a series of institutional features – for example, that the IRA should have 'separate annual budget allocations, with autonomy in the implementation of the allocated budget, and adequate human and financial resources to carry out its duties' and that its members be appointed for terms of 5–7 years, renewable only once. Such conditions mark a significant extension of European Commission powers, aimed at increasing IRA independence.

8.4 RISKS OF DIRECT CAPTURE OF IRAS BY REGULATED ENTITIES

Legal and institutional structures may set a framework on paper, but how does that framework operate in practice? This is a difficult question to answer, since neither IRAs nor regulatees have incentives to disclose capture. Instead, a more indirect approach is used to gauge the risks highlighted by the traditional theoretical literature on capture. Here, we look at three such risks in more detail: revolving doors, resources and lobbying.

The institutional structure of IRAs leaves great scope for the appointment of regulators, with few formal criteria. What patterns of recruitment have emerged, how important is the revolving door, and why? In practice, the revolving door between IRAs and private suppliers has been kept mostly closed, especially in continental Europe. The majority of IRA members in countries such as France, Germany and Italy come from the public, not the private, sector. The exception is Britain, where a high percentage of IRA board members come from the private

sector and return to it. One survey of most economic IRAs (network regulators and general competition authorities) between 1990 and 2001 found the following (see Table 8.2) for the four countries (Thatcher, 2005).

Table 8.2 *Public sector origins of IRA members, 1990–2001*

| | Britain | France | Germany | Italy |
|--|---------------|----------------|----------------|----------------|
| % IRA members whose previous occupation was in the public sector | 29% (9 of 31) | 74% (14 of 19) | 92% (11 of 12) | 76% (19 of 25) |

Note: Coverage of IRAs as in table 8.1; refers to IRA boards. Principal occupation if IRA members is taken.

Source: IRA websites and annual reports, Who's Who, and newspaper reports.

More recent analysis of IRA members finds a similar picture. Thus, for instance, in January 2010 all members of the French communications and postal regulator ARCEP had public sector backgrounds, while all three top members of the Bundesnetzagentur had spent all or most of their careers in the public sector.

More detailed examination reveals interesting national patterns. A high proportion of senior French regulators come from the *grands corps* (elite public administrators who can also transfer to the private sector) – thus for instance, of the ARCEP's seven current (January 2010) members, three (including the president) came from public administration and from the *grands corps*. Over the period 2002–6, 33% of members of economic IRAs in France came from the *grands corps* (Thatcher, 2007b). In Italy many regulators are university professors. In Germany the three senior members of the Bundesnetzagentur all have extensive experience in public administration, with the president being a former lawyer.

In Britain a higher proportion of IRA members come from the private sector – and return to it – than in continental Europe, but their direct connections with major suppliers are often weaker. Thus, for instance, Alistair Buchanan, chief executive of Ofgem since 2003, was an electricity analyst in banking, while Ed Richards, chief executive of Ofcom since 2006, has previous experience in both the public and private sectors, in the latter as an economic analyst. Many members of the FSA also have direct industry experience. Thus, for instance, Hector Santis, the FSA's chief executive, was formerly a banker. In France, too, several IRA members have had direct experience of the industry, but often both within ministries and publicly owned suppliers. Thus, for instance, several members of the energy regulator the CRE have worked for major French suppliers.¹²³

Several factors lie behind the patterns found. One concerns the pool of possible candidates. In some countries, such as France, public sector employees have the right to be *détaché* from their posts for several years before returning to

¹²³ For example, the president and one member worked for Charbonnages de France while another member worked for Total.

them. Thus, a spell in an IRA does not mean loss of employment. A similar situation can be found with respect to professors in Italy. In contrast, it is more difficult for civil servants and professors in Britain to leave for long periods and then return to their previous posts. The patterns of appointments have typically reflected existing national power structures. Thus, for instance, in France, the *grands corps* dominate decisionmaking, in Germany the public administration is highly influential, while in Italy university professors enjoy prestige and good connections. In Britain government policies have underlined the value of private sector experience.

What are the implications of these patterns for capture? The traditional US literature has argued that use of the revolving door increases capture. From this point of view, continental European countries have serious problems due to the inflow of regulators with strong ties to public sector suppliers, while Britain has a problem due to the outflow of IRA members who go into consultancy or banking. By using the revolving door, there is a risk that people will exploit their inside knowledge and contacts, and that their decisions will be influenced by prospects of future employment. But there is an alternative view: some authors suggest that previous experience with regulatees may in fact make a more effective regulator, due to gains in expertise and knowledge (see, for example, Che, 1995). Indeed, the revolving door may enhance enforcement and effectiveness if a strategy of ‘enforced self-regulation’ is adopted, which is sometimes argued to be superior to punishment, or ‘command and control’ (see, for example, Ayres and Braithwaite, 1992). From this perspective, Britain may suffer from its regulators’ *lack* of private sector expertise, whereas industry experience in countries such as France may lead to more effective IRAs.

A second major issue to consider when assessing the direct risk of capture by regulatees is resources. Regulation of network industries is highly complex, involving both technical and financial concerns that include cost of capital, marginal costs of additional capacity, interconnection, and allocation of costs among different services. Regulated suppliers in network industries tend to be very large firms with vast resources that may include regulatory affairs departments. IRAs remain small, with limited budgets. Table 8.3 presents the 2008 budgets and staff numbers of major network IRAs in communications and energy.

Table 8.3 *Budgets and staff numbers, 2008*

| | Ofcom | Ofgem | ARCEP | CRE | BNETZ | AGCOM | AEEG |
|-----------------------|-------|-------|-------|-----|-------|-------|------|
| Budget (€ million) | 141 | 44 | 22 | 20 | 155 | 62 | 33 |
| Staff | 812 | 295 | 168 | 128 | 2,500 | 419 | 120 |

Source: Annual reports; for acronyms, see Table 8.1.

The small size and budgets of IRAs indicate their weakness and vulnerability to capture by regulatees, who can overwhelm them in terms of staffing expertise and information. Moreover, there are strong upward pressures on the administrative costs of IRA staff due to functions such as increasing coordination, extending regulatory competencies, and introducing market-type mechanisms that then need to be implemented and enforced (see, for example, Bauer, 2005).

The limited resources of IRAs are linked to another capture risk, namely, lobbying by regulatees. Network industries remain dominated by a few large suppliers, who are now privately owned. They have both the capacity and incentives (in terms of pressures for higher profits and dividends and also rewards for senior managers) to lobby for favourable terms, notably looser price controls. Moreover, in the 2000s, major regulatees (especially former incumbent network operators) had large regulatory affairs departments – some staffed by as many as 60 people (Coen, 2005a). This is a large number relative to the total staff of IRAs. Privatisation has since been followed by internationalisation, so that several network companies are now ‘international champions’. They are large, can switch operations abroad, and – perhaps most importantly – have managed to build a reputation as deserving of support and protection. Examples include EDF (Electricité de France), France Télécom, Telecom Italia, Telefonica, and Deutsche Post. Despite privatisation, national governments, especially in continental Europe, have on several occasions acted to protect or promote these companies at the cost of promoting competition or punishing poor decisions. France has been at the forefront of such moves. One example is the French government’s rescue of France Télécom in 2002–3, when the telecommunications giant faced bankruptcy due to excess debts, in large measure caused by overseas acquisitions (such as Orange). Another has been the constant promotion of EDF in overseas markets both in Europe and elsewhere. Other states have followed similar paths; one example is Germany’s 2008 decision to impose a minimum wage on the postal sector, a decision that limited the ability of new entrants to undercut Deutsche Post.

While these cases involve high-level political manoeuvring that attracts media attention, countervailing actions that have tended to reduce capture risks can also be noted. Even if competition remains imperfect in network industries, monopolies have been replaced by several suppliers. Market shares of incumbents and concentration ratios indicate that in major network markets, incumbents have lost significant market share. Thus, for instance, even in fixed-line telephony – a field in which incumbents often have advantages – incumbents’ share of retail revenue in the fixed market declined from 66% in 2006 to 64.8% in 2007, and their volume of traffic had reached 63% by 2007 (European Commission, 2009).

The existence of several major suppliers is important in several ways. First, it reduces the risk of capture of regulators, as firms may have divergent interests and hence lobby for diverse ends, offsetting one another. Second, it helps ensure several sources of information, which helps regulators to compare suppliers. Third, the expansion of competition suggests that policymakers have been able to reduce the market power of large powerful national champions.

