

CHAPTER 1

Regulating Infrastructure: A Review of the Issues, Problems, and Challenges

Ed Araral, Darryl S.L. Jarvis, M. Ramesh and Wu Xun

1. Introduction

The political economy of infrastructure provision has undergone profound transformation in the last quarter century. Historically, telecommunications, electricity, water, gas, railroads, ports, airports, and urban transport were the exclusive preserve of the state and operated as state monopolies. They tended to be vertically and often horizontally integrated, financed by the state and managed by bureaucrats. The involvement of the state in network utilities was seen as necessary to ensure rapid deployment of strategically important services to support economic development and promote national interests. In the last few decades, however, these views have eroded as governments across the world reformed infrastructure provision. The first wave of reforms centered around the privatization of state monopolies, most famously under the Thatcher government in the United Kingdom with the divestiture of British Telecom and British Rail, the unbundling of electricity and water sectors, and the sale of electricity generating facilities, sanitation and water supply infrastructure. Similar reforms were subsequently undertaken in many countries around the world (Thomas, 2006, p. 1974; Millán, 2006; Kessides, 2004, p. 3).

The reforms have not, however, been viewed as an end in themselves. The advocates of energy, water and telecommunications reform have had

various rationales, but nearly all center around what Stephen Littlechild describes as the overreaching desire to “create new governance arrangements that provide long term benefits to consumers” (Littlechild, 2006, p. xvii–xviii). However, such a rationale is problematic. Governance by whom, for whom, and at what cost, are inherently complex questions and the institutional arrangements charged with effecting oversight are not easy configurations to establish or sustain. Michael Pollitt perhaps understates the problem when he notes that reform in the utilities sector is a complex business that requires not just a “commitment to competition and efficient regulation” but also the construction of a reflexive regulatory apparatus that is responsive “to emerging information and allows scope for mid-course adjustments” (Pollitt, 2008, p. xxxi). To these we could add the dimension of policy goals, administrative and legal structures, and the appropriate sequencing of reforms to ensure regulatory credibility and thus the sustainability of reforms. As the British experience taught us, privatization and the divestiture of state assets is but a first, and perhaps the easiest, step in a long sequence of initiatives that must be carefully calibrated, flexible, credible, sustainable, and perceived as such if the regulatory bargain that is struck is to sustain private sector participation, allow efficient operation of competitive forces, and deliver benefits to consumers (Thomas, 2006).

In addition to dealing with the relatively simple issue of incentive and market design, regulations need to address numerous complex problems. As Levy and Spiller (1994, p. 205) observe, the universe of regulation is divided between the design of regulatory incentives (utility pricing, subsidies, entry costs, market extensity, etc) and the design of the governance apparatus (institutions, administrative processes, review mechanisms, dispute procedures) that administers these incentives. Cost plus, rate of return, price cap and other variations on the design of regulatory incentives have produced multifarious models to allocate risk, determine who captures exogenous windfalls from technological innovations or efficiencies, and the allocation of unanticipated costs, revenues, and risks. Far from a simple econometric exercise, the history of such endeavors has been fraught with experimentation, unanticipated outcomes, and less than optimal results. Indeed, instead of enhancing economic efficiency or correcting the inefficiencies associated with state operated monopolies, real

world experiences have highlighted the importance of *review*, *revision*, *flexibility*, and *modification* in regulations.

As the contributors to this volume highlight, such decisions about models of regulation, the sequencing of reforms and the operation of regulatory regimes occur within the context of specific political landscapes, institutional endowments, and, indeed, geographical attributes. While regulation and the design of regulatory characteristics might be viewed as the quintessential mechanism of sector reform, the economic geography of a sector defines market density, network deployment costs, returns, and thus the motivations that underlie investment decisions. No amount of tinkering of the regulatory apparatus can overcome the inverse relationship between the economies of network density and network deployment costs, for example. The physical characteristics of a state (market size, resource endowments — hydro, coal, gas, oil — the geographical distribution of energy demand — thinly distributed versus concentrated demand nodes — and the disbursement of population centers) impacts the nature of the energy market and thus the nature of competition that might reasonably be expected to develop (Correljé & De Vries 2008, p. 68). Thinly populated and geographically dispersed markets pose steep barriers to entry constraining competition; a fact equally true for water and the telecoms sectors. To these issues we can add the extent and rate of economic development, the institutional capacity and endowment of states, among others, as major determinants that shape the reform process and impact the regulatory outcomes. In all, far from a relatively homogenous or unproblematic process, reform and regulation of the utilities sector highlights a series of enduring problems, obstacles, constraints, and thus a diversity of experiences, outcomes, and lessons.

The complexities involved in infrastructure industries are now being recognized, with reform minded proponents more circumspect about the dynamics of the reform process, the problems of regulation and the benefits that may ensue. The World Bank, for example, one of the original proponents of privatization and unbundling in utilities sectors has recognized the difficulties of regulation in countries with low institutional endowments, noting that “regulating unbundled utilities is harder than regulating vertically integrated utilities,” and that reform of this nature may have limitations in markets that are small in scale and scope (Kessides,

2004, p. 5; see also Yi-Chong, 2006). Unbundling, as the World Bank admitted, “is no panacea” and the economic geographies of markets is an important determinant of the limits beyond which privatization and private sector participation can play only a limited role (Kessides, 2005, p. 5). As the same World Bank report went on to note, privatization has been “oversold and misunderstood,” in many cases producing less than optimal outcomes, in other cases outright hostilities and political protest.

