About the Paper

Herath Gunatilake and Mary Jane F. Carangal–San Jose use the framework of nonmarket failures to explainy why public sector provision of water supply and sanitation is prone to failures. Lessons from private sector participation (PSP) show that the limited success of PSPs is attributed to prevalance of strong demand and willingness to pay, effective regulation, good governance and contract enforcement, and innovative measures to create competition. Therefore, a reasonably well-functioning public sector is a precondition for the success of PSPs.

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Privatization Revisited: Lessons from Private Sector Participation in Water Supply and Sanitation in Developing Countries

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FOREWORD

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ABSTRACT

This paper examines the experiences of private sector participation (PSP) in the water supply and sanitation (WSS) sector. The paper first uses nonmarket failures as a concept to briefly explain why public sector provision of WSS is prone to failures. The widely sought solution, PSP, has not shown encouraging results in the WSS sector. In particular, private resources have not been adequately mobilized to solve WSS sector problems as anticipated by the proponents of PSPs. PSPs in the WSS sector managed to succeed in environments where effective regulation, good governance, and contract enforcement were prevalent. Effective demand for improved WSS services and innovative approaches for competition also paid an important role. Experience also showed that public water utilities can work well when anchored on reforms with ingrained internal and external accountability, customer orientation, and autonomy. While ownership itself hardly influences the efficient provision of WSS services, the interdependence of the public and private players should not be overlooked; a reasonably well-functioning public sector is a precondition for the success of private provision of WSS.

I. INTRODUCTION

Water scarcity has reached alarming proportions leaving some 1.1 billion people without access to safe water, and 2.6 billion without basic sanitation, in developing countries. It is commonly said that the problem of water supply and sanitation (WSS) is not one of economics but of politics; not one of physical shortage but of governance. "The generic problem of WSS is one of matching demand with supply, of ensuring that there is water of a suitable quality at the right location and the right time, and at a price that people are willing to pay" (Hanemann 2005, 26). As Hanemann (2005) contends, the difficulty in providing water supply and sanitation to the poor is partly institutional. During the past five to six decades, developing country governments have explored various ways by which they can provide water and sanitation to the poor households. This paper reviews the lessons learned from the efforts of developing countries to engage the private sector in water supply and sanitation.

Unlike other goods, water has unique characteristics because certain forms of water represent ordinary private goods while other forms represent different types and degrees of market failures. This has spurred a long-standing debate over the institutional provision of WSS, i.e., a choice between the public and the private sectors. Given that WSS services have the characteristics of a natural monopoly, traditionally it has been provided by the public sector. The poor performance of developing country public water utilities instigated a privatization[1] drive in the 1990s. Sixty-eight developing countries have brought private sector participation (PSP) to their water sector since 1990. By 2005, 54 of those countries still had the private sector engaged in operational water projects (consisting of more than 220 contracts). From 2002 to 2005, countries as diverse as Albania, Algeria, Ghana, Peru, and Russia have opened their water sectors to private participation (Marin and Izaguirre 2006). The experience of PSP in the WSS sector has now been adequately documented so that it is timely to ask the question whether the private sector has met the expectations in delivering WSS services. This paper attempts to answer this question and also analyzes the circumstances under which private and public water utilities have experienced successes or failures.

The paper is organized as follows: Section II discusses the rationale, failures, norms of success, and lessons learned from public sector provision of WSS. Section III deals with similar issues for the private sector. Synthesizing the lessons and converting them into suggested courses of action, Section IV discusses useful general guidelines for successful PSP in the WSS sector. Section V concludes the paper.

[1] As will be explained later, public–private partnership is the most commonly observed mode in the WSS sector rather than complete privatization.

II. PUBLIC SECTOR PROVISION OF WSS

In a market economy, the government should play the role of "steering rather than rowing" according to conventional economic thought. Private sector, in such an economy, should play the leading role of producing and distributing the goods and services. Market failures and unequal distribution of economic outcomes are the two fundamental reasons for government's intervention in a market economy. Market failures, however, only provide necessary justification for government's interventions. Governments' failure to intervene optimally—nonmarket failures—should also be given due consideration before launching any intervening actions in the economy. Appendix 1 provides a brief description of the role of government in an economy using the framework of market and nonmarket failures. It also discusses related specific features of water.

Market failures—natural monopoly, externalities, and public good characteristics—are the prime justifications for public provision of WSS. It is commonly held that productive efficiency in an industry with declining long-run average costs (i.e., a natural monopoly) requires that a single firm serve the market, but a sole supplier will restrict output to the monopoly level, generating a social welfare loss (Savenjie 2001, Megginson and Netter 2001). In such settings, efficiency can be achieved only if the government regulates the price that the monopolist can charge. Moreover, positive externalities in the form of health improvements can result from a reliable supply of water. In Bangladesh for instance, the combined improvement in drinking water and primary health care led to a drop in mortality caused by diarrhea from 300,000 deaths per year in 1980 to 150,000 in 1997 (Biswas and Adank 2004). In the British water industry, municipalization was motivated in part to achieve certain nonmarketable benefits such as reduced fire losses (Hassan 1985). It has also been argued that access to water is generally perceived to be a socially desired or "merit"[2] service compared to other utilities such as telephones or electricity (Savedoff and Spiller 1999).

At the end of the 19th century, many privately owned water utilities in the United States and the United Kingdom reverted to state ownership as governments were believed to be more adept and judicious in providing water. The depression in the 1930s, the ensuing worldwide recession, the end of the second World War, and the final break-up of colonial empires pushed many governments, developed and developing alike, to assume a more active role in owning and providing all types of goods and services, including WSS. In developing countries however, government ownership grew for slightly different reasons. The postcolonial countries of Asia, Africa, and Latin America chose to "nationalize" a number of strategic industries borne of their historical resentment toward foreign colonizers who had previously owned many of the largest firms. Moreover, these countries saw government ownership as essential to promoting growth by attracting heavy investments in physical facilities, including in water and sanitation (Megginson and Netter 2001). In view of the above developments, WSS has remained largely in the hands of the public sector. It is estimated that over 90% of the world's population continues to be supplied by the public sector (Madhoo 2007, Baietti et al. 2006, Prasad 2006).

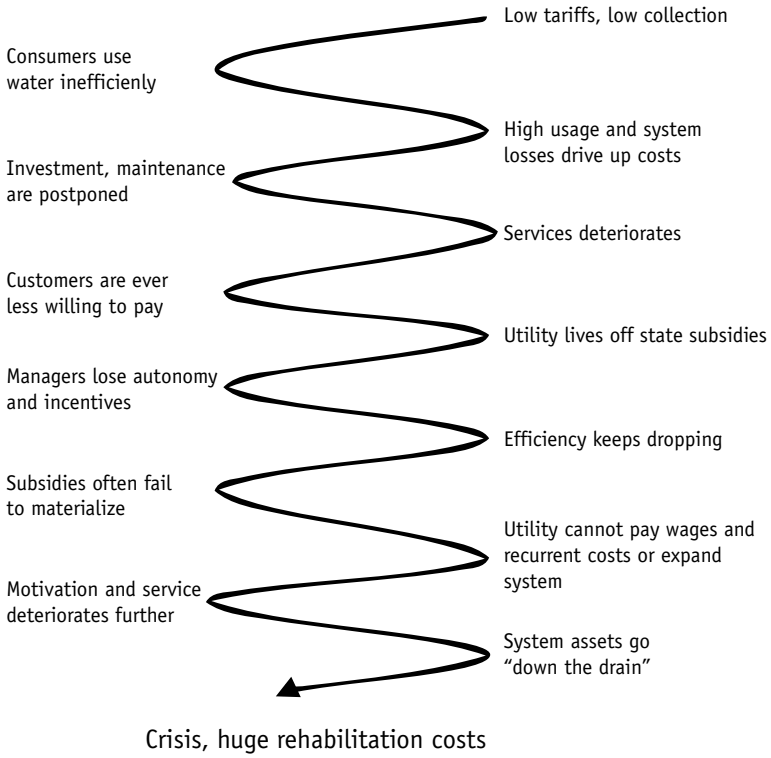
Experience has shown that publicly owned water utilities have not always been successful both in developed and developing economies. Nonmarket failures in supplying water were however, much more severe in developing economies. Clearly on grounds of efficiency, public WSS services have remained wanting. Large proportions of the population remain with little or no access to public services, and the quality of services for those who receive them had often been poor—characterized by frequent breakdowns and unreliable supply. At the same time, water utilities could barely cover

[2] Merit goods are goods or services that are deemed to have positive externalities or considered to be so important that society believes that everyone should have access to these goods or services.

operational costs, leaving no surplus available to finance the expansion of water networks. In the Appendix 2, we provide examples of nonmarket failures in the WSS sector.