A further point is to distinguish between IRAs and national governments. While clear links exist between national champion firms and nations, recent research points to the links between such firms and IRAs. IRAs and regulatees develop mutual trust and dependence, especially in long-term relationships where reputation also plays a role (Coen, 2005b). In this context, regulatees have incentives to provide accurate information and cooperation. Indeed, there is a possibility of 'reverse' capture when firms' regulatory affairs departments build their own relationships with IRAs, and so become potentially vulnerable to regulator influence.

8.5 RISKS OF CAPTURE OF IRAS BY ELECTED POLITICIANS

After delegation, elected politicians retain important powers ('controls') over IRAs. Key powers may include appointing IRA heads, overturning decisions, and setting resources (Wood and Waterman, 1991; Huber and Shipan, 2002; Weingast and Moran, 1983). But having formal powers is different from using them. Indeed, there is a distinction to be drawn between formal independence and independence in practice, which can depend on such factors as informal relationships and the actions of third parties – especially since IRAs form part of a larger 'regulatory space' (Maggetti, 2007, 2009; Thatcher, 2005; Hancher and Moran, 1989; Scott, 2001).

This section looks at how formal controls may be used by politicians seeking to capture IRAs either for their own purposes ('politicisation') or for those of regulatees (who achieve 'indirect' capture by this means). It examines appointments and dismissals, budgets and the overturning of IRA decisions. It then looks at informal controls.

Almost all members of IRAs for network industries in Europe are appointed by elected politicians. Other selection methods – such as universal elections (used for some state regulators in the United States) or selection from particular groups, such as from among judges or representatives of labour or capital – are rare. Selection methods vary across countries. In Britain, regulators were traditionally appointed by government ministers; they now have to be selected through open procedures with advertisements (the Nolan procedures), though no parliamentary ratification is required (in contrast with many US appointments). Until around 2000, most IRAs were headed by a single director general; today, most have a board with executive and non-executive members, modelled on corporate boards. In continental Europe, IRA members are typically selected by several institutions – notably the government, the head of state and the legislature. Thus, for instance, the French postal and telecommunications regulator, ARCEP, is composed of a board of which the president and two members are appointed by the president of France, two by the president of the National Assembly, and a further two members by the president of the Sénat. In Italy the communications IRA AGCOM has a complex arrangement: eight of the nine members are elected by the two houses of parliament, with the president nominated by decree.

How have elected politicians used their appointment powers? Table 8.4 covers all market IRAs in four countries between 1990 and 2001. It examines politicisation, in the sense of linkages with political parties, using two criteria. One is the appointment of people who have either held an elected office or who, after serving on the IRA, go on to hold an elected office. The second is broader – namely, the appointment of individuals who have a publicly known affiliation to a political party.

Table 8.4 *Party activism and public affiliations of IRA members, 1990–2001*

| | Britain | France | Germany | Italy |
|---|--------------|----------------|---------------|----------------|
| % holding or standing for public office (local, national, or European) before or after IRA term | 3% (1 of 33) | 9% (4 of 46) | 15% (2 of 13) | 23% (6 of 26) |
| % publicly affiliated with party | 3% (1 of 33) | 46% (21 of 46) | 36% (5 of 13) | 77% (20 of 26) |

Note: Coverage – Britain: Members of all sectoral IRAs; only heads of OFT, Competition Commission, and predecessor Monopolies and Mergers Commission, SIB/FSA, and ITC; excludes temporary interim regulators. France: All members of sectoral IRAs; President of Conseil de la Concurrence, and COB. Germany: Presidents and vice presidents of Bundeskartellamt, Bundesaufsichtsamt für den Wertpapierhandel, and RegTP; one vice president of Bundeskartellamt excluded due to lack of information. Italy: All members of AGCOM, AEEG, and AGCM.

Source: Thatcher (2005), information derived from biographies, newspaper reports, and *Who's Who*.

The data suggest that party politicisation exists but is limited: only a minority of IRA members were once politicians, and with the exception of Italy, only a minority have publicly known party affiliations. More recent data suggest that the same aggregate pattern continues; thus, for instance, in the 2002–6 period 5.3% of French IRA members stood for elected office (4 out of 76) while only 0.8% (1 of 119) did so in Britain (Thatcher, 2007b).

Closer analysis reveals several interesting aspects of politicisation. One is that most party affiliations are found in IRAs for the media. Indeed, the reason for Italy's high percentage of known party affiliates is that almost all of AGCOM's members have a known affiliation to a political party, even if they are not former elected politicians. The same is true in several other countries. Thus for instance, the 2001–7 head of CSA, the French media IRA, was a prominent centrist politician, Dominique Baudis. Meanwhile, in Britain the chair of the communications regulator Ofcom during 2002–9 was a Labour Party peer, Lord Curry.

Despite the caveats, IRAs' overt politicisation seems limited. Why is this? One reason may be that elected politicians have established IRAs because they hope to enhance credible commitments (and so attract longer-term private sector funding), shift blame for difficult decisions, deal with international organisations

(notably the EU), and enhance the efficiency of regulation (see, for example, Gilardi, 2008). They have thus struck an ‘institutional bargain’ and, for their part, do not attempt to politicise the IRAs. In this, they may also be following the preferences of regulatee suppliers, who may seek predictability and/or may have already captured IRAs directly, and so would oppose party politicisation. Another reason may be that due to informal controls or an institutional set of incentives, IRAs have in fact followed the preferences of elected politicians, who therefore have not needed to politicise them. Yet another reason may be that politicisation need not involve political parties but relations with policymakers. Thus, for instance, many French IRA members have served as members of ministerial cabinets, while in Britain, several have been civil servants (for instance, Sir Ian Byatt, head of the water IRA Ofwat during the period 1989–2000, was a former Treasury official, while Lord Mogg, current head of Ofgem, was a civil servant and then an official in the European Commission). Thus IRA members may share policy preferences with their political appointers even if they are not party politicians or public supporters.

It is usually very difficult for elected politicians to dismiss IRA members, who by definition cannot be ejected at will by ministers. But even when such powers exist (for example, on grounds of incapacity) they have almost never been used. In some cases, elected politicians have the power to overturn IRA decisions. The most significant examples concern decisions about mergers and acquisitions by general competition authorities in Germany and in Britain until 2003. But even here, such powers were rarely used. Thus, for instance, between 1990 and 2000 only six decisions of the Bundeskartellamt were reversed by the minister, and these concerned all industries, not just networks.

The final formal control in the hands of elected politicians is the ability to alter the powers, institutional form, and even existence of IRAs. Since IRAs were first established, they have undergone several institutional changes. Some have involved mergers – for example, in Britain, the IRAs for electricity and for gas merged to create Ofgem. Indeed, at times, such changes have clearly involved politicisation. One example was the transfer of the French media regulator’s power to nominate the head of the public broadcaster France Télévision to the president in 2009. But most changes have seen an expansion of IRA competencies, notably through the addition of responsibilities for new sectors. Thus, for instance, responsibility for railways was given to the German networks regulator, the Bundesnetzagentur in 2008, while postal services were put under the oversight of the French telecommunications IRA in 2005. This may be of course a ‘reward’ for IRA compliance, but it is far from overt politicisation.

In addition to formal controls, politicians may try to control network IRAs through informal influence or other powers. This is by its nature often difficult to assess, but three forms of influence are examined here. One is the ‘persuasion’ of IRA members to resign ‘voluntarily’ from their posts – for instance, by making their lives difficult and/or by the offer of other posts and incentives. In practice, however, such resignations are rare and most IRA members serve their full term. Thus, for instance, an analysis of IRAs between 1990 and 2001 shows

the following percentages of resignations (regardless of motive): in Britain, 15%; France, 13%; Germany, 17%; and Italy, 19% (Thatcher, 2005). Indeed, IRA members typically serve 4–5 years, a considerably longer period than most government ministers remain in their posts, giving IRAs important advantages in terms of expertise and the ability to outlive and outwait political interests.

Another informal means of political influence over IRAs can be through inciting public pressure, for instance through public hearings before legislative committees or legislative enquiries. Legislatures have certainly been concerned about the rise of IRAs, with fears that they reduce legislative power and that IRAs are unaccountable. There have been several enquiries, both into IRAs generally and into specific IRAs. But legislature enquiries have rarely recommended that IRAs be abolished or their powers reduced. On the contrary, they have often suggested greater links between IRAs and legislatures and enhanced public accountability, measures that could weaken the control of governments (for example, *Assemblée Nationale et Sénat*, 2006; *House of Lords*, 2007).