In hindsight, such opposition and sensitivities were perhaps to be expected. Reform, privatization and the political act of divestiture of state assets provide fertile political terrains for opposition, especially if poorly implemented or implemented in environments that are less than transparent, seen to favor sectional interests, inefficient or corrupt. More generally, the act of reform itself and the on-the-ground changes to employment practices, pricing regimes, tariff review mechanisms, billing processes, and connection costs have proven obvious avenues for political contest. In more aggressive reform environments where cost recovery regimes have been implemented, affordability and equity of access issues have driven consumer backlash and generated heated political opposition.

These experiences explain the elongated spectrum along which reform of the utilities sector has progressed and in many cases stalled or failed to launch. If the success of the reform agenda is judged by the extent to which full privatization has occurred, wholesale or spot markets created, statutory independent regulators set in place, and state involvement in the sector withdrawn, then there are few examples of successful reform. Rather, the reform processes examined in the chapters in this volume display a preponderance of hybridized systems: a continuing strong state involvement in the utilities sector but with varying degrees of private sector participation. Rather than an unproblematic spectrum along which reform progresses, in many jurisdictions reform has been a start-stop, on again, off again affair, creating hybridized systems with unique characteristics and, as a result, a series of unique problems for effective regulation to be realized. Any attempt to understand the regulation of infrastructure has thus to grapple with the added complexity of regulation in hybridized environments — a feature that is particularly dominant in Asia. Powerful institutional legacies and the continued presence of entrenched state

utilities, creates polycentric regulatory environments where issues of coordination, information asymmetries, organizational-bureaucratic competition, confusion over rule ownership or contestation, adds complexity and often deleteriously to the effectiveness of reform and regulation. While multilateral development agencies such as the World Bank and Asian Development Bank (ADB) have euphemistically denoted these problems as “sequencing issues,” they more correctly speak to the larger political hurdles and domestic contexts within which reform and regulation have to be managed.

2. Organization of the Volume

Reforming infrastructure regulations involves more problems and potentially negative externalities than the early proponents of reform realized. Constructing competitive markets and regulatory governance systems to oversee these are complex tasks, and require adroit policy formulation cognizant of the limitations imposed by the sector’s economic geography, and the regulators’ planning, design, and implementation capacity if the reforms are to be successful and sustainable. This volume is a contribution to addressing these issues across three infrastructure sectors: telecommunications, electricity and water. The specific task of the volume is implied in its title: *Infrastructure Regulation: What Works, Why, and How Do We Know?* Each of the contributors reflect on the innovations adopted and the obstacles encountered during the course of reforming infrastructure regulations with the purpose of drawing broader lessons. As the contributions to this volume demonstrate, answering the questions implied in the title of the volume are more difficult than they first appear. Indeed, despite more than two decades of reform efforts and regulatory innovation, the overreaching lesson appears to be that there is no universally appropriate model for reform of network utilities, that no singular regulatory model can be transposed across multiple environments, and that the mechanisms of regulatory governance are often more specific to the domain in which they operate than generalizable beyond basic governance principles implied in accountability, participation, and transparency.

The volume is organized into three sections. Part I addresses the problems, issues, and perspectives in regulation focusing on regulatory design

issues and outcomes in relation to the telecommunications sector. In Part II, the volume addresses electricity sector regulation and governance, and in Part III issues relating to water sector regulation and governance.

Part I: Telecommunications Sector Regulation and Governance

The economic and social significance of telecommunications in the contemporary world is broadly recognized. A widely quoted US National Academy of Sciences study in 2006 noted that while the sector accounted for only 1 percent of the American economy, it contributed 10 percent to the nation's economic growth. The sector's significance has strengthened particularly with the emergence of mobile and, subsequently, broadband technology. The declining cost and improving quality of mobile phones has been instrumental in fostering economic and social benefits unimagined as recently as the 1980s. Mobile telephony has now reached distant rural communities — by 2002, for example, the number of mobile subscribers exceeded fixed line subscribers — in ways no other technology has been disseminated since the advent of the steam engine and electricity. As a consequence, the material benefits and mode of commerce available to the rural poor have been vastly expanded. The subsequent spread of the internet and the advent of broadband technology has likewise changed the face of commerce, vastly reducing the cost of communications and the ease of transaction across multiple geographical spaces and markets. These new technologies have enabled developing countries, of which India is the most spectacular example, to experience some of the highest economic growth rates in the world. In 2009, information and technology industries are believed to have contributed 6 percent to India's and 8 percent to the Philippines' GDP. Moreover, telecommunications form the basis for e-governance which has the potential to strengthen the public sector's efficiency, the mechanisms of accountability, and the modes via which the public is able to engage with government.

Telecommunication was the first networked infrastructure sector to be deregulated. The experiences of the sector, especially its methods of liberalization and privatization, thus casts a long shadow over other network industries. Prior to deregulation, telecommunications was regarded as a case of pure natural monopoly and, as such, heavily regulated and often

owned by Ministries of Post, Telegraph and Telecommunications. With the decline in telegraph's significance and the separation of telecommunications from postal services, the telecommunications industry came to emerge as a key pillar of the modern economy. The subsequent removal and or relaxation of barriers to new entrants, often accompanied by privatization, further stimulated the industry. The lower prices and better service quality that followed deregulation of the telecommunications sector remains a key selling point for those proposing greater deregulation for all infrastructure industries. While in many respects telecommunications is a typical infrastructure industry, in other crucial aspects it is unique: mobile and internet technologies allow a level of competition in the industry that is simply not possible in most other networked infrastructure industries. For example, multiple telecommunications networks can be deployed because of technological innovations, network economies of scale are not fixed but now more elastic because of falling network deployment costs, and barriers to entry are now not driven so much by technological costs as political restrictions and considerations. While these features are atypical and do not represent the technological realities confronted in the electricity and water sectors, the experiences of the telecommunications sector continues to be a catalyst for approaching and examining deregulation and liberalization in other networked industries.