For many developing economies, the widespread nonmarket failures eventually led to a downward spiral (see Figure 1) that eroded the quality of WSS services. This spiral combines weak performance incentives, low willingness of customers to pay, insufficient tariffs to recover costs, and lack of funding for maintenance, ultimately leading to a deterioration of assets and squandering of financial resources. This downward cycle attracts further political interference and regenerates the downward trend with increased velocity (Baietti et al. 2006, Spiller and Savedoff 1999).

FIGURE 1
VICIOUS SPIRAL PERFORMANCE DECLINES OF UTILITIES



Source: Baietti et al. (2006).

A. Norms for Successes in Public Water Supply

While performance of the public sector in supplying water and sanitation in developing economies has been generally poor, there are limited instances of success.[3] Success was due in part to the new public management philosophy in the 1980s that was intended to reform the public sector in developing economies. While not exhaustive, these reforms are deemed fundamental to achieve effective provision of WSS. The analysis in this section is complemented with anecdotal experiences from case studies of public water utilities.[4]

[3] The failures of public sector WSS provisions are well documented in the literature. However, the success stories are not well known. Therefore, we provide some details on the success stories in this section.

[4] The case studies undertaken by the World Bank (Baeitti et al. 2006) included utilities owned by the national government and municipal governments across 11 countries. Public water utilities in the sample are distributed across various

Among many factors, the need to ingrain internal accountability is crucial for success. Internal accountability looks at how the management and staff are held liable for effectiveness (the degree to which the utility realizes its goals) and efficiency (the cost-effectiveness of resources used to produce water). Measures that highlight internal accountability in a utility may include having well-defined performance targets; enforcing incentives, sanctions, or both; annual performance evaluations of the utility staff; employee incentives for achieving performance targets; and staff training. The internal accountability mechanism is aimed at preventing nonmarket failures that are customary in public water utilities.

Municipal water companies in Netherlands that enjoy regional monopoly ensure efficiency through benchmarking, while yardstick competition[5] is used in setting prices (OECD 2004). Some empirical studies suggest that introducing explicit performance incentives can help improve efficiency (Estache and Kouassi 2002). An example would be the water and sanitation policy of Bogota in Columbia that introduced transparent, performance-linked budget transfers from the central government to the municipalities (Calaguas 2006). The Phnom Penh Water Supply Authority (PPWSA) in Cambodia, which ranks among well-run utilities in Asia, incorporated a profit-sharing system that monitors corrupt practices by all the employees (World Bank 2006a). Viet Nam's Haiphong Provincial Water and Sewerage Corporation (HPWSC) and Singapore's Public Utilities Board (PUB) institutionalized performance reviews as basic criteria for salary determination and promotion. These were also based on seniority and experience, providing incentive for workers to stay with the utility. Benchmarking was introduced in some countries to improve the performance of the public sector (Baietti et al. 2006). For instance, Uganda's National Water and Sewerage Corporation (NWSC) benchmarks other utilities in terms of financial performance and operational efficiency indicators such as water losses, energy cost, and revenue collection. Table 1 provides a sample set of performance indicators for water utilities.

Baietti et al. (2006) describe that well-run public water utilities also allocate substantial budgets to staff training such as in Uganda's NWSC, Singapore's PUB, and Burkina Faso's Office National d'Eau et d'Assainissment. In Brazil, the state-owned water utility Departamento Municipal de Água e Esgotos (DMAE) motivates its workers through strong investments in education, health care, and insurance, among others (Maltz 2005). Malaysia's Perbadanan Bekalan Air Pulau Pinang has adopted a commercial outlook in managing the water system (Santiago 2005).

income levels and across all regions. The Transnational Institute and Corporate Europe Observatory (Hall 2005) explored cases of public utilities in eight countries representing the northern tradition (Germany, the French city of Grenoble, and United States) as well as southern participatory models (Porto Alegre in Brazil; cooperatives in Santa Cruz, Bolivia; Colombia; and public sector development in Bogota and Malaysia). The Water Utility Partnership (WUP 2003) studied utilities (and other service providers including nongovernment organizations, communities, the private sector, and municipalities) in nine African countries. The Inter-American Development Bank (Savedoff and Spiller 1999) uses examples from Argentina, Chile, Honduras, Mexico, and Peru to illustrate why it has been so difficult for governments to efficiently manage and operate water systems.

[5] Schleifer (1985) was among those who pioneered in introducing yardstick competition as a regulatory policy. This policy involves breaking up the dependency of a firm's payoff on its own performance (basically the cost of service regulation), and making it depend instead on other firms' performances, in which case, the regulator could actually create artificially some competition among locally monopolistic firms.

Table 1
Examples of Performance Measures for Water Utilities

OUTPUTS/PROCESSES	PRODUCTIVITY/EFFICIENCY	ASSETS
Cubic meters of water processed	Unaccounted for water	Length of installed pipes (various types)
Cubic meters of water delivered	Cubic meters of water delivered (or processed) per employee (or labor hour)	Water processing capacity (various types)
Water substances and organisms controlled for	Cost of a cubic meter of water delivered	Number of employees
Outbreaks of health hazards in the water system per year	Cost of a cubic meter of water delivered, including the costs of health hazards in the water system to the population	Employee education and experience
Days without service for various types of consumers	Consumer satisfaction rating and other quality measures relative to cost per cubic meter of water delivered	Expert rating of asset quality (technology, maintenance, reliability, etc.)
Number of system breaks per kilometer of pipeline	Expert rating of productivity /efficiency	
• Restoration rate • Percentage of repairs that do not fail within a year • Number of complaints per 1,000 customers per month • Percentage of operational procedures followed correctly • Consumer satisfaction rating (survey) • Employee and other stakeholder satisfaction rating (survey) • Expert rating of service quality		

Source: Savas (2000).

Lack of continuous and consistent feedback from customers, as is usual with private commodities, is an important reason for nonmarket failures. Customer orientation can overcome this problem as it guides in producing quality output. Well-run public water utilities are more systematic in gaining customer feedback. Customer feedback is apparent where there are strong oversight capabilities, routine customer satisfaction surveys, and a flexible partnering approach between those who monitor and the operator. For the NWSC in Uganda, a magazine called Water Herald provides a platform for utility managers to describe innovations, identify constraints, and receive credit for good performance, while Viet Nam's HPWSC solicits user suggestions through a customer box (Calaguas 2006). Brazil's DMAE maintains close relations with its users through city offices that attend to billing complaints, and administer debt payments from low-income users. DMAE can also be accessed easily via the internet and telephone (Baietti et al. 2006). In France, the public water utility in Grenoble allows the elected councils to set tariffs. An annual report on the price and quality of the public service is approved by user-consultation commissions, the "council of exploitation" and locally elected assemblies (Avrillier 2005).

