

Cambridge University Press

978-0-521-86502-9 - The Political Economy of Power Sector Reform: The Experiences of Five Major Developing Countries

Edited by David G. Victor and Thomas C. Heller

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## 1 Introduction and overview

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*David G. Victor and Thomas C. Heller*

Over the last three decades a wave of market reform has spread to nearly every aspect of modern economic activity. Reformers have sought to replace state control with private enterprise and market competition in air transportation, telecommunications, banking, ports, railroads, food service, and sundry other activities. Even Russian vodka, for decades a guiding spirit of the planned economy, is today a product of private entrepreneurs rather than solely state enterprise.

Yet markets do not arise or function spontaneously. To deliver on their promise, they require ancillary institutions, such as banks, regulatory agencies and courts that must operate in steadfast but subtle ways. This book is part of a growing literature that seeks to explain how that institutional context affects the origins and operation of markets. Our interest is the political economy of the shift to markets – that is, how political forces interact with institutions to affect how markets function in practice. The perspectives of political economy, we will argue, explain why the real outcomes from attempted market reforms have often diverged sharply from the economist's theoretical ideal.

Infrastructures have proved to be a particularly challenging area for the introduction of market forces. Infrastructures are marked by high capital costs and require long time horizons that can make it especially difficult to attract private investors who are wary of their ability to earn an acceptable return. The services supplied by infrastructures – such as telecommunications, electricity, and running water – are often highly visible politically, which raises the risk that governments will intervene if markets, left alone, deliver outcomes that are politically inconvenient. Indeed, heavy infrastructure has long been viewed as a central function of government, especially in countries where the state is strong and occupies a large space in the economy. It has also proved difficult to replace the state with private enterprise because infrastructures usually display strong economies of scale, which arise through network interactions that are prone to natural monopoly. Even where governments find ways to open infrastructure for private investors and operators they

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must still monitor closely the behavior of private firms to detect, punish, and deter monopoly behavior – tasks that are demanding even when regulators are highly competent.

Despite these obstacles, some infrastructures have been the locus of successful market reforms. They include the auctioning to private firms of the concessions to run toll roads, airports and ports. Telecommunications offers the most striking success with reform of a network industry – thanks to a variety of technological innovations that have eased the entry of new competitors and created new products (such as wireless telephony) that old state-owned, wired telecommunications firms could not nimbly deliver. New services, competition across platforms, and lower prices in turn stimulated much larger demand and allowed for more contestable markets. Declining costs and improved service helped to sustain the political constituency for market reforms in telecommunications.

Electricity is proving to be among the trickiest of all network industries for reformers.<sup>1</sup> The network effects of large power grids, along with the massive economies of scale in modern central power stations, create high barriers to entry that (until recently) had made electricity the epitome of natural monopoly. The prohibitive cost of storing electricity requires that all power systems be managed literally at the speed of light – a characteristic of systems that many had thought would require synchronized central management rather than the looser and decentralized coordination that are hallmarks of most markets. Unlike telecommunications, no technological revolution has swept over electric power generation to catalyze a fundamental change in business structure; across most of the world the core technologies for delivering electric power have changed little since the 1950s (or earlier).

Despite these challenges – high capital costs, political visibility, network monopoly effects, technological stasis and daunting regulatory tasks – reformers have found ways to introduce market forces into the business of electricity. One track for reformers has involved the model that dates to nearly the beginning of the electric power industry: regulated franchises. Indeed, a few markets – notably in the United States and Hong Kong – never abandoned this mode of regulated enterprise even as the rest of the world turned power systems over to state managers during the twentieth century. Following this model, private firms would operate the entire integrated electric power system, earn a guaranteed return on their investment if they perform well, and be subject to the oversight of

<sup>1</sup> The literature on reforming electric networks is large. For introductions see Newbery, 1999, pp. 199–279; Carbajo and Fries, 1997; Gray, 2001; Asia Pacific Energy Research Centre, 2000; Wamukonya, 2003; Bradley, 1996; Bacon and Besant-Jones, 2002.

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regulators. Some analysts even suggested the regulator could be eliminated if franchisees would be required periodically to bid for their service (e.g., Demsetz 1968).