There is wide agreement that regulations and their implementation is a key determinant of the telecommunication sector's performance. There is less agreement over exactly what sort of regulations are the most appropriate for the telecommunications sector. The dispute is not over whether the regulatory regime should be more or less liberal but, rather, over the extent to which the government needs to be involved in the sector beyond establishing the essential market rules and letting competition determine the rest. Current debate in telecommunication regulations thus pertain to more complex issues. How should societies and regulators deal with the emerging convergence between fixed line and mobile telephony, broadband, VOIP, mobile TV and broadcasting? To what extent should new firms be allowed to enter the sector and bundle services? To what extent should dominant players be required to share backbone and network infrastructure? What should be the nature and form of accountability of telecommunication regulators and firms? And what is the meaning and

significance of universal access to services in the current environment and how can it best be achieved?

Of all the issues confronting the sector, that of market entry, accountability, and consumer access are the most pressing as well as complex. The three chapters in section 1 of the volume discuss these issues in turn.

The chapter by Chalita *et al.* analyses the effects of changes in entry regulations on mobile telephone firms across a series of Asian countries. It finds a noticeable improvement in the sector's performance as a result of entry relaxation when accompanied by the existence of favorable macroeconomic conditions and an independent regulator. However, to realize the full potential of entry relaxation, the chapter points to the need for an independent regulator before entry restrictions are relaxed — the sequencing of regulatory reforms, in other words, remains a key determinant of regulatory and sector outcomes.

Judith Clifton and her colleagues assess the sector from a new, and broader, perspective: that of the consumer. Instead of focusing on the supply side, as is the case for most writings on the subject including Chalita *et al.*, they concentrate on the citizen–consumer, i.e. on the demand side. The traditional focus on supply is premised on the assumption that consumers are automatically well served in the presence of optimal regulations with regard to market concentration, market entry, and access to networks. Regardless of the theoretical merits of concentrating on supply conditions, the ultimate test for the success of any regulation is how its benefits are perceived by end users. The authors use stated and revealed preferences gathered from Eurobarometer and Household Budget Survey data to reflect on the performance of the telecommunications sector with respect to accessibility, affordability, service use, and consumer protection in the European Union. The chapter provides rich evidence on the diverse patterns of consumption and attitudes towards public services. They conclude with a plea for regulators to take consumers' preferences into account when designing regulatory regimes.

Gasmi, Naoumba and Virto cast their net far and wide in the following chapter and assess the performance of the telecommunications sector in 29 developing and 23 developed countries. Using a composite methodology that combines overall political variables with sector-specific “regulatory governance” variables, they find strong empirical evidence

highlighting the importance of political and institutional contexts, especially in developing countries, for performance outcomes. Countries with stronger political accountability are found to perform better in terms of mainline penetration, cellular subscription, mainlines per employee, and prices. The chapter concludes with suggestions for greater emphasis on improving overall “good governance” rather than sector-specific reforms.

Part II: Electricity Sector Regulation and Governance

The foundations of the electricity industry go back to 1882 when the world’s first central power station was established in Manhattan by the Edison Illuminating Company. The event set a trend that for the first half century of the electricity supply industry (ESI) which saw power generation, transmission, and distribution dominated by private firms. The extent of private domination diminished as the sector was nationalized in most parts of the world during the post-War period.

As Gratwick and Eberhard (2008, p. 3948) note, the rationale for progressive government involvement in the sector was fourfold. First, the network nature of the sector combined with economies of scale makes the industry a natural monopoly, paving the path for government intervention to help protect the public interest. Second, the scale of national electrification efforts, each requiring the deployment of extensive networks and large generating plants to capture economies of scale, required massive long term commitments of capital, with the state increasingly called on to act as financial guarantor and socialize the investment risk. Third, the burgeoning size and scope of the sector made state involvement a natural corollary. Effective coordination, standardization of service delivery and reliability, uniform pricing and equity of access issues, combined to involve the state as a means to enhance efficiency, reduce information asymmetries, and coordinate capacity development in line with demand requirements. Fourth, post-war energy intensive industrialization elevated the strategic importance of the sector, aligning the sector with national industrialization and development plans and progressively bringing the sector under central state planning. By the mid-1950s, the sector had thus been transformed with governments of all political persuasions seeing the sector too important to be left to the seemingly haphazard ways of private sector interests.

Vertical integration of the industry replete with government intervention into fuel source chains, coal transportation, electricity generation, transmission and distribution was a common outcome. While the United States, Japan and Germany opted for significant private participation in the sector, vertically integrated monopolies became the order of the day with the state involved through a strong regulatory and oversight presence (Gratwick and Eberhard, 2008, p. 3949).