A sense of social responsibility persists in well-run public water utilities, enhancing the utility's public image. Good public relations and a "socially responsible" image help utilities to harness public support in implementing difficult decisions such as a tariff increase. Cambodia's PPWSA exercises social responsibility by providing a revolving fund to finance domestic connections to help the poor connect to the network (World Bank 2006a). South Africa's Johannesburg Water Utility is more proactive in assisting the poor as it tests and implements free water meters in the poorest neighborhoods as part of its product testing. In Viet Nam, HPWSC offers its customers various options by which they can pay their water bills (Baietti et al. 2006).

Widening stakeholders' representation can help avoid or minimize nonmarket failures through strengthening the utility's external accountability. Water utilities can serve public interests well when multiple actors are able to offset the short-term political interests or internal goals of politicians with objectives such as financial sustainability, good management, and service quality improvements. This was the case in Uganda's NWSC, which has formed clearly defined performance contracts with the government, and where such contracts are subject to regular external audits. Moreover, customer organizations and nongovernment organizations have been heavily involved in Uganda's NWSC as well as in Burkina Faso's Office National d'Eau et d'Assainissment, and stakeholders are widely represented in Singapore's PUB. In Viet Nam's HPWSC, financial audits are required as part of financial covenants with donor institutions (Baietti et al. 2006). In Latin America, "democratization" meant increasing consumer participation in running a utility's operations as exemplified by the deliberative council in Brazil's DMAE and Bolivia's Fejuve, which controlled corruption in the water sector in El Alto (Miranda 2006, Maltz 2005). Wider stakeholder representation can guard against the pursuit of self-interest by service providers and more importantly, contribute in defining product quality to ensure that what is produced is needed and will be consumed and paid for willingly.

Some degree of autonomy is needed to exercise effective decision-making by utility managers. Cambodia's PPWSA became autonomous in 1986 and has since been seen to be one of the better run utilities in developing Asia. Malaysia Perbadanan Bekalan Air Pulau Pinang's adherence to a commercial outlook meant being budget-conscious, adopting a commercial accounting system, instituting internal and external audits, a customer-friendly service, accurate recording of payments, and a systematic billing and collection system. It also involved developing a reliable and accurate integrated customer and engineering data system (Santiago 2005). Viet Nam's HPWSC has flexibility to determine its own salary scale by introducing bonuses funded internally, although it is not easy to fire or terminate staff as the utility is subject to the government's labor regulations. In terms of investment financing, South Africa's JNB and Singapore's PUB rely on internally generated funds to finance water investments. Board appointments are impartial in Uganda's NWSC, where directors are appointed based on their expertise in the fields of management, public finance, engineering or public health (Baietti et al. 2006).

The foregoing conditions of success were observed largely in the context of improving water supply in the urban areas. There is scant literature on successful government provision of rural water. For various reasons, many developing governments have either withdrawn from, or drastically failed in supplying water to the rural areas. Rural areas proved unviable because they are usually characterized by scattered populations that often presented difficult technical, organizational, and financial sustainability issues (Biswas and Adank 2004).

B. Lessons Learned: Public Water Utilities

The experience of public water utilities in developing economies reviewed so far offer essential insights. First the concept of nonmarket failures (see Appendix 1 and 2) provides reasonable explanation to the poor performance of public water utilities, hence this framework helps in assessing the potential for failures and suitable remedies. Basic human nature, which responds to personal incentives; and the misalignment of such incentives under the structure and functioning of public organizations, are the root causes of nonmarket failures. The lack of a sense of ownership in the public organizations oftentimes provides a conducive environment for divergence of personal goals from social goals. Such divergences generally manifest in poor performance. Second, poor performance is exacerbated when the citizens who receive the services have virtually no means of influencing what the utility can do (Robinson 2005). The absence of reliable measures to hold the public utility accountable for its actions provides room for rent seeking by public officials.

Third, in the absence of any competition that would have checked public water utility performance, resource allocation tended to become widely inefficient. Lack of competition meant that pressures on the water utilities to increase efficiency and to pass the gains on to consumers were very weak or nonexisting. The result is poor performance and excessive costs. Fourth, how the government could effectively regulate itself and insulate the public utilities from short-term political goals has been difficult in many developing countries. Short-term political goals have been interfering with tariff setting and other management aspects, severely undermining the financial sustainability of water utilities. Consequently, these utilities lose capacity to expand and provide services to the poor. Many developing country governments have been regarded with incredulity for their lack of probity and strong governance. This makes it difficult to undertake essential reforms, including tariff increases. These factors reinforce each other resulting in a downward spiral (see Figure 2).

Fifth, the conventional view of economists that government's role should be "to steer and not to row" seems to be largely supported by the widespread failures of water utilities in developing countries. While it made theoretical sense for the government to intervene when market failures occurred, this did not always seem meritorious in practice. This understanding has translated to recent efforts at minimizing government's involvement in operating various entities, which were originally considered to do better under public ownership.

Sixth, despite widespread failures, efficiency and better performance can be achieved by reformed public water utilities as shown by a number of successes. Norms for success are embodied in internal accountability, customer focus, public image as a socially responsible agency, external accountability, and autonomy. These can successfully reduce or minimize opportunities for nonmarket failures in the WSS sector. Moreover, these measures enable publicly owned water utilities to mimic the market processes to perform reasonably well.

III. PRIVATE SECTOR PARTICIPATION IN WATER SUPPLY AND SANITATION

As discussed earlier, the growing realization of nonmarket failures since the 1970s encouraged many countries to introduce PSP as a way of improving WSS services. Apart from nonmarket failures, some have argued that there is a compelling reason for the private sector to provide water and sanitation. Fundamentally, piped water has many characteristics of a private good—a fairly homogeneous commodity, purchased for domestic or industrial consumption, and with reasonable information about its quality and characteristics. Demand for water is normal and fairly stable, and has predictable

elasticities with respect to prices and income. Piped water also satisfies the traditional definition of a private good: rivalry in consumption. While there are public health benefits to a clean water supply, the private benefits of clean water are similarly high, giving individuals a strong incentive to pay for water quality (Savedoff and Spiller 1999, Cowen and Cowen 1998).

The private sector has in fact long played a role in the water sector, particularly in the industrialized economies. Many of today's municipal and state-owned water companies in the United States were once owned by the private sector[6] (Water Science and Technology Board 2002). France has had a long history where water is supplied by the private sector led by two companies, i.e., Générale des Eaux now owned by Veolia (formerly Vivende Environment) and Lyonnaise des Eaux now owned by Suez, which continue to dominate the world water industry.[7] To date, the only major divestiture of public water supply is that in Chile and the United Kingdom (Perard 2007). The successful initial public offering of British Telecom in 1984 encouraged the Thatcher government to pursue privatization as a basic economic policy. But instead of retaining the assets of the water utility in the government while franchising out the operations and maintenance as the French did, the British government chose to privatize their assets as well. Britain's perceived success encouraged other industrialized countries to divest their state-owned enterprises through public offerings in the 1980s. Many other countries though, adopted the French's mode of contracting out management, operations and maintenance, and customer services, among others, while keeping assets in the public's hands (Absenergy 2006, Megginson and Netter 2001).