The final and perhaps most important potential source of politicisation and especially indirect capture are alliances between regulatees and elected politicians. Such alliances can involve the use of different government instruments. One is the sale of state holdings, which can reshape a market and greatly affect the regulatory power of IRAs. If the government ensures several strong competing suppliers, the IRA has a greater chance of being an effective regulator. This is because several suppliers offer multiple sources of information (good for purposes of comparison), and may have diverging interests and so not constitute a centralised lobbying body. One dominant supplier, allowed a monopoly position by privatisation policy or otherwise, mitigates such benefits and holds sway over weaker competitors. The ownership of suppliers also matters; if the government sells its shares in suppliers to domestic firms, this gives them considerable political influence, whereas if overseas buyers are permitted, it is easier for IRAs to take decisions opposed by suppliers.

A comparison of electricity in Britain and France illustrates the impacts of the sale of state shareholdings. In Britain the state-owned incumbent, the CEBG, was broken up into several companies that were then sold. In addition, several suppliers were bought by overseas firms. As a result, the energy IRA Ofgem has been able to compare performance across different companies. Moreover, there has been little political support for suppliers; on the contrary, stricter controls (for example, over prices) and greater competition and consumer choice have been welcomed by the government and appear popular with the public. In contrast, in France, EDF remains the dominant electricity supplier and continues to be majority state owned. The government has played an active part in structuring the electricity market, notably by leading the creation of the alternative energy supplier, Suez-GDF, a largely French company created from the merger of the state-owned GDF with Suez and in which the state retains a large minority shareholding. The IRA faces dominant domestically owned firms with strong political support as well as links to the policymaking elite. In addition, firms such as EDF and GDF are regarded as national and indeed international champions

with a good reputation and public support at home, whose development needs to be assured as part of French economic policy. In these circumstances, it is not surprising that regulation remains highly politicised, with many agreements being negotiated between the government and the (majority or minority state-owned) dominant suppliers.

We should also note that governments do not delegate all their powers to IRAs. Thus, often governments are responsible for licensing, especially when the number of licences is limited or when network infrastructure requires authorisation. Sometimes they also set tariffs or else assign responsibility for providing ‘social’ tariffs – namely, prices for certain categories of users. Governments also set standards and may allocate subsidies, grants and public orders. These powers serve to structure the environment in which IRAs operate or indeed to undermine regulatory efforts.

Both telecommunications and energy offer good examples of these activities. When third generation (3G) mobile licences were allocated, the method of allocation and final decisions were mostly taken by governments. In some countries, governments chose ascending auctions, which left them little discretion; sometimes they actively encouraged entrants. Thus, for instance, Germany allowed bidders for blocks of two or more frequencies, resulting in six licences being allocated, allowing two new entrants; Britain reserved one licence (the best thanks to having the widest bandwidth) for a new entrant. In contrast, France allocated licences through a ‘beauty contest’, following a vigorous debate in which incumbents pressed for protection and obtained the support of the IRA and eventually the government (Dasgupta, 2009). The outcome was that only two of the three incumbents bid for licences. The third was later allocated a licence, but when a fourth licence was mooted, the government dragged its feet as incumbents sought to protect their position.

The politicisation of IRAs can take many forms, some of which are difficult to detect. The analysis suggests that overt use of formal controls has been limited in Europe. But informal forms of politicisation may be more common, in part because they are less visible. These may be especially significant if elected politicians act in alliance with large domestic suppliers.

8.6 CONCLUSION

Until the 1980s and 1990s, most network industries in Europe were composed of state-owned monopoly suppliers of final services. Many formal powers lay with governments, and there were few sectoral IRAs. Now there are IRAs for many network industries across Europe, as governments have created sector-specific agencies and delegated powers to them. In addition, network industries face regulation from IRAs overseeing general competition policy. The spread of IRAs raises two interlinked questions: What are the risks of regulatory capture? How has the creation of IRAs altered these risks?

The chapter has analysed two forms of regulatory capture: direct and indirect. Direct capture is by regulated firms and elected politicians, while indirect

capture is by politicians acting in the interests of regulated firms. The starting point for our analysis is the existing literature on IRA capture (mostly developed in the United States) and principal–agent work on autonomy and the control of agencies.

The chapter shows that in the three continental European countries, the ‘revolving door’ between IRAs and privately owned regulated firms remains, for the most part, closed: most IRA members are drawn from the public sector – often national elites such as the *grands corps* in France or academia in Italy – and return to it. The exception is Britain, where many IRA members come from and then return to the private sector. But to assume that this increases the risk of capture is open to question for two reasons: (i) several IRA members have links with publicly owned suppliers, having worked for them or in relevant ministries; and (ii) experience working in the sector offers valuable knowledge and so may, in fact, reduce the risk of capture.

Instead, direct capture may be in large part due to the limited resources of IRAs – in terms of both staffing and spending – relative to their tasks and to regulatees. Limited resources leave them vulnerable to capture through asymmetries of information and expertise, as well as lobbying, especially when one or two suppliers are dominant.

Indeed, the question of politicisation is a crucial one for Europe, with its strong tradition of national industrial policies and promotion of ‘national champions’. The chapter suggests that party politicisation through the appointment of former politicians or via known party sympathisers is limited except among media regulators. The use of other formal controls – such as dismissal, the overturning of IRA decisions, or even the institutional reform of IRAs to reduce their powers – also seems limited.

Instead, less formal capture by alliances seems more prevalent. Thus, for instance, regulators without declared political affiliations but with strong links to the policymaking elite might pose considerable risk. But it seems that the most significant risk of capture arises when governments are allied with powerful domestically based ‘international champions’. Here IRAs are at risk from the combination of these two powerful actors. Although the EU may provide some help, the risks are great in the face of strong alliances.

How has the creation of IRAs affected risks of regulatory capture? On the one hand, the pressures to capture regulators may have increased. The privatisation of suppliers has increased the incentives for their managers to seek very high profits. Moreover, IRAs have helped ‘depoliticise’ network regulation, taking decisionmaking power away from the traditional legislative and executive arenas. Regulatory decisions are often highly technical, especially as they involve the regulation of competition rather than visible outcomes such as retail prices. Even when retail prices are covered, IRAs frequently explain them in economic and technical terms such as costs. While residential customers are dispersed, privatised suppliers often form small oligopolies and are in a powerful position to lobby, especially over high technical decisions taken over by IRAs.

On the other hand, strong capture risks existed under state-owned monopoly suppliers, even if those suppliers sought investment programmes and protection from competition more than profits. They too lobbied and enjoyed strong links with governments, as well as monopoly advantages such as control over substantial information. In contrast, IRAs often have clear duties to promote competition. They regulate legally liberalised markets and operate under extensive EC regulation for new European networks. They enjoy several sources of information and can compare suppliers since monopolies have been replaced with, at worst, duopolies or oligopolies. They can also build expertise thanks to lengthy service terms and specialisation.

In conclusion, risks of capture persist, although perhaps more from informal processes and alliances than from the use of formal powers. But such risks are inevitable when competition is limited (as is usually the case with network industries). Any analysis must start from this understanding and look at how these risks have changed over time rather than assume they are zero.

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The Governance of Infrastructure Regulation: An Economist's View

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Network industries – electricity, gas, road, telecommunications and private water supply – need regulation in one way or the other. Very often only one network operates in a given market. The expenses of developing a second network are substantial, and the first network often fully satisfies the demand for services. Counting on market forces to ensure better sector performance – in terms of prices, quality and access for consumers – usually implies several firms offering services in the same network. Since there are limits to the number of suppliers in a network, competition has often been for the market, rather than in the market. Even if it is technically possible for a market to set prices, the price-setting process often fails to secure fair and undisputed competition between suppliers. There are many reasons for this – among them political support for price regulation, subsidies for consumers and suppliers, manipulation of supply to push prices up, and a dearth of firms in the market. Benitez and Estache (2005) highlight political resistance to reducing market concentration and scepticism toward private solutions. Despite the well-established understanding of the benefits of market forces in the countries of the OECD, Benitez and Estache find Europe to be one of the regions where market concentration in network sectors (particularly electricity) is most intense.