This track, however, suffered from many deep flaws. It depends on regulators that, in practice, are often unable to function independently. Even where regulators are strong and competent they often find it difficult to obtain full information on the firm's costs and thus are prone to make mistakes that either allow excessive returns or, in the opposite, regulatory rules that do not allow a sufficient return to encourage fresh investment. Moreover, a guaranteed return provides strong incentives for firms to over-invest in favored projects and reliable staid technologies. Thus regulated franchises, it was thought, tended to squander capital and to avoid innovation (Averch and Johnson 1962). To fix these problems, experts on regulation have developed a wide array of new schemes – often loosely called performance-based regulation – that give the regulator and the firm, alike, a stronger incentive to behave more efficiently. None, however, has solved the fundamental problem that regulators have incomplete information and are subjected to political forces that make it difficult to provide credible long-term commitments.

The second track for reformers offered the promise of fuller efficiency through market competition. New ideas advanced since the early 1980s have shown that some aspects of electric power systems were not natural monopolies and could be made more efficient through market competition (e.g., Joskow and Schmalensee, 1983). In a classic integrated power monopoly – whether owned by the government or run as a private franchise – the entire system is owned and operated as a single entity (see figure 1.1). The new insight of these market reformers was that some power functions – notably the generation and final marketing of electricity – could be transformed to allow the entry and market competition of many private firms. Generation, especially, could be highly competitive because the number of power plants is usually large and the barriers to entry (and exit) are not prohibitive.<sup>2</sup> By contrast, transmitting electricity from generators via high voltage power grids to final users is replete with network effects and prone to monopoly. That is because

<sup>2</sup> Moreover, in the twenty years since these ideas were originally developed a series of technological and financial innovations have reduced the barriers to entry for many types of generators. Technologically, thermal power plants have declined in size due to the wider availability of natural gas and innovation in gas turbines that have sharply reduced the capital cost required to build a thermal power plant. Financially, more efficient capital markets and improved financial instruments have made it easier to fund the construction of single power plants – usually in the form of independent power projects (IPPs).

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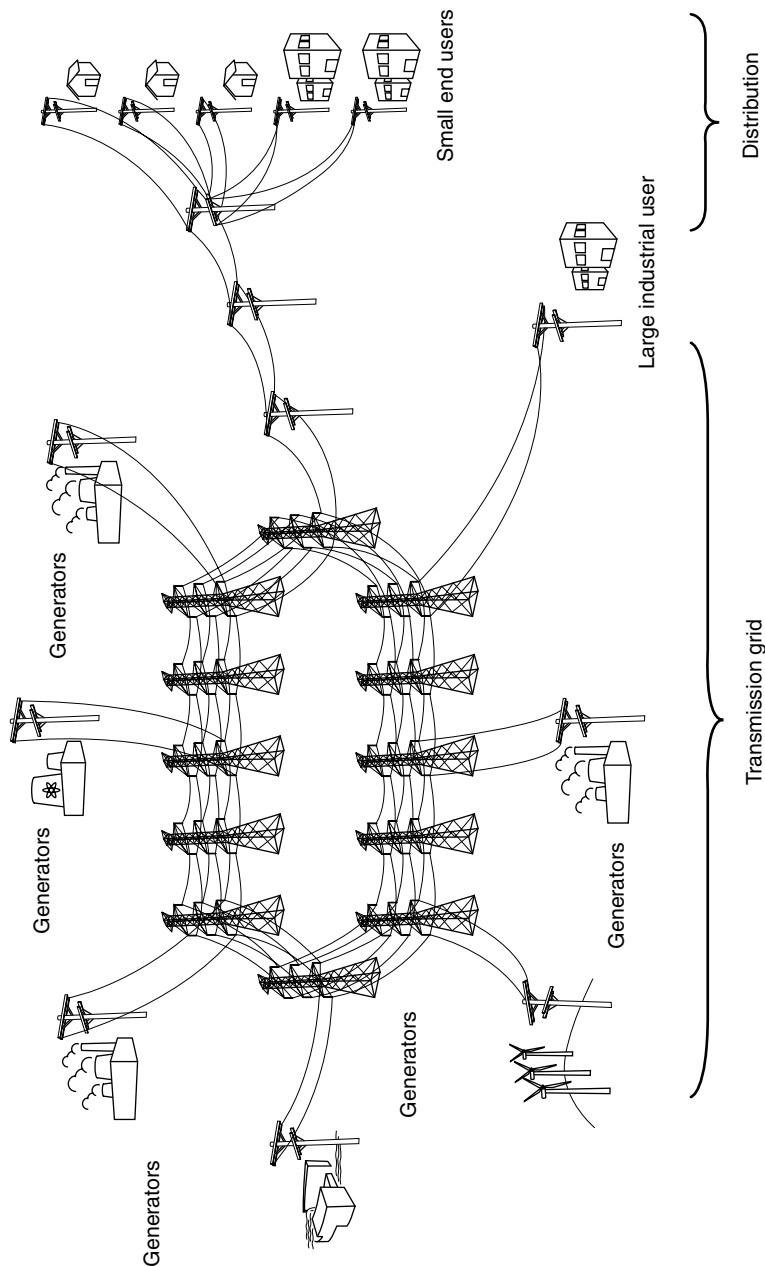