In developing countries too, much the same trajectory was followed. From the 1950s through to the 1990s, electricity provision was dominated by the state. Indeed, strong state involvement in the ESI was championed by leading multilateral development agencies like the World Bank and seen as essential to the rapid deployment of energy infrastructure in support of economic development (Williams and Dubash, 2004, p. 411–412; Victor and Heller, 2007). In Asia, a core feature of state involvement was the formation of state-owned utilities predominantly organized as vertically integrated monopolies and overseen by large energy ministries and bureaucracies charged with energy planning (World Bank, 1993; Williams and Dubash, 2004, p. 414). Electrification schemes became synonymous with national development, commanding massive public resources and assuming iconic status as purveyors of national aspirations. In countries as varied as India, Thailand, South Korea, Indonesia, China, and the Philippines, bureaucracies overseeing the development of the electricity sector commanded a central place in the institutional and political fabric of the state, indeed often becoming large political empires unto themselves.

Since the early 1990s, however, this model has been progressively eroded with the private sector again increasingly involved in the ESI across a large swath of jurisdictions. Concerns about service quality, fiscal burdens, inefficiencies, and spiraling costs combined with ideational changes about the role of the state in the provision of infrastructure triggered a decade long series of reforms across the globe. By the end of the 1990s it was commonly accepted that private sector participation in the ESI was both desirable and necessary, and that the progressive reform of the sector via the introduction of performance and market based incentives, could deliver significant cost reductions, sector efficiencies, and increase network deployment and access in developing countries. Remarkably, by the

end of the 1990s, over 70 countries had instigated sector reforms, progressively moving the sector away from public monopolies and toward private ownership coupled with publically regulated structures (Jamashb *et al.*, 2005, p. 1).

Unbundling of the ESI through the divestiture of generating assets, the introduction of private power producers (PPP), competitive tendering and procurement processes, and innovations in network operations have been the obvious forms of sector reforms. Equally, however, a small revolution has occurred in the mode and manner of regulation of the ESI, with the sector witnessing a general move toward the establishment of independent regulators charged with oversight, licensing, compliance, and review of the sector, and otherwise challenging the vertically integrated nature of the industry, the domination of state utilities and the large energy ministries and bureaucracies which have historically dominated the sector.

These reforms, of course, are ongoing. In Asia and further afield, there is no resolution to these experiments, the mix of public-private sector participation, and the manner and mode of oversight and regulation. Indeed, the reform process itself has thrown up a series of challenges and conundrums that remain as much unsolved as they were unanticipated. Questions about what models, forms, styles, institutional designs, and operational parameters produce what outcomes and in what order of magnitude and deliver what benefits to who have proven more problematic than reform minded proponents initially anticipated. Indeed, the broader project of trying to devise regulatory forms that produce superior outcomes while serving equally the interests of private sector participants and the general public remain as contested today as when first proposed. So too the institutional mechanisms of governance and making effective regulators and thus regulation, have equally been the subject of experimentation, on-going reform and innovation, with little sense that this project has been completed or the questions settled. And perhaps most importantly of all, such issues have proven doubly difficult in developing countries, where institutionally contested environments or inadequate institutional and analytical capacity have exacerbated the complexity of these questions and problems. When it comes to regulating electricity infrastructure, “what works” and what does not are likely to produce multifarious and contradictory conclusions.

It is not surprising, then, that “the evidence on the success of electricity reform is ... mixed” and particularly so for developing countries (Pollitt, 2008, p. xxvi). Much of this might be explained by the unfinished business of electricity reform. The reform process has not been a uniformly linear process of nations progressing along a continuum towards full liberalization. As Pollitt (2008) observes, “significant progress towards the maximum possible electricity reform” is observed in only a handful of countries “while reform progress has stalled at some intermediate stage in many more jurisdictions” (Pollitt, 2008, p. xxvii). In Asia, in particular, reform of the ESI sector is spotty, with a mix of institutional forms, different levels of private sector involvement and still dominant state utilities in operation. Constructing a simple narrative about where we stand with reform of the ESI is thus more difficult than it might first appear, with countries displaying different trajectories and mixes of private-public forms and methods of regulatory oversight. It might thus be more appropriate to describe regulation of the ESI in Asia as a “work in progress.” Despite more than a decade of reform efforts, addressing some of the most elemental questions about sector reform outcomes, efficiency, modes of regulation and regulatory design, what works and what does not proves more difficult than ever to answer authoritatively.

The contributions in Part II of this volume, *Electricity Sector Regulation and Governance*, grapple with many of these questions, highlighting how problematic and perhaps premature are firm conclusions. If there is a common strand to the seven chapters in this section of the volume, it speaks to how particularistic are the institutional environments and political contexts in which the electricity supply industry is situated, and to the historical legacies each much grapple with as the process of reform is confronted. This conclusion is amply demonstrated in Chapter 5, where Darryl Jarvis looks at the labored process of reform in the Thai ESI which has ebbed and flowed amid political crisis, contestation, protest, and violence. While it would be unfair to take Thailand as representative of other developing countries, the analysis by Jarvis highlights the unique problems developing countries face in constructing credible regulatory governance mechanisms with sufficient capacity to oversee effectively a complex and highly politicized policy space such as electricity. If the problem of regulation resides significantly in getting right

the mix of public and private interests that allocate risk, profit, and other externalities, equally Jarvis demonstrates it also lies in getting right the forms of regulatory governance necessary to make credible the commitments that governments make and the market extensivity set in place for private sector participation. The problem, of course, as Jarvis highlights, is that there is no universally accepted road map on which to build effective regulators and regulatory institutions, not least for developing countries where traditions of administrative practice are often pre-formative or where historically strong state utilities command extensive political power.