Economists have studied the challenges and offered a steady stream of alternatives for governance of sectors in which network industries operate. Economic results have indeed had a huge influence on network sector regulation. How can it then be that welfare-promoting competition is so difficult, while surplus rents for firms and weak sector performance continue? Have economists failed to deliver practical policy recommendations? Or could it be that policy recommendations are not implemented as intended and thus fail to deliver results?

9.1 ECONOMICS, POLICY IMPLEMENTATION, AND THE ECONOMICS OF POLICY CHOICE

Advisers in this field, particularly non-economists, suggest that economists' policy recommendations often are not implemented because of a failure or limitation of economics itself. Clearly, the insights required to deliver a sharp economic argument will usually be developed through analytical studies of a well-defined mechanism under a given set of underlying assumptions. These assumptions may fit well with the realities of the real world, although they always simplify empirical reality. Hence, while simplifications, analyses and specialisation in economics make it easier for economists to understand economics, they are also the factors that make it more difficult to translate economic results into policy design – where the complexities in all their colours and shapes have to be taken into account.

Many reasons for suboptimal performance in network industries have been identified, but policy makers may not be convinced by a recommended economic solution if they believe that important determinants behind the challenge have not been convincingly explored. Not only are economic analyses based on simplifications of the real world, they are also fragmented by the specialisation in economics.

Different fields of the economic literature may explain different facets of the same problem, such as market design, regulation of prices and services, corporate governance, foreign direct investment, and openness to trade, as well as rent seeking and political economy (Estache, 2006; Estache and Wren-Lewis, 2009). We cannot expect policymakers to have a full overview of the different branches of economics and their solutions. Hence, until we – the economists – can present a holistic theory about what works we should not be surprised if our insights are not readily adopted.

The standoff between economists and policymakers is especially pertinent in the regulation of network industries, where policy choice and implementation are very much a question of political space, obstacles at the sector level, and the capacity of institutions. We may well seek to implement economic results in policy design to secure the welfare effects of market forces when possible – and this is also what economics has done over the past decades. But implementation will depend on *the economics of policy choice*. In this chapter we argue that economists will have more to offer to the policy debate surrounding network industries if salient aspects of the economics of policy implementation are taken more fully into account in economic research on regulation and governance of these industries.

Although there are many ways to improve our understanding of the failure of network industry governance, this chapter directs attention to three areas in particular: private agendas in politics, the details of specific deals and players, and legal frameworks. These aspects will be discussed in Sections 9.2 through 9.5, following which the discussion of economics and its influence on policy design will be revisited in Section 9.6. The chapter begins with some perspectives

on governance difficulties in network industries and undue influence for market benefit.

9.2 EXERTING INFLUENCE FOR MARKET BENEFIT IN NETWORK INDUSTRIES

The characteristics of network industries make them subject to government ownership, intervention and regulation. Their services are essential in any developed society, and their provision is often considered a government responsibility, even if the utilities themselves are privately owned. Economy of scale has made it difficult to draw benefits from competition, as discussed, and this has justified regulation of prices, while the capital intensity of the needed infrastructure often requires government investment and guarantees. The values at stake are large, the contracts and financial set-up often complex, and there is a role for the government to make sure that concessions and procurement are carried out in accordance with the interests of society, rather than biased toward the interests of one party or another.

The risk of ending up with deals that favour narrow interests is higher when there are unclear or multiple objectives behind sector governance. If an objective is unclear, it becomes difficult to assess government performance in the various deals and decisions that are up for negotiation. Alternative choices can all be defended since there will usually be *some* social concern that can be used to defend the final decision. As a result, the decisions – and thus also the performance of the sectors – will easily be subject to unbalanced bargaining powers in negotiations, while corruption and other forms of influence may prevent the function of market mechanisms.

Regulatory biases that benefit some players in the sector are often referred to as regulatory capture.¹²⁴ Electricity supply in Europe, for example, is said to be characterised by artificial bottlenecks in transmission, inflexible long-term contracts, and purchase obligations in supply contracts with industrial consumers – none of which can be said to benefit society as a whole – while EC antitrust investigations have resulted in reactions at the corporate level (EC Sector Inquiry, 2007). Continued challenges of this sort, where regulators fail to secure welfare through the use of market forces while players in the private sector benefit, are rightly perceived as a symptom of regulatory capture.

Regulatory decisions can be captured in other ways too, however. For example, politicians may be captured by large consumer groups, preventing prices from achieving cost-recovery. Regulators that are supposed to work independently can be captured by the political regime, causing their decisions to be overturned or their budgetary allocations to depend on how well they have adapted to the views of the government.

Different forms of capture are frequent targets for economic analysis and policy recommendations, yet they have proved difficult to combat. The reason is not necessarily poor advice by economists. Rather, obstacles to the implementation

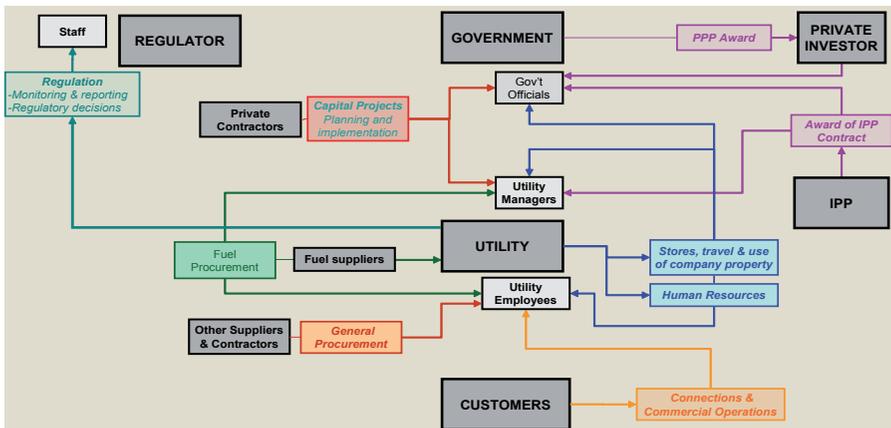
¹²⁴ See Dal Bó (2006) for a review of the literature.

of good proposals must be understood in light of the underlying conditions and organisation of societies, including governments’ monopoly on authority (which most of us support), incumbent politicians’ adaptation to the preference of large voter groups (an essential element of democracy), the need for private capital (to hold public spending down), and capacity limits in relevant institutions (that make it impossible to implement advice at a given point in time). Removing these obstacles to policy implementation may not only be difficult but it may also imply huge trade-offs.

Understanding fully how players in the network industries can influence the terms under which they operate demands an appreciation of the complexities of each industry. As an example, Figure 9.1 illustrates the many decision units and players involved in electricity supply. Some decision nodes in the illustration are more relevant than others to unfair competition, including (from the left) regulatory decisions, the planning and implementation of capital projects, the award of concessions, and the details of risk allocation.

The illustration in Figure 9.1 also implies that players in network industries have multiple channels through which to influence their terms. As suggested in Table 9.1, those channels include three broad categories: (i) taking direct action to affect competition (something usually regulated by competition law); (ii) reducing the cost side of the profit function – including transaction costs, access to credit and favourable outcomes of court decisions; and (iii) exerting political influence to have regulatory decisions diluted or reversed, to alter the legal framework or its interpretation, or to enlist diplomatic support to gain benefits in procurement processes in foreign markets.

Figure 9.1 *Industry structure, electricity supply*



Source: Diagram prepared by Castalia, a US-based consultancy, for the World Bank.

Table 9.1 *Three channels of influence for players in network industry markets*

| Reducing competition | Lowering costs | Exerting political influence |
|-----------------------------------|-------------------------------|--|
| Cartel/market sharing | Taxation | Tender criteria / direct awards |
| Mergers /acquisitions | Vertical cooperation/access | Ad hoc interference in competition control |
| Entry barriers | Access to credit | Regulatory decisions kept subject to discretionary judgement |
| Single-source supplier agreements | Biased enforcement of the law | Diplomatic pressure for award of contracts |

Source: Søreide (2007a).

Exerting influence to gain market power and increase monopoly rents has been studied in several branches of economics, among them industrial organisation, regulation, rent-seeking, agency problems and corruption.¹²⁵ But the areas where economic research has had the most impact on policy choices and debate are competition law and the design of regulatory institutions.