Figure 1.1. An electricity network: generation, transmission and distribution

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alternating current grids that interconnect generators and distributors operate as a single organism with power looping and flowing in all directions, making it difficult (but not impossible) to atomize the system into individual competitive units. Similarly, the function of distributing power to millions of final users is also prone to monopoly because the rights of way, power poles and lines have high fixed costs that make competition difficult except for very large users that can afford to acquire their own lines and transformers needed to interconnect directly with the power grid. Thus the transmission (grid) and distribution functions would be left in the hands of the state or operated as private franchises according to the strictures of a state regulator. No country in this study has operated these infrastructures other than as state enterprises, although Mexico and Brazil have some private franchises for individual power lines. The function of marketing power to users could be competitive so long as companies that bought power from generators and sold it to final users could be assured “open access” to the monopoly-prone grid and distribution system.<sup>3</sup>

Britain’s market-oriented Thatcher government was the first to apply these insights on a large scale. It unbundled the integrated state enterprise into several competitive generators. It also created twelve distribution companies, each with its own exclusive franchise area. The transmission system was maintained as a single enterprise owned by the state. Generators and distributors were required to trade power through bidding in a common pool or through direct contracts. (Most bulk power was sold through competitive long-term contracts with relatively stable prices; smaller quantities were traded on the more volatile pool market as needed.) Large users, too, were allowed to purchase their power directly from generators and through the pool. A new regulator, the Office of Electricity Regulation (Offer), was established to oversee the whole enterprise – to monitor possible collusion by generators and distributors and to set rates for the parts of power system that remained governed as natural monopolies.

The great experiment in England and Wales saw rates fall sharply, especially for large users. The decline in rates correlated with market reforms, but the actual causes were complex. Some of the decline was rooted in factors exogenous to the power sector reform, notably a decline in the cost of coal (from reforms that broke the unions in that sector) and the unexpected availability of natural gas from the North Sea. However, much of the decline in rates was due to the power sector reformed.

<sup>3</sup> For an accessible introduction to current theory and practice of power sector reform see Brennan (2002).

Table 1.1. “Standard textbook model” for electricity sector reform

1. Unbundle	Separate generation, transmission, distribution and marketing of electricity.
2. Privatize	Sell those parts of the system amenable to competition to multiple private firms.
3. Create regulatory institutions	Setup independent regulators to oversee market conduct in the competitive industry and to regulate the monopoly-prone parts of the system.
4. Create markets	Allow markets to function for parts of the system that are amenable to competition.

The experience in England and Wales has revealed some dangers in the design of electricity markets. These include the risk that single firms can exert “market power” – the ability to affect prices for the whole market by their actions alone or in tacit collusion with others. As regulators learned about these and other flaws in their market, they crafted substantial adjustments to trading rules and oversight mechanisms. Nonetheless, the England and Wales experience is widely (and rightly) seen as a success, and that experience (along with the theory of power market reform) has established a model for reform in other part of the word.

Out of this theory and practice arose what we call the “standard textbook model” of electricity sector reform, consisting typically of four major elements (table 1.1). These reforms would begin with government “unbundling” the functions of generating, transmitting, distributing, and marketing electricity. Then, the standard textbook model called for the state to transfer those parts of the system that were amenable to competition into the half of private firms. The standard textbook model required creating powerful new institutions – notably, independent regulators – to oversee conduct in the industry and regulate the monopoly-prone parts of the business.

For generators, the standard textbook model required the creation of markets such as power pools and provisions for power users and marketers to contract with generators. So long as many different generators have access to a transmission system capasse of moving (“wheeling”) their the users of electricity could select among the diverse offers and the market would be competitive.