These issues are fully exposed in Chapter 6 where Puree Sirasootorn sets about a detailed examination of the regulatory substance of Thailand's enhanced single buyer model and the problems surrounding the regulation of tariffs in institutional environments where rule ownership, roles, and multiple agencies have overlapping jurisdictional control. Puree explores the practical implications of these regulatory designs on consumers by addressing the impact of an electricity tariff that is separated into two tariff steams; a base tariff and an automatic tariff adjustment mechanism. By tracing the incentive structure that emerges, who captures exogenous rents, and how windfall revenues are allocated Puree suggests that the enhanced single buyer model contains inherent flaws that discriminate against the Thai consumer, favoring the interests of ESI operators. More importantly, Puree is able to explore the ramifications of this model, the perverse incentives it generates and which lead, for example, to the development of excess capacity, and excess profits for industry operators.

Puree's main concern, however, is to suggest the development of alternative models and how a reconfigured design of the regulatory incentive structure using price cap regulation can ameliorate price distortions and perverse incentives. Simulating such a price cap regulatory system, Puree's analysis demonstrates the importance of revisiting the enhanced single buyer model and reforming the systems of oversight that administer this.

In Chapter 7, Kun-Chin Lin, Mika Purra and Lin Hui address the broader problems of constructing effective regulatory regimes and regulatory bodies in one of the world's largest electricity markets, China. As the second largest power market in the world, China will invest some USD\$2 trillion dollars over the next 30 years in the ESI, with China's demand for

power generation equipment alone likely to account for 32% of total global demand. China's phenomenal demand for energy is only matched by its ever increasing demand for effective planning, coordination, and regulation of the sector. Indeed, with demand for electricity growing at approximately 10% a year, and likely to double in the coming decades as China's industrialization deepens, China will require a massive expansion of its energy infrastructure if its developmental goals are to be realized and per capita electricity consumption increased to global averages. As Kun-Chin, Purra and Lin Hui argue, however, the institutional legacy of the National Development and Reform Commission (NDRC) which has historically overseen energy sector planning, has undercut new institutional initiatives such as the State Energy Regulatory Commission (SERC), otherwise established to introduce market and efficiency incentives, breakdown vested interests, and represent the interests of both ESI industry participants and consumers. China, like other developing countries, equally faces the challenges of vested SOE interests, particularly in the large 5 generating and transmission companies whose monopolistic control of the ESI has effectively hamstrung the prospects for the emergence of an integrated national energy policy. Such an outcome, Kun-Chin, Purra and Lin Hui argue, is producing inferior oversight capacity, diminished regulatory effectiveness, and potentially harbors longer term risks for satisfying the electricity needs of China.

The conclusion reached by Kun-Chin, Purra and Lin Hui is that institutional collusion among existing ESI providers and oversight institutions bears on the facility not just to plan and enact policy reform, but diminishes the implementation of reforms, new performance benchmarks and thus the prospects for successful reform outcomes. As the authors note, their analysis partly answers some of the key themes in this volume, not just in terms of what works, and why, but more importantly of what is feasible in highly contested political spaces where vested interests and inter-organizational rivalry impact efficient policy making and implementation.

In Chapter 8, Mika Purra addresses the ESI in Southeast Asia's largest economy, Indonesia. Indonesia's most recent past has been a tumultuous period of authoritarian rule, street violence in the wake of the Asian Financial crisis, and severe economic dislocation as foreign investment

evaporated amid political protest and a full blown currency crisis. By contrast, Indonesia's most recent past has witnessed the emergence of a vibrant and flourishing democracy, with numerous calls for increased accountability, political transparency, and improved public administration to pursue much needed national reforms to enhance economic growth and development. Such calls are understandable. Eighty per cent of Indonesians still live below or slightly above the poverty line, only 60% of Indonesians enjoy access to electricity, and the informal sector of the economy tends to dominate the lives of most ordinary Indonesians.

Not surprisingly, getting energy policy right and embarking upon an effective electrification campaign has been seen as essential to the growth aspirations of Indonesia. As Purra observes, however, Indonesia also presents a case of substantial policy failure, poor levels of implementation, highly contested policy domains and poor levels of administrative capacity, pen ultimately leading to policy inertia and less than optimal policy or reform outcomes. Amid such constraints, reform initiatives in the ESI have been modest, with the underlying issues of electricity pricing, the introduction of new tariff mechanisms and incentive structures to allocate efficiency gains, lost amid an essentially dysfunctional bureaucratic culture that is unable to grapple with the institutional configuration that has dominated the sector for the last several decades. The lessons Purra identifies, then, reside not so much in the regulatory systems and modes of regulation necessary for reform, but how to ensconce reform and enable its implementation in an environment where reform is often thwarted at multiple junctures.

In Chapter 9, Rajendra Kumar addresses ESI reform in India, a country experiencing rapid growth in electricity demand and, in the process, experimenting with innovative reforms and regulatory models. Like other developing countries, India too has moved to liberalize the sector, recognizing the importance of foreign capital and investment as a means of closing the energy gap and increasing generating capacity. One of most significant reforms appeared in the 1990s, designed to create uniform institutional frameworks for independent power producers (IPPs) and encourage greater private sector participation in the ESI. As Kumar observes, however, multiple layers of governance and the vastly dissimilar administrative systems between Indian states produced dissimilar

outcomes and performance in the sector. Kumar examines these dissimilarities and the reasons for them by analyzing three states, Andhra Pradesh, Gujarat, and Tamil Nadu. Using legal, political, institutional and comparative economic analyses, Kumar assesses the relative performance of IPPs in each state with reference to the literature on institutional economics to examine the interactions between political institutions, regulatory process and outcomes.