Following Britain's perceived success, the biggest private water companies (Vivendi, Suez, Saur, and Rheinisch-Westfälisches Elektrizitätswerk [RWE]) entered the water markets of the developing world beginning in the 1990s. This entry presented several risks for both the public and the private sector. Two primary risks facing the government were: the risk that services supplied by the private sector will not meet desired standards and the risks that the cost of services provided by the private sector will be much higher than that charged by the government. On the other hand, numerous risks beset private investors, namely, commercial, financial, technical, legal and political risks. Commercial risks involve the fear that the private investors may not be able to recoup their investment and make a profit. Market-related commercial risks may occur if the demand for services is lower than anticipated. Financial risks relate to currency devaluations and convertibility of local to foreign currency, especially when foreign borrowings are used to finance service provision. Technical risks pertain to the lack of sufficient knowledge about the state of installations; the need for replacement, rehabilitation, and expansion; and the resulting operational risks that installations will not perform as expected. Escalation in construction costs due either to inflation or other reasons also pose technical risks. Legal risks occur as a result of contractual disputes. The main political risk is that the government will expropriate the assets or change policy in the course of implementing a contract. Another political risk stems from governments' reluctance to increase tariffs before an election period (Idelovitch and Ringskog 1995).

[6] Historically, water services were initially delivered by private providers in many cities in the United States, such as Boston, New York, and Philadelphia (Water Science and Technology Board 2002, 2).

[7] Two other companies, Saur, part of France's Bouygues construction group; and the German conglomerate RWE, which acquired leader Thames Water in the United Kingdom in 2000, lead the ranks of international private water companies.

Given these risks, privatization of WSS in developing economies often did not involve fully changing ownership of the utility from the government to the private sector. Instead, many developing governments chose to pursue some intermediate form of private sector participation. These forms ranged from tendering for construction contracts in large urban cities to joint ownership of water utilities.[8] Table 2 shows the broad range of options under which developing country governments involved the private sector in supplying water and sanitation. The options vary, depending on the risks that both the government and the private sector were willing to assume. Option A represents willingness by the government to assume more risks while Option B indicates a decline in the risks that the public sector prefers to address, as this option involves partial private ownership. Both these options meant to introduce competition in WSS service segments that do not have natural monopoly characteristics. Option C signals a shift wherein governments move away from owning and operating the infrastructure, to regulating the services provided by the private sector. We use the term private sector participation in this paper to indicate all three options given in Table 2.

[8] In its strictest sense, privatization meant the transfer of productive assets from the state to the private sector (Parker and Kirkpatrick 2005). But private sector involvement (Webster and Sansom 1999) has acquired various meanings as follows:
Privatization: This term was commonly used toward the end of the 1980s to describe the increase in private involvement mostly referring to the full hand-over of assets (or divestiture).
Private Sector Participation: Refers to the role that the private sector can play in the delivery of services. Private sector participation in water supply took many forms that varied basically on the extent to which the responsibility for capital investment and the burden of commercial risk are shifted from public to private sector.
Public–Private Partnerships: PPP acknowledges the key role that both the public and private sectors have in service provision. The term has drawn much interest as it emphasizes the need for partnership to maximize the benefits that both sectors can contribute.

TABLE 2
FORMS OF PRIVATE-SECTOR INVOLVEMENT IN THE WATER SUPPLY AND SANITATION SECTOR

	OPTION A				OPTION B			OPTION C
RISKS/ ATTRIBUTES	**SERVICE CONTRACT**	**MANAGEMENT CONTRACT**	**LEASE OR AFFERMAGE**	**CONCESSION**	**BUILD OPERATE OWN CONTRACT (BOOT) and VARIANTS**	**REVERSE BOOT**	**JOINT OWNERSHIP OR MIXED COMPANIES**	**DIVESTITURE OR OUTRIGHT SALE**
Asset ownership	Public majority	Public majority	Public majority	Public majority	Private and public	Private and public	Private and public (major)	Private, or private and public
Sectoral investment, planning, coordination, regulation	Parent ministry or separate public authority	Parent ministry or separate public authority	Public authority negotiated with private operator	Public authority negotiated with private operator	None or public authority	None or public authority	None or public authority	None or public authority
Capital financing (fixed assets)	Mainly market-based	Mainly market-based	Public	Private operator	Private operator	Public	Public	Private
Current financing (working capital)	Mainly internal revenues	Mainly internal revenues	Private operator	Private operator	Private operator	Public	Private operator	Private (government may pay for public service obligations)
Operation and Maintenance	Public entity	Private operator for specific services (billing)	Private operator	Private operator	Private operator	Private operator	Private operator	Private
Collection of tariff revenues	Public entity	Public entity	Public entity	Private operator	Private operator	Private operator	Private operator	Private
Managerial authority	Public entity	Public entity	Private operator	Private operator	Private	Private	Private and public	Private
Basis of private party compensation	Fixed fee based on services rendered	Based on services and results	Based on results, net of fee paid by the operator for the use of existing assets	Based on results, net of fee paid by operator for use of existing assets	Privately determined	Private firm pays annual fee to public authority equal to full debt service of entire investment	Not available	Privately determined
Typical duration	Less than 5 years, mostly 1–2 years	About 3 to 5 years	5–10 years or sometimes 8–15 years	10–30 years or sometimes 25–30 years	10–30 years	Long-term	Long-term	Indefinitely (may be limited by license)

Sources: Adapted from Madhoo (2007), Davis (2005), UNECA (2005), Webster and Sansom (1999), and Idelovitch and Ringskog (1995).

A. Performance of PSP in the WSS Sector

The perceived merits of PSP in WSS include (i) mobilizing private resource to the sector to meet growing investments needs, (ii) competition because of the entry of more investors, (iii) increased innovation and efficiency, (iv) lower prices, and (iv) universal coverage. The following section discusses the performance of PSPs in each of these.

1. Mobilization of Private Capital

Private sector participation has been generally touted as the solution to the pressing needs for huge capital investment in water and sanitation that have beset many developing countries, allowing governments to free resources for other important sectors (Prasad 2006, Davis 2005, and Trebing 2004). In practice however, these goals have been difficult to achieve. Prasad (2006) claims that many of the so-called "private investments" were not really investments (or greenfield operations[9]), but more of private flows to acquire existing business assets. Given the larger risk for private enterprises, WSS investments flowed largely to concession (70.9% of total) rather than to greenfield (14.6% of total) projects (see Appendix 3).

The Global Water Partnership estimates total investment needs for new water infrastructure at $180 billion per year for the period 2000–2005 (Cosgrove and Rijsberman 2000). Based on recent historical data (World Bank PPI database 1990–2006) total private investment in WSS averaged $3.3 billion per year, i.e., only about 1.8% of the annual investment needs of developing countries. In Asia, the $1.9 billion annual average private investments in water (World Bank PPI database) account for 7.9% of the total financing needs of the region.[10] Thus, the private sector has not mobilized an adequate amount of resources to meet the needs of the WSS sector as proponents of PSP have anticipated. UN Secretary General Ban Ki-Moon raised these concerns during the World Economic Forum 2008 in Davos lamenting that only a fraction of the 1,000 companies had in fact joined the UN's Water Mandate to increase investments in the water sector (Edgecliffe-Johnson 2008).

2. Inadequate Competition

Competition among producers and consumers is the most critical factor that ensures the success of markets in maximizing social welfare. Despite various attempts to introduce competition, the WSS sector continues to be characterized largely as a natural monopoly (Prasad 2006 and 2007, Savedoff and Spiller 1999). In principle, competition can be introduced in some areas of water supply such as supply of bulk water in a multi-reservoir system, billing and metering, construction, replacement, and repair work within water services. The relevant natural monopoly problem largely originates from the distribution rather than from other aspects of water supply. In terms of distribution it is uneconomical to duplicate water and sewerage networks. Competing pipe systems did occur in

[9] A greenfield operation is an investment in a manufacturing, office, or other physical company-related structure in an area where no previous facilities exist. In the World Bank's Private Project Investment database, greenfield operations include build-operate-own-transfer (BOOT), BOT variants, and reverse BOOT (included under Option B of Table 2).