There were many variants on the markets that reformers sought to create. Some countries required power generators to sell their output to

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a single distribution company, known as a “single buyer” system. The most ambitious reformers, however, envisioned that multiple distribution companies and even individual users would compete and contract directly with the multiple competitive power suppliers. For very small users such as households and light industry the benefit of such competition would be small, and thus nearly everywhere those “captive” users have relied on the power distributor to obtain the best prices and services. Large users, by contrast, were encouraged to participate directly in electricity markets, adding competition to keep the system operating close to full efficiency. The standard model required creating powerful new institutions – notably, independent regulators – to oversee conduct in the industry and regulate the monopoly-prone parts of the business. Very few among even the most energetic reformers have actually implemented the full standard model. Nonetheless, the model and experience of England and Wales illustrated the great potential for markets – a shining city on the hill that has inspired reformers worldwide.

The vision and practice of power sector reform has spawned a vast and growing literature that, broadly, fits into four categories. First, there is a large literature on the design of competitive power markets. While some of this literature is purely theoretical, much is rooted in the actual experiences of reform – particularly of England & Wales, New Zealand, California and a few others (e.g., Joskow 1983, 2000; Newbery, 1995, 1999; Sweeney 2005, IEA, 1999, 1999a). Nearly all of the empirical literature focuses, by necessity, on jurisdictions that have done the most to restructure their power systems and thus this literature has a selection bias in that it is largely silent about the many settings, where market reforms have not advanced far. This literature also contributes to a broader economic literature on the operation and restructuring of network industries. It is this first literature, which derives its general theory from these much analyzed cases, that has given rise to the textbook model (Shy 2001).

Second, a small but growing literature has arisen in reaction to the optimism of the first. It has two strands. One strand has focused on the various ways that effective competition could fail to materialize (e.g., Apt 2005). Another strand questions whether reforms might intrinsically undermine certain important functions that state-owned power systems provide, such as low-cost access to power for poor villages, protection of the environment, or investment in research on new technologies (e.g., Dubash 2001, 2002; Goldemberg, 2004; and Lopez-Calva, 2002). We call these broader functions of power systems, which the market does not autonomously value on its own, the “social contract” of the electric power system. Many of the authors in this genre



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have been primed to find such erosions in the social contract, and thus this literature has kept a skeptical eye on the many dangers in market reform. However, a small body of research has examined the actual effects of power sector reform on the social contract (especially on access to energy services for the poor) and generally found that the shift to markets is not necessarily harmful and often is quite positive (e.g., Powell, 2000; and Victor, 2005).

Third, there is a rapidly growing body of empirical research on the actual practice of market reforms in countries that are early in the process of restructuring. Much of this work is focused on individual cases (usually countries), although some part is comparative and few studies have applied statistical techniques to large samples. This literature has not emerged around any particular theory of market reform; nor has it established a theory (or collection of competing theories) to explain the reform process. Rather, most of these empirical studies are conceived as unique to each country and market (e.g., Estache, 1996, 1999; Guasch, 1999; Berrah, 2001; Dubash and Rajan, 2001; Ferreira, 2002; World Bank, 2003; Deloitte Touche Tohmatsu, 2004). Most adopt the textbook model as the end-point for reform, in part because reformers author much of the analytical literature and in part because the textbook is often the only star on the horizon. (One goal of the present study is to articulate other outcomes from reforms that are more feasible and likely in much of the world.)

The consequence of holding the textbook as the measuring stick for reformers is that much of case study research has concentrated on the yawning gap between the textbook goal and actual practice. Since the goal has been unquestioned in its attractiveness and feasibility, most of these studies aim to explain the failure to reach the shining city as a series of inconvenient obstacles. These impeding factors include “politics,” poor “rule of law” and other “weak institutions” that impede efforts to put the state on the sideline and to provide space for markets to operate.<sup>4</sup> Studies that have given attention to these factors are usually anecdotal and suffused with the view that politics, law, and institutions are barriers to be cleared before launching the real work of implementing market designs that accord with the standard textbook model. By placing the textbook model in a prized position they bring this empirical literature into alignment with the first literature on market design. The lack of rigorous attention to these impeding factors as

<sup>4</sup> For example, a World Bank survey of international investors in reforming power sectors identifies a stable legal environment, government responsiveness, and regulatory independence as some of the most important factors to consider in infrastructure investment (Lamech and Saeed, 2003).