Influence may be exerted in ways that are legal and acceptable, or in ways that are illegal or otherwise unacceptable (such as corruption). It may be argued that the difficulties of distinguishing between what is legal or not should lead us to concentrate on procompetition mechanisms, since competition tends to dampen both the exercise and the effect of influence, legal or otherwise. This is a valid argument – and also the view pursued by the World Trade Organization (WTO), for example, which focuses on procurement rules rather than anticorruption. Regardless of the different forms of influence, there are features that justify attention in any effort to get procompetition mechanisms implemented and enforced.

Whether the exercise of influence is acceptable or unacceptable is relevant in this context, particularly when there is suspicion of governance failure. In cases of corruption, both parties benefit strongly from a deal. The decisionmaker typically benefits in his or her personal (rather than official) sphere, with bribes representing compensation for the risk and inconvenience of deviating from the goals of the institution that he or she represents. As long as the deal can be hidden, the players can achieve more through corruption than through other forms of influence where the element of compensation for the decision maker is less present. The element of compensation (bribes) for biased policy choices can therefore undermine attempts to improve welfare through procompetition structures.¹²⁶

Perception-based surveys and indices that mirror the characteristics of network industries suggest that corruption may affect the performance of network industries in Europe. That suggestion is supported by cases brought to court. Corruption has been reported in all the network industries and in most

¹²⁵ See this chapter's references for works on each of these approaches.

¹²⁶ For more discussion, see Estache and Wren-Lewis (2011), Auriol and Straub (2011), Harstad and Svensson (2006), Søreide (2009)

European countries, and the OECD and European Union (EU) complain that ‘member states fail to implement EU legislation to combat corruption in the private sector’. Siemens, a big player in telecoms and power generation, was heavily penalised for corruption (£540 million), a case that sapped confidence in the capacity of procurement procedures to deliver cost-efficient contracts. At the same time, competition in gas delivery in Europe is the subject of ‘the Great Pipeline Opera’, a political game involving gas supplies to Europe, in which powerful individuals appear to benefit from their undue influence.¹²⁷

While speculations of corruption are common in the media, it can be difficult to tell whether the exercise of influence or continued market failure reflect the presence of corruption. Without information about the details of a specific case involving one or more of the varied practices listed in Figure 9.2, it is difficult to say for certain that what appears to be unfair or suboptimal competition is the result of corruption. However, if we focus on welfare implications – subordinating sanctions for individuals to sector performance – we may not need to draw that distinction in arguments about how sector performance can be strengthened.

Figure 9.2 *Grey zones of influence*

| LEGAL | | | | LEGAL GREYZONES | | | | ILLEGAL |
|--|--|--|--|-----------------|--|--|--|---------|
| <p>Honest and professional business conduct</p> <p>Ordinary marketing</p> <p>Marketing targeted at specific individuals: exclusive excursions, sports tickets, gourmet evenings, etc.</p> <p>Unsolicited proposals, with all details of an unplanned project prepared</p> <p>Middlemen and agents, ‘personal relationship is what counts’</p> <p>Gifts to political parties – by condition of a certain benefit</p> <p>Quid pro quos – a way of covering corruption?</p> <p>‘Facilitation payments’ – ‘to get the procedures going’</p> <p>Bargaining on opportunities for reconcessioning (profitable solutions for the firm)</p> <p>Violations of rules of communication (as if they were not important)</p> <p>Persuade politicians at home to put pressure on local govms. (difficult to prosecute)</p> <p>Acquire secret information about evaluation, use of ‘fronts’</p> <p>Misuse of ‘facilitation payments’ (makes corruption ‘less illegal’)</p> <p>Expensive gifts to people involved in the tender procedure</p> <p>Buy secret information about competitors’ bids</p> <p>Local partnership with relatives of people with authority</p> <p>Bribes to individuals with influence on the procedure</p> | | | | | | | | |

Source: Sørreide (2007b).

127 For the OECD and EU statement, see EU press release with reference IP/07/848 2007 or website: <http://europa.eu/rapid/pressReleasesAction.do?reference=IP/07/848&format=HTML&aged=0&language=EN&guiLanguage=no>. The monthly magazine *Foreign Policy*, October 2009, describes the political competition between Turkey and Russia for gas delivery to the EU from alternative sources. For explanations and examples of corruption in utilities, see, among others, Estache *et al* (2009), Auriol (2009), Estache and Wren-Lewis (2009, 2011), and Kenny and Sørreide (2008).

Whether or not criminal actions are present or can be proven, the cases of possible undue influence that are debated in the media can enrich the research process. A given case may tell us how a firm in an oligopolistic network market can influence its terms or show us how and why regulation, contract details, and award procedures fail to secure fair competition. A case may raise questions about how frequently similar behaviour occurs: Did it reach the media by coincidence? Is it the tip of an iceberg? The case may remind us that the scope and impact of rent-seeking and capture tendencies on network industry performance are unknown. Consumers rightly start worrying if they begin paying too much for services or if service quality falls. In such cases, it is reasonable to assume that corruption, if it really is a problem, will slow down reform initiatives to secure fair competition in network industries. And indeed, the cases debated in the media may help us understand why the implementation of procompetition mechanisms is difficult.

9.3 SECTOR POLITICS AND SECTOR-LEVEL CONSEQUENCES

Since the mid-1990s we have seen increasing attention to the role of governance, the quality of institutions and political accountability. The economic literature has emphasised the role of regulatory capacity for sector performance and underscored the importance of regulatory independence from politics (Laffont and Tirole, 1994; Bliss and Di Tella, 1997; Ades and Di Tella, 1999; and Estache and Rossi, 2005). When it comes to *political performance* as a determinant of the performance of the network industry sector, however, the economics literature is less profuse.¹²⁸ Several studies, among them Kirkpatrick *et al* (2006), suggest that political instability adversely affects foreign direct investment (FDI), while Gasmi *et al* (2009) point to weak political accountability as a determinant of sector performance in utilities. There are nevertheless many unanswered questions about how political performance affects the regulation of network industries. Social science and the political economy literature tell us about the importance of democracy, checks and balances, and separation of powers. But when it comes to the optimal sector-level response to weak or unpredictable performance at the political level, the basis for policy advice is very weak (Benitez *et al*, 2010).

A first step toward a better understanding of the balance between regulation and political accountability would be to identify the sector-level consequences of weak political performance. Political performance can be weak in different ways, of course, and for different reasons. But when a form of governance failure is allowed to continue – for example, in the form of unfair competition in network industries – we must entertain the possibility that the causes may have something to do with private agendas at the political level. Politicians and civil servants responsible for overseeing the sector may have personal reasons for deviating

¹²⁸ See Laffont (2005) for discussion of the shortcomings of theory in developing country contexts. Cruz and Keefer (2010) discuss the problem of politicians who do not really care about sector performance, but use their authority for various forms of private benefit. The problem is reviewed in Benitez *et al* (2010).

from what is generally perceived to be the more welfare-enhancing track. They may secure opportunities to obtain positions for themselves or their allies in the sector at a later stage. They may seek to secure votes from consumer groups or party contributions from the industry. Their friends' or their own ownership shares in the sector may gain value as a result of a certain decision. They may be ignorant about how the sector should be governed and lack the will to find out. They may even have received bribes from the sector, but clearly – despite the attention to corruption over the last decade – this is certainly not the only private agenda that can make politicians deviate from the welfare-enhancing path.

Among the private agendas that politicians may entertain are (i) getting re-elected through populist appeals, (ii) securing political power through patronage-based networks, (iii) feathering their nest by showing themselves to be friends of industry, and (iv) enriching themselves directly through corruption. Table 9.2 is a matrix that cross-references each of those agendas with sectoral outcomes at various levels (market structure, service provision, and so on). Many of the outcomes reported in the cells have not been studied empirically but deserve scrutiny by economists.

As we gain a better understanding of correlations between weaknesses in sector politics and sector-level consequences, such as those reported in the cells of Table 9.2, we will also become better equipped to suggest practical, second-best solutions. Although economists have the tools to make important contributions in this area, multidisciplinary approaches will strengthen their work as that work is converted into policy recommendations.