[10] Total financing needs for water supply, sanitation, solid waste management, and slum upgrading in urban areas will be $25 billion per annum and will reach $50 billion per year if urban roads were included (ADB 2006, 22).

Canada and in the United States in the 19th century, and still exist in Hong Kong, China where seawater pipes are used to supply flushing water while other pipes deliver drinking water. However, multi-piping systems are often too costly for consumers (Cowen and Cowen 1998).

A large portion of the cost of supplying water and collecting sewage is tied up in the distribution network obscuring the potential for direct product market competition in developing countries (Shirley and Ménard 2002).[11] Installing piped water networks is capital-intensive with investments quite large relative to the size of the market. Studies from the United States indicate that the ratio of investments in fixed assets to annual tariff revenues of WSS is in the order of 10:1 compared to 3:1 for telecommunications and 4:1 for energy. Given the higher ratio in water supply, it becomes difficult to attract private investors and give them responsibility for financing investments because the payback period is long (Savedoff and Spiller 1999, Idelovitch and Ringskog 1995). In Zambia, Craig (2002) found evidence that breaking large water enterprises into smaller, and independent units ahead of sale, in order to ensure competition, eventually risks losing economies of scale in production.

The natural monopoly problem also explains why in some parts of Latin America and Africa, there are no known firms that tried to introduce direct product market competition other than water vendors (e.g., *aguateros* in Panama) and self supply[12](Abidjan and Conakry in Africa). This can be done on a limited scale though, with customers being supplied by alternatives such as boreholes or large individual reservoirs (Prasad 2006). In a study of 110 water utilities in Africa, Kirkpatrick et al. (2006) found evidence that the technology of providing water (high fixed costs and location specificity) has severely restricted competition.

Given natural monopoly problems and high sunk costs, rivalry under privatization tends to be confined to "competition for the market" or competition to win the contract or concession agreement. However, bidding for water concessions in developing countries tends to be problematic, often drawing a small number of participants (Kirkpatrick et al. 2004) due to high transaction costs and high risks. The number of bidders can also be limited by strict prequalification criteria as in the case of Kathmandu Valley (McIntosh 2003). With a few bidders, there is significant potential for either actual or tacit collusion that could compromise the bidding process (Cook and Minogue 2002). Collusion among private water companies restricts competition and encourages corruption. Lobina and Hall (1999) related how water concessions in Jakarta were awarded to two consortia in 1997—Thames Water and Suez—both known to be closely associated with President Suharto. After Suharto's ouster from office, the two consortia negotiated a new concession with the city council without competitive tender.

[11] **What explains the lack of experimentation with product market competition in water compared to other infrastructure?** London Economics (1998) argues that because a greater percentage of the costs in water systems are in the noncompetitive network than in the potentially competitive areas, the relative efficiency gains from competition are small. London Economics estimates that a greater percentage of the costs (around 66%) in water systems are in the noncompetitive network than in the potentially competitive areas (estimated at 34%). This is above that of electricity where transmission and distribution account for 60% of the costs and are potentially competitive (Shirley and Ménard 2002, Savedoff and Spiller 1999).

[12] **Self supply is an approach to water supply that concentrates on intervention and management at the household or** small group level. Those who are "unserved" with safe water continue to draw their supplies from sources they have found or developed themselves using traditional means.

3. Unclear Productive Efficiency

It is generally expected that PSPs are more efficient compared to public utilities. However, the impacts of private sector involvement on firm-level efficiency in the water sector have been mixed. For both industrialized and developing economies, studies do not robustly support the view that water sector PSP has improved firm-level efficiency. Studies using econometric estimations of cost functions, stochastic frontier production function analysis, and data envelopment analysis (Appendix 4) do not provide conclusive evidence of higher productivity or technical efficiency among PSP water utilities. Of 20 studies reviewed, only three show concrete evidence on technical efficiency improvements or cost reductions under PSP. Some caution needs to be exercised here as measurement has been obscured by the lack of comparable data, poor quality of data, and short time period for analysis; as well as the fact that studies were often undertaken for the period immediately after privatization.[13] Moreover, two recent World Bank studies concluded that "there is no statistically significant difference between the efficiency performance of public and private operators in this (water) sector" (Estache et al. 2005, 12). Furthermore, Hall and Lobina (2005) found evidence that strongly suggests there is no systematic intrinsic advantage to private sector operations in terms of efficiency. This lack of clear evidence on firm-level efficiency and cost reduction through PSP may be a manifestation of inherent difficulties in creating adequate competition in the WSS sector.

4. Pricing Issues

As discussed earlier, political goals often motivated developing country governments to keep water tariffs low. With privatization however, water tariffs are normally bound to increase as prices need to recover the full cost of providing WSS. While price increases to cover costs do not constitute market failures, information failures tend to accompany the process of tariff setting with private operators in developing countries. Tariff setting is most contentious when negotiating privatization contracts. The much-publicized failure of privatizing water in Cochabamba (Bolivia) was due to a combination of complex political, social, and economic factors, where the doubling of tariffs in January 2000 fueled much opposition. Consumers opposed the contract because many felt that it would have been against their long-term interests. Contracts with the private sector are often renegotiated on the basis of tariff levels. Some case studies in Latin America show that private operators are not transparent with regard to the parameters or pricing schemes that they plan to implement (Clarke et al 2004). Certain studies even blame the incidence of contract renegotiations to moral hazard problems, which tainted those pursued in Buenos Aires and Manila (Davis 2005). In the concession tenders for both cities, firms were required to submit bids with average tariffs at or

[13] The potential problems in all empirical work in privatization include the lack of data and bad data, omitted variables, endogeneity, and selection bias. The two most pronounced difficulties are determining the appropriate set of comparison firms or benchmarks, especially in developing economies with limited private sectors, and the fundamental reasons why certain firms are government-owned. Thus, it is difficult to evaluate the effects of government where the ownership structure itself, which includes both political and performance goals, is endogenous to the system. Moreover, some of the studies that assess the impact of privatization often combined both industrialized and developing economies, producing results that may be unreliable (Megginson and Netter 2001, 332). Assessing the impact of privatization is difficult due to a number of methodological problems including the lack of a counterfactual, difficulty in identifying benchmarks to assess performance, complexity in doing general equilibrium model analysis, danger of short-run performance improvement, and unclear basis for causality (Parker and Kirkpatrick 2005, 515–16). Other limitations include the small sample size, poor quality of data, and shorter time frames for analysis (Clarke et al. 2004, 4).

below levels previously charged by the government.[14] Davis (2005) argues that companies tend to pledge unrealistic tariff reductions during the bidding, expecting to renegotiate these clauses once the contract is awarded. Many governments often agree to new demands by the private firm given the high political and financial costs of canceling a contract and initiating a new bidding process. These problems are common in developing countries where governments' capacity to negotiate contracts with experienced multinational firms as well as to regulate their operations is weak.

5. Low Coverage

One of the important expectations of PSP is that the private sector brings resources to invest in the WSS sector so that coverage can be increased. However, increasing water coverage in developing economies has been difficult to achieve under PSP for two reasons. On the demand side, water users in some countries are not willing to pay cost-recovering tariffs, partly because people are not aware of the health benefits flowing from reliable supply of water.[15] In these countries, effective strategies to sensitize the public on key issues such as paying for water, raising hygiene awareness, reducing vandalism and misusing facilities are rarely developed before launching the PSP (WUP Africa 2003). For example van den Berg et. al. (2006) show that all the main assumptions made in designing a PSP in Sri Lanka are unrealistic. Culture can also constrain demand where for instance, it proved difficult to impose cost-recovery tariffs given the culture of nonpayment among those living in the black townships in South Africa (Budds 2000).