Kumar's analyses offer some sobering conclusions. First, no single regulatory process, model or incentive structure produces similar outcomes across all three states. Indeed, institutional design alone, replete with the manner by which profits, costs and risks are allocated, do not themselves determine performance. Second, intangible variables like leadership, trust relationships, and effective communication in some cases prove the overriding reasons that determine successful outcomes, even in the face of relatively poor regulatory models. Third, intervening political variables, especially the manner of politicization of the sector, irrespective of the regulatory system and its operation, can, but not in all cases, be the determining factor for performance in the sector. Kumar's analysis is thus unique in as much as it takes three very different case studies and demonstrates through the application of a uniform analytical framework how important is context. As Kumar observes, above all "an institutional 'fit' between the regulatory systems and the overall institutional endowment of the state in the political, legal, and economic contexts is extremely important to ensure success of the reforms and the IPPs."

Finally, Sunil Tankha in Chapter 10, and Junki Kim and Kyuhyun Kim in Chapter 11 attempt to grapple with the outcomes of conventional approaches to liberalization, the privatization of infrastructure, the emergent regulatory systems of oversight, and the outcomes associated with these models. Again, the conclusions are mixed with both chapters suggesting vicarious performance contingent on anomalous assumptions contained in orthodox approaches to liberalization and regulation, and the enormous challenges that effective regulation poses for governments of all types and capacities. The chapters by Tankha, Kim and Kim thus provide further evidence that performance outcomes of infrastructure regulation are far from uniform, that any conclusions we might draw about what works and how has to be heavily qualified as much by context, the political

environment in which regulation occurs, as by the nature of the regulatory model, and the capacity of the agencies changed with oversight.

Part III: Water Sector Regulation and Governance

Water is unique among infrastructures: it is essential to life, local in supply, mysterious in information (asymmetry), and dull in technological innovation (Shirley, 2007). Water being essential to life and public health, and hence politically salient, has led most governments around the world to be directly responsible for its provision. Water is also dull in innovation. Compared with telecommunications and electricity where technological innovations have changed their natural monopoly characteristics, there is no equivalent in the water sector. These distinguishing characteristics have implications for the way the water infrastructure is provided and regulated.

To meet the vital need for water adequately, about 85% of water utilities worldwide are publicly owned and controlled. Public ownership, however, is not without its problems. Like other state-owned enterprises, they suffer from poor service quality, excessive staffing, and political interference. In addition, water and sanitation services are often priced at below cost-recovery level, creating enormous financial burdens for governments in developing countries. These problems have become widely manifested in the late 1980's, especially in developing countries.

The failure of public water utilities to expand service coverage and improve service quality prompted municipalities in many developing countries to turn to the private sector for investment capital, technical expertise, and efficiency improvement (Dosi and Easter, 2003). At the same time, private participation in the water sector is controversial and subject to intense debate. While private operators may be more efficient because of their profit motive, critics argue that profits are incompatible with public interest (Estache *et al.*, 2001; Birdsall and Nellis, 2002; Smith and Hanson, 2003). Others have held that water privatization compromises access to water as a basic human right and that it harms the welfare of the poor (Gleick *et al.*, 2004; Scanlon *et al.*, 2004).

The privatization of water in England and Wales in 1989 is considered as a catalyst in the rapid expansion of private participation in the water

sector in the following decade (Marin, 2006). The early results were encouraging; raising hope among policy makers in developing countries that privatization might provide a viable solution for poorly performing public water utilities. By the end of 2000 at least 93 countries had experimented with water privatization in one form or another (Brubaker, 2001), and the population served by private operators in developing countries grew from 6 million to 94 million between 1991 and 2000. However, the period of tremendous expansion of private participation in the water sector didn't last long as the late 1990s were marked by renegotiation, termination, and cancellation of privatization contracts and projects. A World Bank database on infrastructure revealed that by 2002, 75% of contracts for water privatization in Latin America and the Caribbean had gone sour, experiencing either renegotiation or cancellation (Gómez-Ibáñez *et al.*, 2004). In Asia, the rate of water privatization has slowed considerably since the Asian financial crisis, as a number of high-profile water privatization projects have been abandoned or canceled due to disputes over water tariff increases (Hall *et al.*, 2004).

While much of the existing literature has focused on the rationale and merit of private participation in the water sector, more attention needs to be paid to the role of regulatory systems in improving the sector's performance. Given the unique characteristics of water supply, water sector regulation usually aims to 1) improve efficiency i.e. producing and delivering water at the lowest possible cost while ensuring that operators receive adequate returns on their investments; 2) improve equity i.e. the population have access to affordable quality service and 3) ensure environmental sustainability i.e. minimizing pollution and damage to the natural resource base. The major challenge is information asymmetry. As Shirley (2007) notes, consumers cannot fully assess water quality, utilities cannot cheaply determine quality of underground pipes while investors cannot cheaply see how well underground pipes have been maintained.

The first objective, improving efficiency, can be achieved using three regulatory instruments to determine the industry structure (i.e. the extent of competition in the industry): 1) promoting competition for the market; 2) competition in the market (also called yardstick competition); and 3) direct competition for specific services. Competition for the market involves operators competing for control of the market. These involve the

use of regulatory instruments such as concession contracts, management contracts and lease agreements. Competition in the market — also known as yardstick competition — involves splitting the market into service areas covered by operators that do not compete directly but that can be compared by a regulator. Examples of these include Paris and Manila. Yardstick competition is often used to deal with the problem of information asymmetry and to ascertain cost information (Shleifer, 1985).