Table 9.2 Sector-level indicators of private agendas at the political level

| Regulatory focus | | Agenda of political decision maker | |
|---|--|--|--|
| | To boost chances to get re-elected through populist (democratic) stances | Securing political power through patronage-based (undemocratic) networks | To ingratiate him or herself to industry so as to obtain future rewards (revolving door) |
| Strategic planning of expansion and maintenance of access | Highly visible investments | Disdain for planning | Emphasis on infrastructure investments over other welfare |
| | Low maintenance Favours for certain constituencies ('pork barrel') Promises of coverage extensions but not delivered | Threats of expropriation Expanded coverage not sufficiently linked to needs assessments | Disparities between budgets and spending Cost overruns Weak incentive to institutionalise accountable supervision |
| Market structure | Reform efforts keyed to changes in price and employment | Postponement of reforms Protection of existing firms Sudden difficulty in attracting private capital (reduced FDI) | Privatisation in ways that allow some players too much market power |
| Service provision | Veiled threats unless campaign contributions are made Push for contract renegotiation as election is approaching | Management contracts or the like. Allocation of contracts manipulated for patronage purposes | Manipulation of procurement toward specific supplier (that would be unlikely win in fair competition) Local-content requirements misused to encourage bribery 'Leakage' from subsidy funds |
| Pricing and subsidies | Postponement of tariff revisions Discretionary consumption subsidies | Inconsistencies between pricing/ subsidy policies and actual costs | Generous producer subsidies Producer-friendly tax regime |
| Oversight and regulation | Relaxation of oversight during election cycle Restrictions on access to financial data of state-owned enterprises | Restrictions on access to information Disdain for data | Failure to take action when targets are not met Inconsistencies or disparities in financial data |

Source: Benitez et al (2010).

9.4 CHARACTERISTICS OF DEALS AND POTENTIALLY CORRUPT INFLUENCES

The network industries are more exposed than other sectors to private political agendas (Kenny and Sørreide, 2008). Competition in network industries is seldom subjected to the same degree of antitrust control as in other industries.¹²⁹ Governments play a significant role in construction, supply and regulation of utilities. Regulatory decisions and the awards of concessions are often based on non-transparent decision processes, which provide significant latitude to officials, and corruption can easily be hidden behind discretionary bureaucratic judgments or populist political decisions.

As discussed by Kenny and Sørreide (2008: 6–8), infrastructure services vary in the typical mixture of public and private roles (see Tables 9.3 and 9.4). At one end of the spectrum, mobile telecommunications services are provided privately and under a competitive regime in the vast majority of countries worldwide. There is comparatively little pressure to provide services below cost or to subsidise access. While some telecommunications subsectors remain in government hands in many countries, and access subsidies have been created in several countries, the predominant roles of government in the sector are to (i) distribute rights to the available spectrum and (ii) ensure fair competition among providers. This suggests that the largest opportunities for rent extraction involve the process of issuing spectrum licences and the technically complex process of setting interconnection prices (where no single approach is universally accepted). In addition, in countries that retain public ownership of the fixed (landline-based) operator or limited rights to international communications, the processes of privatisation and licence issuance in these subsectors also provide opportunities to extract rents. At the other extreme, very few water and sanitation firms worldwide are operated under full private ownership, with concession and management models predominant.

The complexity of policy choice, combined with the multiplicity of policy goals, suggests that important deals in network industries are vulnerable to influence or unbalanced bargaining power. The procurement literature may guide us in choosing procedures for securing the best combination of price and quality.¹³⁰ However, the unique characteristics of each industry, and the characteristics of network industries generally, suggest difficulties in preventing undue influence through procedures alone. Auction theory may tell us much about contract design and the compatibility of incentives, but little about firms' influence on the choice of an auction method. Are recommendations from that theory understood and implemented? Without a well-implemented auction system firms may achieve overly beneficial terms through their bilateral negotiations with government

129 See Auriol and Straub (2011), Celentani and Ganuzab (2002) and Comte *et al* (2005) on corruption and collusion in procurement. Rose-Ackerman (1978), Shleifer and Vishny (1993), Ades and Di Tella (1999) and Piga (2011) all suggest a greater risk of corruption in environments of limited competition.

130 See Estache and Iimi (2009) for an overview.

representatives, thereby obtaining higher rents from their operations than what a welfare-oriented competitive outcome would produce.

Although the effective influence of contractual terms often will be reflected in prices and service quality,¹³¹ we cannot assume that contract terms have been subject to corrupt influences just because the contract deviates from economic recommendations. Kenny and Musatova (2011) investigate indicators of undue influence in World Bank construction projects, most of them in the water sector. On average they find two to three deviations from procedures and recommendations, referred to as 'red flags,' in every project. They conclude that not all projects have been exposed to corruption. Rather, these (very often) large projects are unique and complex in different ways that often justify some deviation from standard procedures.

Consequently, deviation from standard procedures and 'red flags' should not automatically be interpreted as signals of undue influence or corruption. There may be good reasons for accepting a utility provider's request for beneficial terms, such as a lower level of risk than what is common or a financing package that appears overly generous. Attracting private capital would be nearly impossible in some developing countries, for example, unless the terms were more than usually industry friendly. So how can we distinguish terms that are acceptable in a given context from those that result from undue influence and that will produce unfair competition and fail to achieve optimal welfare effects? What symptoms should we look for in a given context? What signs would justify renegotiation?

On these questions, economists have contributed important empirical and theoretical analyses over the last decade, although many questions remain to be answered. A problem for practical implication, however, is that sector regulation, on the one hand, and public finance and public sector reform, on the other, have developed as two separate areas of research – and perhaps have not yet been sufficiently integrated. Research results on sector regulation should now be reviewed and refined in light of our understanding of political incentive problems as well as law and economics. A key in these attempts will be knowledge about important characteristics of the industries.

Tables 9.3 and 9.4 structure some of the industry characteristics that can be decisive in understanding variations in unfair competition. Table 9.3 details various opportunities for effective competition in the different network industries – and thus also various opportunities for firms to accumulate rents. Table 9.4 reveals how risk and responsibilities are allocated differently in different types of contract. Whether the characteristics of contracts and risk allocation are the result of undue influence (*ex ante*) or if they are structures that tend to provide better or worse opportunities (*ex post*) for unfair generation of rents is an important question that is rarely asked and even more rarely answered.

131 For discussion of determinants of sector performance and corruption, see Estache (2006), Estache *et al* (2009) and Seim and Sørøide (2009)

Table 9.3 *Sector characteristics, contracting, and rents: Opportunities for effective competition in network industries*

| | Electricity production | Electricity distribution | Toll roads | Water and sanitation | Telecoms |
|---|--|--|--|--|--|
| Economic characteristics | Rival, public good elements (environment) | Rival, network economies, natural monopoly | Non-rival, public good elements (land), natural monopoly | Rival, public good elements (health), network economies), natural monopoly | Rival, network economies |
| Political complexity of cost recovery | Medium | Medium | Medium | High | Low |
| Common contractual arrangements for private provision | Licence/service contract, concession, lease | Management contract, lease, concession | Concession | Management contract, lease, concession | Licence |
| Opportunities for rent extraction | Limiting competition, price setting, guarantees/investment support, environmental and pricing regulation | Price setting, guarantees/investment support, pricing regulation | Price setting, guarantees/investment support, pricing regulation | Price setting, guarantees/investment support, pricing and quality regulation | Price setting, spectrum licence issuance/terms |

Source: Kenny and Søreide (2008).

Table 9.4 *Allocation of responsibilities and risks in different contract types*

| | Management contract | Leasing contract | Concession contract | Private licensed provision | Private licensed (service) provision |
|--|---------------------|------------------|---------------------|----------------------------|--------------------------------------|
| Investment planning | Government | Negotiated | Negotiated | Private | Private |
| Capital financing | Government | Government | Private | Private | Private |
| Bearer of commercial risk | Mainly government | Mainly private | Private | Private | Private |
| Guarantee (supply price, political risk) | n.a. | n.a. | Frequent | No | Frequent |

Notes: n.a. = Not applicable.

Source: Kenny and Søreide (2008).

Just as we must better understand the specifics of each deal to accurately assess the risk of influence as an obstacle to policy implementation, we also must learn more about the characteristics that may lead some players to exploit regulatory weaknesses or influence their terms unduly. In response to more attention to policy challenges, and armed with better data, researchers have stepped up their investigations of firm-specific determinants of undue influence.