On the supply side, private suppliers aim to make a profit and hence, they will invest only where they expect to make a profit. Therefore, the poorest clients are inevitably neglected. Concerns abound that PSP could hurt the poor in at least two ways. First, introducing PSP may make cross subsidies difficult and encourage private firms to "cream skim" or "cherry pick", i.e., serve the most profitable customers and ignore the unprofitable ones (i.e., poor and rural consumers). This led private water companies in the People's Republic of China—Suez and Veolia—to operate largely within or near the wealthier residential and industrial centers (McKee 2007). Second, large costs in water supply force private operators to recoup their investment by charging high connection costs, which the poor cannot afford (Savedoff and Spiller 1999). For instance in Buenos Aires, customers in the poorest regions were asked to contribute almost 20% of their income to get water connections (Estache et al. 2000). Thus, in the absence of properly targeted safety nets, it is likely that the poor may be excluded from WSS services.

Rural areas have been neglected for the most part. It is costly for the private sector (and government) using conventional technology to supply water to rural areas, where the population density is low and users are widely dispersed. A World Bank study on improving rural water supply

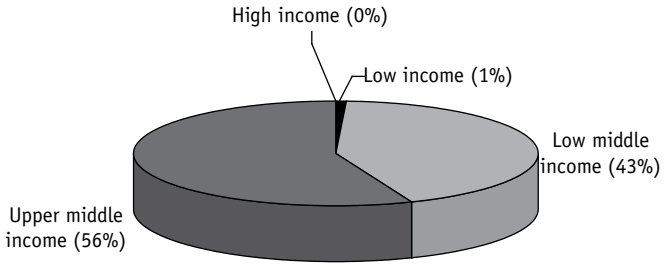
[14] In the case of Buenos Aires, the winning firm offered to set average tariffs 27% lower than the rate charged by the public utility. In Manila, which was divided into two service areas with separate concession agreements, the winning firms pledged to reduce average tariffs by 26–43% (Davis 2005).

[15] This is common among low-income settlements of Côte d'Ivoire, Nigeria, and Zambia where communities are not fully informed on a wide range of issues (e.g., planning and design, operation and maintenance of a water utility) and/or inappropriate information channels/messages are used to reach them (WUP Africa 2003).

in Nusa Tenggara Barat, Indonesia showed that installing a large-scale piped system can cost five to ten times more than rural wells and simple gravity-fed piped systems.[16]

Small scale independent providers[17] (SSIPs) that recent literature has classified under privatization have taken on the task of supplying water to rural areas in some developing economies, as is common in Latin America and Africa. However, SSIPs cannot exploit the same economies of scale that large water utilities enjoy forcing them to charge by as much as four to ten times the usual rate. Hence, SSIPs have often been branded as exploitative and at times, "evidence does suggest that they earn excessive rents" (Davis 2005, 150). For reasons cited above, private capital in the water sector became subsequently concentrated in urban areas given their larger investment needs, higher population density, and high revenue potential.

Figure 2
Private Involvement in Water and Sewerage Projects
(1990–2005)



Source: Madhoo (2007).

Private investments also appeared to have benefited the relatively wealthier countries as the risks associated with water projects in less developed countries are high (Davis 2005; Budds and McGranahan 2003; World Bank 2004,170). Figure 2 shows that for the period 1990–2005, upper-middle-income countries captured 56% of the total investment of $46.2 billion and lower middle income countries getting 43%, while the lowest income countries received only 1% of total private investments. During this period, private investment flowed largely to Argentina (27.5% of total concession funds), Malaysia (20.6%), and Philippines (19.6%) (Madhoo 2007). Latin America benefited largely from private flows given their higher levels of household income, economic and political stability, and perceived government commitment to market liberalization, which is favorable to private investments. Sub-Saharan Africa (SSA) captured the smallest volume of investments (about less than 0.2%), most of which were described as a widespread failure. By 2003, only 5% of the

[16] The average financial incremental cost for installing a large-scale water piped system costs Rp1,197 per cubic meter, rehabilitating a large-scale piped system is Rp526, versus Rp89 for rural wells and Rp96 for simple-piped systems (Perkins 1994).

[17] SSIPs are essentially private sector entrepreneurs who supply water such as vendors who use carts, bicycles, or poles to carry containers of water to customers; kiosks or standpipe operators; tanker truck delivery persons; and households that sell water from their private connections to neighbors. SSIPs sell water to households (often the poorest) that are usually unconnected to existing piped systems, and households wishing to augment their existing supply.

world's population was being served by the formal private sector (World Bank 2004, Kirkpatrick et al. 2004, and Budds and McGranahan 2003). To date, private financing in water supply and sanitation account for less than 10% of total infrastructure investments in developing countries (World Bank 2007).

B. Norms for Successful PSP in Developing Economies

As discussed in the previous section, PSP in the WSS sector has neither created adequate competition that can drive down costs and prices, nor has it mobilized large amounts of resources to the sector and increase coverage. Nevertheless, some PSPs succeeded in effectively delivering WSS. Experience has shown some preconditions for success. From the supply side, an enabling business environment, innovative schemes for product market competition, an effective regulatory mechanism and contract enforcement, and strong institutional factors are behind successful PSPs in the WSS sector. Similarly from the demand side, adequate willingness to pay for improved WSS service, feasibility of metering,[18] cost-recovery tariffs, and context-specific measures had to be met to ensure success.

C. Supply-Side Conditions

1. Policy and Institutional Environment

Private sector participation has made more progress in high-income and middle-income countries, but has failed considerably in low-income developing countries. Success in the wealthier countries is attributed to an investment climate that is conducive to private capital and reduces the risks associated with operating water systems. In developing countries, private sector participation is easier to launch and more likely to produce positive results under a market-friendly policy environment and where the government has ample capacity to regulate. Such an environment is characterized by the existence of competitive product markets for other goods, organized and competitive labor markets, mature capital markets, competitive managerial labor markets; together with institutionalized management training, well-defined property rights, good business ethics, and good governance. PSP launched in developing countries with these enabling characteristics have shown noticeable success. Privatization succeeded in Chile, Mexico, New Zealand, and United Kingdom as these were accompanied by reforms to open markets, removed price and exchange rate distortions, and encouraged free entry (World Bank 1992). The 2002 Water Resource Law in China introduced a user-pay system where water user is charged based on the actual amount of consumption, reducing the commercial risks for private operators (McKee 2007). That paved the way for introducing PSPs in the PRC.

2. Innovative Measures to Create Competition

Views about what constitutes a "natural monopoly" in utilities have changed radically in recent years. In developing economies, competition has been stifled by the lack of any effort to address the natural monopoly problems in the water sector. The solution to this problem is to isolate the natural monopoly elements. While this has been done in the gas and telecommunication sectors,

[18] Water values should be high enough to justify the cost of metering.

this has not largely been done[19] nor tested in the WSS sector. The literature suggests three ways of improving productive efficiency in the water sector namely concentration, trading water rights, and competition. In industrialized countries, the latter two are more widely practiced. While concentration (also referred to as town agglomeration[20]) has been adapted in the developed economies such as Belgium, Italy, and Netherlands, this is not always feasible in other countries (especially developing economies) due to political, legal, and/or geographical restrictions. Water trading has been done but mainly in agriculture and more often to address seasonal demand (Foellmi and Meister 2005).