The second objective, equity, makes use of tariff regulation, performance incentives, community service obligations, fiscal transfer to utilities and targeted subsidies as policy instruments. Tariff regulation is often controversial because of its multiple and sometimes conflicting goals: cost recovery, economic efficiency, equity and affordability. Performance incentives and community service obligations are two common features of water concession agreements to provide access to poor households and peripheral urban areas.

Whatever industry or tariff structure is in place, the literature on optimal regulatory design calls for a politically independent public body to set rates and monitor performance based on objective and verifiable information, with a neutral and independent appeals process (Shirley, 2007). This raises an important question. Does having an independent regulator really matter to the performance of a water utility?

The collection of papers on water supply regulation in Part III of this volume, *Water Sector Regulation and Governance*, examine a number of important questions that have not been adequately addressed in the otherwise extant literature.¹ For instance, can regulation improve the performance of government-controlled water utilities? What is the role of regulatory agencies when concession contracts serve as a regulatory mechanism? How independent are water regulatory agencies and does it matter? What determines industry and market structure for water supply? What processes are needed to establish decentralized water regulatory institutions and what are the challenges associated with building those processes? What does it mean to have a successful regulatory

¹ The papers by Earhardt and Janson, Asquer, Perard, Tanka and Fuller, and Whitford *et al.* were earlier published in a special volume of *Water Policy* (2010). Permission by the journal publisher — *International Water Association* — is gratefully acknowledged.

scheme in allocating river water and how is success to be understood and measured?

Regulatory independence is a subject explored in Chapters 12 and 13. In Chapter 12, Wu Xun *et al.*, argue that there exist two intrinsic conflicts in the regulation of privatized water utilities under concession agreements. First, although concession agreements constrain the discretionary power of regulatory agencies, contract incompleteness, widespread and unavoidable in the water sector, calls for more extensive uses of discretionary power. Second, although contract renegotiations may undermine the efficiency gains achieved through competitive bidding processes, they suggest that the economic costs and political risks of terminating concession contracts can be prohibitively high.

Using the case of the water regulatory agency in Manila, which supervises a major water concession contract in Metro Manila, they assess the impact that these two tensions exert upon the effectiveness of regulations. Their analysis suggests that concession contracts were indeed relatively effective in curbing opportunistic behaviors on the part of the government and concessionaires in the earlier years following privatization. But the relevance and usefulness of these contracts as the primary regulatory mechanism has declined as the regulatory system moved tacitly toward discretionary regulation. They argue that more emphasis should be placed on transparency and performance benchmarking to improve regulatory effectiveness in the absence of regulatory independence.

In Chapter 13, Ehrhardt and Janson explore the question of whether regulation can improve the performance of government-controlled water utilities. The conventional literature has mostly examined the question of whether private participation combined with regulation can improve the performance of government controlled water utilities but little research has been done on whether regulation alone can improve performance. Their paper examines five water utility reform episodes in Latin America and the Caribbean. In each episode, a regulatory regime designed for private companies was applied to a government-controlled utility. Assessing performance across a number of indicators, the authors find that performance was as likely to deteriorate as to improve during periods of regulation of government controlled utilities. This contrasts with the

evidence of improvement following reforms that combined regulation with private participation.

Ehrhardt and Janson's findings suggest that conventional regulation may be of little use in government controlled utilities. Conventional regulation is designed to prevent a profit-maximizing utility from raising tariffs above reasonable cost-recovery levels. Government controlled utilities, however, are not commercially motivated and face systematic incentives for short-termism in tariff-setting, so limiting monopoly profits is not usually the problem that needs to be addressed. The authors conclude that conventional regulation of a government-controlled utility is not useful in isolation. They argue, however, that regulatory tools can complement governance reforms. One approach may be to adapt conventional regulatory tools so as to help citizens judge utilities' performance, and thus be more effective in holding government to account for the performance of government-controlled utilities.

The political salience of water and its institutional implications is a topic explored by Whitford *et al.* in Chapter 14. Specifically, Whitford explores the macro institutional causes of disparities in access to clean water and sanitation. Using econometric analyses on a cross-country data set, he assesses the impact of a number of political, economic, and social mechanisms on disparities in access to clean water and adequate sanitation. Whitford offers a series of vignettes using cross-national data from 2002 and 2004 to assess the effects of key institutional variables on the improvement of access to safe water and sanitation. The two key variables explored are 1) the country's commitment to "quality regulation" and the 2) country's long-term development path. They find that the evidence for the effects of these factors on expanding or contracting access to water and sanitation is mixed.

In Chapter 15, Alberto Asquer illustrates two important themes in water sector regulation. The first theme explores the choice of industry, market and contract structure in the water sector while the second explores the implementation of regulatory reforms. Using the case of Italy, Asquer finds that the implementation of water regulatory reforms, which lasted about 12 years, resulted in a new regulatory regime which combined selected features of public ownership, franchise allocation, and discretionary regulation. These reforms were implemented in different ways

across the country, at the national and sub-national levels, resulting in different forms of organization and management of the water services at the local level. Asquer then attempts to explain why water regulatory reforms were designed as 'hybrids' between different regulatory 'models' and why, within a given regulatory institutional framework, water regulatory reforms may be implemented in different ways at the local level.