A comprehensive study of business-related corruption in transition economies by Hellman *et al* (2000) found solid evidence of patterns of bribery in bypassing regulation and obtaining government contracts. For utilities specifically, Clarke and Xu (2004) study how corruption seems to depend on ownership, profitability, and size in the relationship, not only in their relationship with governments but also vis-à-vis consumers – industry and individuals. Patterns of bribery were found to correlate with macroeconomic and political weaknesses that seem to affect the overall level of corruption in society. In line with the results reported by Clarke and Xu (2002), Svensson (2003), in a study of corruption in Uganda, found firms with market power and those without good exit opportunities to be generally more exposed to demands for bribes. In a survey of Norwegian firms with international FDI and trade operations, Søreide (2007b) found that firms will not leave a market even when they know that they have lost contracts because of corruption. Rather than complain they accept the circumstances in the given market.¹³² Results from an empirical study by Batra *et al* (2003) show that corruption is a far more common business challenge in countries with few obstacles to cartel formation (correlation discussed in Søreide, 2008). Adjusting to local business practices by participating in corruption may not only provide a way to enter a given market, but entering may also be more rewarding if firms can collude without much resistance.

Martin *et al* (2007) analyse determinants of bribery at the national and sector level in light of cultural factors such as individualistic or collectivistic (socialist) ideas and the degree of achievement orientation. They found that the propensity to bribe depends significantly on cultural values. Achievement orientation in an individualistic society seemed to promote bribery, while ‘collectivism’ had the opposite effect.

All empirical studies of bribery are hampered, however, by the lack of a reliable indicator of bribery. Theoretical analyses of incentives are thus important to help explain the mechanisms at play – see Bardhan (1997), Aidt (2003), and Rose-Ackerman (1978, 1999), among others. For the study of mechanisms of bribery we need to develop more precise distinctions between (i) profit-based bribery before award (strong market position wins), (ii) surplus-based bribery that can be offered after award (based on reductions in costs, quality, or performance), and (iii) price-inflated corruption, where the firm that is willing to be involved in a corrupt scheme wins. Studies of corruption have often included bribes as an expense in the briber's profit function – which is at best an oversimplification.

132 For an analysis of why the firms prefer not to speak out when victimised by corruption, see Søreide (2008).

To better understand the challenges to policy implementation we need sharper insights into different categories of bribery-promoting factors based on empirical and theoretical studies. Those factors must include governance factors (political and legal institutions, culture and history, development level, non-renewable natural resource dependency, income differences, and so on), sector-specific determinants (regulation, market design, entry opportunities, and so on), and firm-specific determinants (size and organisation, ownership structure, internal incentive schemes, headquarters location, and so on). As we learn more about the characteristics of the players involved it becomes easier to understand resistance to reform and to explain why some firms are more or less likely to abuse their ability to influence their market terms, as well as to understand the relative effectiveness of different policy targets.

9.5 LEGAL FRAMEWORK

The legal framework for competition and trade has often been taken as a given by economists, even though recommendations in economics often require legal amendments. The factors that determine how well different parts of a legal framework function to promote network sector competition may require a perspective informed by knowledge of both law and economics. To make the legal framework more effective in supporting implementation, legal expertise is needed to see how different sets of rules operate in combination. Economists might contribute to legal analysis by explaining the incentives of law enforcers versus players in the market.

9.5.1 The legal framework for network industries

The legal framework established to secure competition consists of several elements. In line with Table 9.1, rules have been adopted to address the different categories of undue influence or collusion for market benefit. Procurement rules are introduced and frequently reformed to promote fair treatment of candidates for a contract. Competition law is central in mergers, acquisitions, tacit collusion, unfair competition and cartel cases. The cost side of network industries in terms of supplier markets is also covered by competition law, given its multisectoral character. Laws describe how various institutions are expected to control production safety and environmental standards to prevent firms from taking profitable shortcuts with potentially harmful externalities for the society at large. Illegal influence for market benefit will usually be covered by laws that criminalise corruption and by rules on employer liability. Lenience programmes and whistle-blower protections are elements introduced to promote disclosure of illegal acts and may also have preventive effects. For regulatory decisions there are sector-regulation laws, ethical guidelines, and anticorruption rules, as well as requirements on impartiality that serve to prevent biased decisionmaking. Audit routines established by law – complemented by various sophisticated controls – may uncover fraud and corruption. The political arena is regulated

by constitutional law, registration requirements for lobbyists, and requirements related to impartiality. In addition, the political arena is scrutinised not only by auditors, but also by the media and watchdog groups. Members of politicians' staffs may blow the whistle if political decisions seem to have been steered by undue influence.

These elements of a legal framework are common in the OECD countries. Their existence may be taken for granted, but how well they function matters in important ways for fair competition in network industries – and their effectiveness may vary significantly across countries. What explains the variation? This section considers briefly the relevance of (i) transplanted laws and regulations, (ii) incentives to speak out about violations, and (iii) self-regulation.

9.5.2 Transplanted laws and regulations

Legal systems develop through experiences and policy decisions at the national level, but also through learning from legal changes in other countries. Not only are laws copied from one country to another, but substantial regional and international collaboration takes place to harmonise laws and sector regulations. Similar rules across countries reduce obstacles to trade and investment and may promote competition in network industries, as well as in other sectors. Procompetition rules, procurement procedures, and anticorruption laws have been among the more copied elements over the last decade.

A challenge with legal transplants, however, is how a law copied from one jurisdiction – where it serves its purpose well – may fail to elicit the same effect when copied. Its function will depend on a complex set of factors at the national level.¹³³ Rules work differently in different legal cultures depending on underlying conditions related to checks and balances, the quality of institutions, the function of democracy, and legal traditions. Common law countries (United Kingdom, United States), which are often perceived more conducive to business, share significant differences from civil law countries (Nordic, German, French, continental Europe), which exhibit greater variation in their law traditions. For example, there may be important differences in the independence of the judiciary from the executive and legislative branches, the ability to have a case considered in light of the principles behind the law, the predictability of written rules, the procedures for evaluating a competition case, the professional status of judges, the cost (to judges) of false conviction versus false acquittal, and in the use of appeals and relitigation. These factors and mechanisms may explain how well the legal framework functions to secure fair competition in a country; they are thus relevant to economic research on sector regulation and its weaknesses.

Several economists have studied legal transplants, particularly in the area of competition law. Dutz and Vagliasindi (2000), for example, identify factors

¹³³ Several elements of the legal framework function differently in different countries. See, for example, the Civil Law Convention on Corruption (Strasbourg, 4.XI.1999), particularly on whistle-blowing and compensation for damage.

that seem to be decisive for the functioning of competition law in 18 transition economies. They find institutional effectiveness to matter more for the intensity of competition than enforcement and competition advocacy. Kee and Hoekman (2003) studied developments in 42 countries over 18 years. They found competition law to have no direct impact on industry markups; the indirect effects of entry conditions were stronger. Reduction of trade barriers also seemed to matter more for fair competition than did the competition law itself. Djankov *et al* (2003) found civil law countries (especially the Nordic) to have stricter regulations on entry, lower enforceability of contracts, more challenges with corruption, and a less fair legal system. Nevertheless, while legal tradition appears to matter, Lee (2005) found that the enforcement of competition law was not determined by legal tradition. The process of implementing the law mattered more than the details in the law.¹³⁴ Lee's result is supported by that of Berkowitz *et al* (2003), who claim that the success of a legal reform strategy depends on 'how the meaning is understood and purpose appreciated by domestic law makers, law enforcers and economic agents, who are the final consumers of . . . the rules'. For competition in network industries, these insights are supported by Estache and Martimort (1999), who examine how the larger institutional framework, including the internal organisation of the government and the functions of the legislative and the executive, seem to matter in the implementation process, sometimes eclipsing in importance the details of regulations, anticorruption procedures, and competition targets. Better understanding of the determinants of an effective legal framework – legal transplants included – is needed to deliver a more complete theory on unfair competition in network sectors.

9.5.3 Disclosure and incentives to speak out about violations

The many ways of introducing unfair competition to network industries and of hiding undue influence, legal or not, underscore the importance of whistle-blower mechanisms – for preventing as well as exposing crime. Those in positions to understand how decisions have intentionally deviated from welfare targets should be encouraged to speak out and should be protected against the consequences they may face. While whistle-blower mechanisms and protections are common features in criminal law, the implementation of such regulations has been challenging. Several OECD evaluations of the performance of convention-based, cross-border anticorruption legislation, for example, point to weaknesses in how anticorruption legislation is supported by whistle-blower protections and how those weaknesses may undermine the legislation.