Competition can be achieved either through competition for the market (i.e., through bidding of contracts as discussed earlier) or through direct product competition. In industrialized economies, direct product competition has been done through three basic channels: inset appointments, border line competition, and common carriage. Inset appointment in England, Italy, and Wales enable the licensees to allow new entrants to supply customers in a defined geographical area. Border line competition such as in Poland and Czechoslovakia allows customers (usually large customers) that are located at the border of a supply area to purchase water from an existing neighboring utility. Common carriage (recently adopted in England) is a model of interconnection, wherein two or more rival companies render water services in the same area and customers are free to choose their water supplier. In such a model, former monopolists connect their water networks in order to allow each other access to their distribution pipes—similar to telecommunication or electricity—based on access pricing. However, there are difficulties associated with common carriage including limitations of mixing different water qualities,[21] extensive coordination requirements for the exchange of treated water, diseconomies of scale due to pumping requirements, and quality losses over long distances that can significantly limit the exchange of water between utilities. Given these difficulties, efficiencies may be achieved only at the regional or local level. At this stage, the potential for common carriage to induce competition is still unclear given high transport costs and high fixed costs in the water sector (Foellmi and Meister 2005, OECD 2004).

3. Effective Regulatory Mechanism and Contract Enforcement

When direct product competition is not feasible, the regulatory mechanism is expected to provide incentive for competition and ensure socially desirable outcomes. Given that the private sector's main motive is profit, regulatory mechanisms have a greater role to play under PSP. But as discussed earlier, a more effective regulatory framework is absent in the low-income countries. Even where rules and guidelines for competition did exist, they were poorly implemented (Cook 2002).

[19] There are isolated instances of parallel piped water systems that can be found in some arid areas, where one system delivers pure water for direct human consumption and the other delivers lower quality or reclaimed water for such uses as flushing toilets or watering gardens. Thus, some competition even in delivery, based on quality differentiation and price, can be found, indicating that reformers ought to consider whether their water system really is a ubiquitous natural monopoly (Noll et al. 2000).

[20] The 1994 Galli Law mandated that all existing water service suppliers should be consolidated into water sector management areas, based on hydrographical sub-basins ("optimum territorial areas," referred to as "OTAs"), to be defined by the 20 regional governments within six months. The process was delayed however, due to strong political resistance to aggregate and to objections by influential vested interests, particularly private operators who, before the Galli Law, managed roughly 5% of Italy's water and wastewater services (Kingdom 2005, 8).

[21] Mixing different water qualities raises the possibility of leaching and corrosion of pipes, sedimentation, suspension of particles, and microbial quality. These can also happen when there is a need to pump water for long distances (Foellmi and Meister 2005).

In a number of case studies of water privatization in Latin America,[22] Shirley and Ménard (2002) observed that a regulatory contract with a private operator could most likely succeed under three conditions: (i) information asymmetries between regulator and utility are reduced; (ii) incentives are provided to motivate the utility to comply with the contract's goals; and (iii) both parties provide credible signals of their commitment to abide by the contract, and credible enforcement is in place.

Information asymmetry can be reduced by introducing competition (e.g., product market competition, competition for the market, and yardstick competition) and by monitoring. Although product market competition is rare in water, the regulator can use competitive bidding for the franchise to operate the system, and yardstick competition to augment the information base. Yardstick competition, such as that pursued in Wales, was quite problematic as utilities operate under various circumstances that are often not comparable. More sophisticated as well as pragmatic regulatory mechanisms such as the Vogelsang–Finsinger mechanism can be used to avoid information asymmetry (see Train 1997 for details).

There is emerging evidence that in seeking contracts with the private sector, transparent tendering and information disclosure yields better conditions for consumers. Shirley and Ménard (2002) described how competitive bidding was effectively employed in Buenos Aires. Firms revealed more information whereby the proposed water tariffs reflected the bidders' assessment of investment as well as operating costs. Under Argentina's contract, the government's commitment to sustain full convertibility (of returns) at a fixed rate reduced the risks associated with exchange rate devaluation (Cook 1999). In Cambodia, Webster and Sansom (1999) found that contracts with local private operators required them to explicitly provide full coverage in their respective or designated areas.

The regulatory mechanism should include effective incentives to induce the private sector to reveal more information and not to act opportunistically. Incentives often take the form of setting specific targets, sharing risks and rewards, or price regulation. Prior to privatizing in 2003, the Metropolitan Waterworks Authority in Thailand streamlined its manpower and installed a key performance indicator system to evaluate work efficiency and control expenditure, resulting in profits 40.3% above-target (McIntosh 2003). In Senegal, the government based the remuneration of the private operator on the efficiency of the network (measured by lower unaccounted-for-water, and higher billing and collection efficiency), and operator contributions to capital expenditures (UNECA 2005). In a public–private partnership for water services in Colombia, the management fee for the operator was linked to revenues creating an incentive to improve billing and collections, as well as to reduce leaks and to expand services (World Bank 2006b).

Commitment of the government to effectively enforce the contract and resolve disputes plays a critical role in successful PSP. Such mechanisms should also include penalties for reneging on the contract, including fines, forfeiture of bonds, and revocation of the contract. For instance, the contract with the water operator in Santiago could be revoked for nonperformance and the company could be sued by consumers for failure to provide adequate service (Shirley and Ménard 2002). Commitment is deemed to be stronger, particularly on the part of developing governments, when there are strong institutional factors that ensure good governance and effective regulation.

[22] The case studies include privatization contracts of different forms ranging from management contracts to concessions in Buenos Aires (Argentina); Lima (Peru); Mexico City (Mexico); to urban water supply in Chile, Abidjan (Côte d'Ivoire), and Conakry (Guinea).

Probity is crucial in ensuring successful PSP. To achieve this, the regulator needs to be shielded from political interference (Cook 1999). Credible regulatory frameworks exist where the operator has some autonomy from the executive branch, arms-length relationships between governments and public water agencies, and cordial relationships between government and private investors as in Argentina and Brazil (Savedoff and Spiller 1999). Among those studied by the World Bank in Latin America, Santiago's regulator was powerful, independent, politically insulated, and guided by detailed laws that left little room for abuse (Shirley and Ménard 2002). Moreover, the government needs to support a regulatory environment that is transparent, consistent, and accountable (Cook 1999) to ensure the success of the PSP.

4. Demand Side Measures

While the foregoing suggests a host of supply-side conditions should be in place for PSP to be successful, certain demand-side conditions should be simultaneously met to ensure success. These conditions include feasibility of metering, adequate willingness to pay, cost recovering tariffs, and certain context-specific factors.

Metering follows the user-pay principle whereby a consumer pays for the amount of water he/she consumes. However, the water values should be high enough for metering to be economically feasible. The need to recover costs is universally accepted. However, assessment of willingness to pay and the public's preference for private sector provision of WSS, and the participatory assessments on feasibility of tariff increases, should precede the introduction of PSP. PSP that had paid attention to these demand aspects and had considered price elasticity in revenue predictions has performed better.

Tailoring the provision of WSS according to local circumstances can help make the service acceptable to the customers. For instance, water multinationals partner with local private operators in Cambodia, Colombia, Paraguay, Philippines, and Uganda, given that the locals have a better understanding of the market (Triche et al. 2006). Durban Metro Water in South Africa differentiates its water service by offering the poor (approximately 30% of the total 3 million) a choice of water connection: full pressure "high tank" or "low tank" each with different connection charges and monthly tariffs. Water kiosks are available for those who are not willing to pay for piped water, as are standpipes from which water is sold at an affordable rate (Webster and Sansom 1999). Temporary connections can be tapped in Haiti and Burkina Faso to address the needs of slum areas (WUP Africa 2003). Appropriate involvement of the community and civil society organizations in designing the PSP systems also has enhanced the acceptance of PSP among local communities.