In Chapter 16, Alex Coram and Lyle Noakes take on a different view of water, not as a service, but as a resource. They are particularly concerned with assessing the effectiveness of regulation across a river system. Such a system, they argue, is characterized by complex interdependencies among the various components of the hydrological system. Extraction of water at any one point in the river has a number of welfare and environmental impacts at a large number of other points. This raises a number of important regulatory questions. What does it mean to have a successful regulatory scheme in allocating river water? How is success to be understood and measured? How do we know that whatever regulatory scheme is in place is allowing the appropriate amount of water to be extracted at each point? If the regulator has to negotiate with various interests over pricing or water allocations what criteria should be used? To answer these questions, Coram proposes a welfare approach to measure the effectiveness of regulation across a river system using the case of the Murray Darling Riverbasin in Australia.

If the water source is a stock, such as a lake or a dam, it may be necessary to regulate it in a way that controls demand according to some criteria and set different prices for different users, such as agriculture and industry. It may also be necessary to have a regime that allows the amount extracted to vary inversely with the volume available. If the water source is a river system, it has different characteristics because it is a uni-directional flow in which upstream extractors are able to inflict damage on downstream interests. In this case it will be necessary to devise the criteria for measuring the effectiveness of regulation and to set regulatory standards in a way that takes into account these interconnections.

Perard also explores, in Chapter 17, the issue of independence of water regulatory agencies. Donors, and the literature on efficient water supply, routinely recommend the separation of regulation from production and provision. In reality, only a few developing countries are able to do this.

Using case studies from southern Mediterranean countries (Tunisia, Algeria, Egypt, Morocco and Jordan), Perard finds that (a) “independent” regulatory agencies have been set up only in a few countries and that a closer look at them confirm that they are rarely independent; (b) in all cases he examined, the management of water supply suffers from political interference and is overly centralized; and (c) while the corporatization of local operators has been legalized in most countries, few have implemented it.

There are two possible explanations for this, both of which need further testing. First, water supply is a politically salient good and therefore politicians are reluctant to give up effective control to an independent regulator. Second, water is a mysterious good (i.e. has significant information problems in terms of water quality, information about customers and information about hidden pipe networks) which gives the service provider informational advantages relative to an independent regulator. Thus, when the marginal transaction costs of having an independent regulator plus the political salience of water significantly outweighs its marginal benefits, there is little incentive to establish independent water regulatory agencies. This is one possible hypothesis why independent water regulators are more the exception rather than the norm.

Finally, in Chapter 18, Tankha and Fuller (2010) are concerned with the importance of processes in establishing decentralized regulatory institutions for water and the challenges associated with establishing those processes. While the argument on the importance of the learning process approach to local institution building was first suggested by Korten (1984), most aid agencies and academic literature still often assume that participation will follow once the organizations and rules supporting it are in place. Comparing case studies from Brazil and India, Tankha and Fuller find that water sector reforms are creating a market of informed demand for public participation, and a supply of services to aid both the participation process and the technical work that will ensue. However, they find that this market must be created using four strands of crucial processes: (1) creation of forums for public participation; (2) capacity building for both government and non-government stakeholders; (3) creating the institutional environment for administration reform; and (4) creating demand for “good” participation from the

affected communities. They argue that as each of these strands gets developed, the market for services expands and consolidates. However, they find that in both India and Brazil, capacity building and administrative reforms are lagging, thus suppressing the demand for participatory reforms, a point illustrating the difficulty of participatory approaches to decentralized regulatory reforms.

References

- Correljé, AF and LJ De Vries (2008). Hybrid electricity markets: The problem of explaining different patterns of restructuring. In *Competitive Electricity Markets: Design, Implementation, Performance*, Sioshansi, FP (ed.), pp. 65–94. Oxford: Elsevier.
- Gratwick, KN and A Eberhard (2008). Demise of the standard model for power sector reform and the emergence of hybrid power markets. *Energy Policy*, 36, pp. 3948–3960.
- Jamasb, T, R Mota, D Newbery and M Pollitt (2005). Electricity Sector Reform in Developing Countries: A Survey of Empirical Evidence on Determinants and Performance. World Bank Policy Research paper 3549.
- Kessides, IN (2002). *Reforming Infrastructure: Privatization, Regulation, and Competition*. World Bank and Oxford University Press.
- Levy, B and PT Spiller (2004). The institutional foundations of regulatory commitment: A comparative analysis of telecommunications regulation. *The Journal of Law, Economics, & Organization*, 10(2), pp. 201–246.
- Marin, W (2006). *Altered Perception: Addressing the Real Water Crises*. Unlimited Publication, Indiana, USA.
- Millán, J (2006). *Power Sector Reform in Latin America: Accomplishments, Failures and Challenges*. Inter-American Development Bank, Washington, D.C.
- Pollitt, M (2008). Forward: liberalization and regulation in electricity systems — How can we get the balance right? In *Competitive Electricity Markets: Design, Implementation, Performance*, Sioshansi, FP (ed.), pp. xvii–xxxiv. Oxford: Elsevier.
- Thomas, S (2006). The grin of the Cheshire cat. *Energy Policy*, 34, pp. 1974–1983.
- Victor, D and TC Heller (eds.) (2007). *The Political Economy of Power Sector Reform: The Experiences of Five Major Developing Countries*. New York: Cambridge University Press.
- Williams, JH and NK Dubash (2004). Asian electricity reform in historical perspective. *Pacific Affairs*, 77(3), pp. 411–436.
- World Bank (1993). *The World Bank's Role in the Electric Power Sector*. World Bank, Washington, D.C.
- Xu, Y-C (2006). The myth of the single solution: Electricity reforms and the World Bank. *Energy*, 31, pp. 802–814.