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subjects worthy of analysis is particularly strange since political, legal and institutional forces are hardly transient or quickly and easily modified. In fact, as the studies in this book will show, such factors are the dominant ones in explaining the actual pace and character of market reforms in the electric power system in developing countries (see Yarrow, 1999 and Levy, 1996).

Fourth, a specialized literature has arisen in response to the many difficulties that have been encountered on the road to reform. This work has had one main branch, along with a few smaller offshoots. The main branch has focused on the problem of credibility in making commitments since the reform process is, in effect, a promise by government that reforms will create an environment in which prudently managed investments by private firms will allow for recovery of an acceptable return. Since those commitments often take the form of a contract, this specialized literature is part of a broader body of research on the management of risk in environments where it is difficult for the parties to enforce contracts (e.g., Levy, 1994; Irwin, 1997; World Bank, 1997; Henisz, 1999; Moran, 1999; Wells, 1999; Schiffer and Weder, 2000; Zelnor, 2000; Kessides, 2004). Contract enforceability is particularly important for power infrastructures that demand massive capital investment upfront and offer a return through a stream of payments over a long period (up to 30 years) during which the investor relies on the host government and other counterparties to honor the original deal. This body of research has been particularly focused on contracting for independent power projects (IPPs), which are power generators built and operated by private companies that usually sell their output under a long-term contract. As we will show, many countries begin the process of restructuring by inviting investment in IPPs, in part because this step is seemingly the easiest to take and in part because most power sector reforms begin in the context of looming shortages of generation capacity. IPPs provide an interesting crucible for studying contracting because they are usually financed through special purpose vehicles on a limited-recourse basis, a structure that maximizes sensitivity to the credibility of contracts because lenders can look only to the project company and its revenue as collateral for loans (International Finance Corporation [IFC], 1999).<sup>5</sup>

<sup>5</sup> Project revenues are subject to a pre-determined (usually fine-tuned) allocation of project revenues to particular accounts dedicated to particular purposes or lenders; thus even small changes register loudly in the contractual structure that governs this allocation. Lenders often respond to developing country risk in a variety of ways that increases this sensitivity (Dailami 2003; and Esty 2003). Additionally, as country risk deepens beyond the point of commercial viability, many sponsors and lenders turn to

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Much of the literature on the problem of establishing credibility needed for long-term investment has viewed the issues through the lens of the “obsolescing bargain” (Vernon, 1971). Negotiating leverage in a large private infrastructure project shifts during the project life cycle. Initially, the host needs private investors and thus offers attractive terms. Once operational, the investors require a long amortization period to attain their expected return while the host has already secured what it needs. The original bargain has become obsolete. Theory predicts that the host will force a change in terms – either by outright nationalization or by squeezing revenue streams as far as possible – unless factors such as fear of a poor reputation create an incentive for discipline. As the incidence of wholesale expropriation declined (Minor, 1994; Harris et al., 2003), subsequent development of the original obsolescing bargain hypothesis primed analysts to be wary of subtler attacks on project value – often “creeping expropriation.” Such attacks could be handled (so the story went) by careful contracting to close such loopholes and constrain government actions towards infrastructure investment (see Moran, 1999 and Powers, 1998).

Investors in IPPs and in other elements of the power sector, such as transmission lines and distribution companies, knew about these risks and had studied closely the earlier experiences with expropriation, such as the wave of nationalizations of natural resource companies in the 1960s and 1970s. In response, the architects of private participation schemes in the 1990s sought to improve the commercial and regulatory environment of the host country itself (Jadresic, 1999), as well as the incentive structure of particular transactions in order to bolster the stability of the long term contracts that served as the foundation for these investments (Green, 1993). Much of the literature in this area has centered on the work of a cottage industry of lawyers and financial advisors – project or structured finance specialists, privatization advisors, legal and regulatory reform consultants, and commercial arbitrators – who engineered the tools that investors thought were necessary to solve these problems (Wells, 2005).<sup>6</sup>

Smaller branches of this fourth literature have focused on solving other particular problems that arise in the process of market reform.

multilateral credit enhancements (such as guarantees from MIGA or OPIC) to increase the debt capacity of a particular project. One study finds that the availability of credit enhancements is the most significant variable associated with higher levels of debt in countries with weak institutional environments (Devapriya, 2003).

<sup>6</sup> For a full review and empirical assessment of the contracting issues, with a focus on IPPs, see Woodhouse (2006).