Despite attention to their importance, whistle-blower statutes may not work as well as they might to promote disclosure of undue influence, and individuals who blow the whistle may be doomed to lose their case in court. Opposing big corporations, whistle-blowers are exposed to power and resource imbalances

¹³⁴ Lee (2005) offers a broad review of the empirical literature on this area and discusses mechanisms mentioned here in more detail.

and will often lack sufficient protection as the conflict escalates. Poor insight into conflict theory and organisational behaviour on the part of the lawyers in a court adds to the challenge for the whistle-blower, because he or she may be put into the position of having to explain corporate actions as parts of a scheme to damage the whistle-blower's reputation.¹³⁵

Firms, in contrast to individuals, may act as whistle-blowers if victimised by unfair competition. They may not be exposed to the same resource imbalance, but their tendency to speak out – for example, if competitors have won contracts through corruption – is nevertheless very low. The reason is not only the lack of proof in most such cases. Firms will be concerned about reactions in the market if they complain about a competitor, and they may worry that a complaint may harm their chances to win contracts from the same or other customers. Although there have been developments in liability claims for contracts lost because of corruption – in addition to procurement procedures that encourage whistle-blowing – the actual tendency to speak out is likely to depend on the firm's market position, its trust in the legal institutions to pursue the allegation, the political environment, and how a charge of unfair competition will be perceived at that level (Søreide, 2008).

In contrast to whistle-blowing, leniency programmes have been introduced in many countries to encourage those who are themselves involved in economic crime to speak out and get a lighter sentence as a result. Experiences from the United States have encouraged European countries to introduce leniency programmes to prevent and disclose cartel collaboration. Brenner (2009) finds these programmes to have important effects. The duration of investigations in cartel cases, for example, is reduced by 1.5 years on average. As suggested by Spagnolo (2004), however, the effect of leniency programmes depends critically on how the programme is designed. The 'steeper' the programme, in terms of reduced sanctions for those who speak out, the stronger the 'run to the courthouse' effect. Spagnolo predicts that moderate programmes can be counterproductive, while 'courageous' programmes will be highly efficient.

Before leniency programmes can be safely imported from another system, we need a better understanding of how any such programme depends on specific legal traditions and institutions. The same programme may work very differently in a country where the legal institution that offers leniency is able to offer reduced sentences only for cartel collaboration (civil law systems, typically), than in one where the legal institution can offer to reduce penalties for a combination of offences. In the first case, the cartel might be expected to respond to a leniency programme by getting members involved in other types of crime, such as corruption, that may have the additional effect of facilitating the cartel, thereby hampering the effect of the programme, since cartel members would still risk sanctions even if they reached a deal with the authorities on cartel collaboration.

¹³⁵ In Norway, for example, where the legal framework to secure fair competition is well developed and based on international trends, there have been about 20 cases in which a whistle-blower has spoken out against a corporation. The whistle-blower has won in just one of these cases.

Players' likely response to legal amendments and programmes in different environments are relevant to understanding why the effect of procompetition legislation may differ across countries .

9.5.4 Prevention, and reliance on self-regulation

Tools for industry regulation are constantly in development. In recognition of increasingly complex market realities and limits to bureaucratic omniscience, firms are expected to regulate themselves in several areas. Self-regulation has become common in quality and safety standards, for example. The trend we have seen over the past decade – with the introduction of ethical standards at all levels of management decisions – suggests that attempts at self-regulation are also made for market benefit.

There are different categories of self-regulation, including (i) *voluntary* self-regulation, which is often expressed in corporate governance codes; (ii) statutory self-regulation, which is often referred to as metaregulation (or semi-self-regulation), in which internal control regimes are required by law and firms provide information that is publicly controlled; and (iii) *indirect statutory* self-regulation, which is not required by law although the law rewards companies that embrace it. As an example of the third category, employers with internal control systems established to prevent corruption may not be liable for damages caused by the corrupt behaviour of employees.

Although such regulations may well promote fair competition in a market, they may also be fraught with incentive difficulties. By instinct, economists are sceptical of self-disciplinary ethical rules, suspecting them to be little more than a cover for hidden profit-seeking actions, particularly where firms can lower their exposure to sanctions by adopting ethical codes of conduct.¹³⁶ In finance, however, studies have been done of the factors that make corporations more or less reliable in the matter of self-regulation – see Carney *et al* (2011) for a recent review. The question of government responsibility vis-à-vis self-regulation, which is on the agenda in several areas, then becomes a matter of firms' internal organisation and incentive schemes. Similarly, the effectiveness of reward systems, for example, for companies that speak out about their own corruption to obtain leniency, may also depend critically on characteristics of the firm and the sector.

This does not mean that the effect of regulatory tools will not depend on market dynamics. Firms, naturally sensitive to issues that influence competition, will quickly adapt to changing market conditions if needed, and often in response to rumours or other unreliable information. The perception that a firm might entertain about a market and the competitors in that market may be decisive in determining how successfully it adjusts to initiatives established to promote fair competition. A firm's sensitivity in these matters, and how it respects self-regulatory schemes, also may depend on risk aversion at the management

¹³⁶ See Rose-Ackerman (2002) for a related discussion.

level.¹³⁷ The likely effectiveness of self-regulation on issues such as corruption and other forms of undue influence for market benefit should be understood not only in light of firm-specific characteristics such as size, organisation and sector (as mentioned earlier), but also on profitability and the ability to handle risk. Some firms will struggle to act ethically in challenging conditions while aiming to secure their place in a market.

9.6 CONCLUSION

This chapter has discussed some of the reasons why implementation of procompetition initiatives may be difficult in network industries. Undue influence for market benefit occurs in many different forms, and there are important but often fuzzy distinctions between what is legal and what is not. Procompetition policies are obviously an important counterforce against the exercise of undue influence for market benefit, but the problem of undue influence must be studied and addressed in its own right as an obstacle to competition. The chapter has pointed out how private agendas at the political level may hamper implementation of economic recommendations for sector regulation. The adverse influence of private agendas may be particularly relevant where the procompetition consensus in network industry governance is weak.

Ultimately, if we wish to prevent firms from succeeding in exerting undue influence, we cannot avoid examining deal- and firm-specific factors. While strategies to harness market forces for procompetitive ends are often implemented based on laws and regulations transplanted from other countries, the effect of those strategies may depend on country-specific determinants, as similar rules have different effects in different settings. Moreover, the process of policy implementation may be as decisive as the terms of policy instruments and the details of market design and regulatory decisions.

The politics behind infrastructure governance and the crucial role of these services in any society, combined with the legal complexity of contracts and their incentive difficulties, imply a multitude of potential obstacles to welfare-optimising infrastructure service provision. Economics is at its best when used to address a well-defined problem under a given a set of conditions, without attempting to take all possible aspects of the legal or governance system into account. What this chapter suggests is that the economic findings on infrastructure governance can be better converted into policy recommendations if considered *in combination with* legal, financial and political knowledge.

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¹³⁷ As discussed in Soreide (2009), the more risk-averse firms may have higher propensity to be involved in corruption, and not the opposite – despite the risks of having the case revealed.

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This book is indispensable to anyone involved in competition and regulation policy of network industries, as it provides an impressive review of the state of our knowledge in applied industrial organisation. Each chapter draws policy schemes from the most advanced progress in the analysis of competition on and for the market, with the objective of properly accounting for the network effects and vertical relations between infrastructure and operations that characterise these industries. Considered jointly, all of these chapters also delineate the research agenda in the field.

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Excellent book, not to be missed! It offers most comprehensive analyses and policy prescriptions. It will prove most useful for scholars, policy makers and students. I was particularly impressed by how the book captures the essence of the new thinking on the interface between regulation and competition; dealing with a wide range of critical issues such as collusion, mergers, regulatory capture, governance, institutionality, procurement and oversight, and always emphasising actionable policy options. The authors have done an excellent job of making this complex subject highly accessible.

Jose Luis Guasch, Professor, University of California, San Diego; Former Head of the World Bank Global Expert Team on Public Private Partnerships and Senior Adviser on Regulation and Competition, World Bank

Emerging Issues in Competition, Collusion, and Regulation of Network Industries is a timely collection of the 'new generation' issues of network regulation, such as institutional diversity, regulatory capture, and governance. The volume marries up-to-date sectoral studies with more conceptually-targeted papers, and thus provides new answers to old questions. Thanks to the high quality of the authors, the volume should become a reference work in the new regulatory literature.

Professor Christian von Hirschhausen, TU Berlin and DIW Berlin (German Institute for Economic Research)