D. Lessons Learned: Private Sector Participation

The poor performance of the public water utilities provided the impetus for PSP in the WSS sector. As shown in the previous section, however, PSP in the WSS sector in developing countries has often fallen short of expectations. PSP succeeded when (i) enabling policy and institutions were in place; (ii) innovative approaches are used to create competition; (iii) effective regulatory mechanisms and contract enforcements are feasible; (iv) there is effective demand for improved WSS; (vi) innovative and flexible approaches are used to suit the local conditions; and (vii) transparent and participatory consultative process precede the privatization process.

The experiences of the private sector in supplying household water in developing economies offer valuable lessons. First, privatization has largely failed in developing economies because efforts to privatize were often expedited without sufficient forethought, analytical work and public consultation. The need to meet conditions for aid and debt relief, rather than the merits of reform, drove some developing governments to involve the private sector in WSS services. Many of these countries undertook privatization even if the necessary policy, legal, and political institutions were not yet in place (Almansi et al. 2003, Bayliss 2002, and Cook 1999).

Second, PSP as a strategy achieved a modicum of success in industrialized economies. Developed countries benefit from mature capital markets with stock exchanges, venture capitalists, banks and other finance institutes, a well-functioning legal system that protects private property rights, and conventional standards of business behavior (business ethics) that facilitate market exchanges. In developing countries however, many of these institutions remain weak or are nonexistent. For instance, in many developing economies, there is a paucity of liquid capital markets to facilitate share trading, and a shortage of institutions that can curb rent seeking by the private sector (Parker and Kirkpatrick 2005).

Third, experience has shown that a pure change in the structure of ownership—from being government to private ownership—does not necessarily enhance the efficiency of supplying WSS. Lessons from studies of PSP show that lack of competition is generally more important than ownership itself in explaining the performance of PSP in the WSS sector (Kirkpatrick et al. 2006). Therefore, the process of privatization has to be complemented with measures that will provide incentives for competition. Fourth, PSP is largely motivated by profit, it is most likely for the private sector to avoid the poor areas and rural markets (OECD 2004) in the absence of supplementary measures by the government to ensure inclusiveness.

In the main, PSP is not a panacea for all the problems in the WSS sector as some development practitioners had thought in the early 1990s. PSP produces good results under certain circumstances. Therefore, selective application of PSP in the WSS sector is imperative. The lessons point out that synergy between the public sector (in setting the "rules of the game"; effective contract enforcement; and effective regulatory mechanism) and the private sector (innovative ways to reduce cost and increase efficiency, ethical conduct of business, and corporate social responsibility) will eventually determine socially optimal outcomes of PSP in the WSS sector. When the enabling business environment and policy and regulatory measures are largely not in place, reforming the public utilities should be given due consideration. Public sector reforms to reduce nonmarket failures serve as a viable alternative for PSP under certain circumstances, as well as a platform for future involvement of the private sector.

IV. PUTTING LESSONS TO PRACTICE

Despite its limited success in developing countries, PSPs play a potentially important role in the WSS sector. Selective and well-planned application of PSP under suitable circumstances is the key to success. Gauging from the experiences surveyed by this paper, the following steps offer a useful general guide in introducing PSP in the water sector.

(i) *Conduct participatory assessments and rigorous demand analysis*. Rigorous analysis on effective demand is critical to understand the feasibility of recovering costs and the potential for profit. The size of the market and willingness to pay for improved services

are critical information to assess the feasibility of PSP. Conjoint analysis to understand the demand for service attributes is complementary to the demand assessment (see Gunatilake et al. 2006 for details). In-depth tariff analysis that takes into account the effect of price elasticity on revenues is indispensable. These analyses should be undertaken in a participatory and transparent manner to ensure public support for PSP.

(ii) *Examine the existence of an investor-friendly business, policy, and institutional environment*. The right climate begins with an overall broad framework that spells out the policies needed to entice private investment. Maturity of capital markets and financial institutes, the capacity of the legal system to protect private property rights, standards of behavior of the private sector (business ethics), and the level of governance and law enforcement should be properly assessed before launching PSP in the WSS sector (ADB 2002).

(iii) *Study pro-poor service delivery options*. As clearly evident, there is a greater chance that the poorest segments of the society may not be serviced by the private sector. In-depth analysis on the feasibility of the pro-poor service delivery should accompany PSP designs.

(iv) *Use a gradual and stepwise approach*. In involving the private sector, a stepwise approach can be undertaken beginning with a simple arrangement such as a management contract. This allows the so-called "test the waters" approach before launching bigger and complicated schemes. Implementing privatization in phases can also help in determining and selecting the most appropriate option to involve the private sector. In countries where there is mistrust on the private sector, this stepwise approach helps in gaining public support eventually determining the political will for PSP-related reforms in the WSS sector.

(v) *Broaden the information base on risks*. Before entering into any contract, both the government and water utilities should obtain expert advice. Best practices in risk management include careful identification, analysis, and ranking of risks by an expert team before competitive tendering.

(vi) *Establish an effective regulatory body*. An effective regulatory framework must be in place for PSP to succeed in the WSS sector. Transparency, public awareness, and public relations are beneficial to regulatory mechanisms. An incentive-based regulatory approach that reduces information asymmetry should be given priority. The capacity of the regulatory body should be enhanced to ensure effective contract enforcement.

(vii) *Tariff reforms*. There should be an agreement between the government and the private sector over appropriate tariff structures and tariff-setting mechanisms. Sound economics in water management demands that water should be provided at fair and reasonable rates and that proposed rate increases be linked with agreed improvements in services.

(viii) *Good relations between the governments and private operators*. A synergistic relationship between the public agencies and the private sector should be fostered.

(ix) *Consider alternative reforms in the sector.* If the enabling business environment is weak, reforms for the public utility must be considered. Rushing into privatization in developing economies, when enabling conditions are not in place, will not only lead to failures but also reduce the political will for future PSP. On the other hand, suitable public sector

reforms will enhance the performance of existing water utilities and pave the way for the future PSP.

It should be noted that there is no blueprint for introducing PSP in WSS sector. It is essential to understand and study vigorously the context under which the PSP is introduced including the culture, political structure, and legal and regulatory framework of the investment site.

V. CONCLUDING REMARKS

Private sector participation in WSS as a strategic policy has gained reasonable progress in higher and middle-income countries, although the experiences in the poorest developing countries are not encouraging. Upscaling this process in developing countries without thoroughly understanding the local contexts under which the private sector can operate can result in failures. When applied in right environments, PSP can produce socially desirable outcomes. More specifically, a change in the structure of ownership (from government- to private-owned) is not sufficient to make PSP work; rather the presence of an enabling environment that harnesses competition is necessary for success. Conditions under which the private water supplier can be more efficient include an innovative approach to competition, effective regulation, good governance and contract enforcement, and sufficient effective demand. Ensuring that these necessary conditions prevail in the developing economy is a must before any PSP in the WSS sector.

Experience has also shown that privatization is not a "one size fits all" solution for the problems of poorly performing public water utilities. Therefore, selective application of PSP in the WSS sector backed by rigorous prior assessment of its feasibility is imperative. When prevailing conditions are not suitable for introducing PSP, reforming the public utility should be given due consideration as a viable alternative. Such reforms should minimize/prevent nonmarket failures by enhancing internal and external accountability, customer orientation, and autonomy. In addition, a more independent regulator is critical to making water operations more efficient since self-regulation is a questionable preposition. The public and private sectors are interdependent. A well-performing public sector is a necessary condition for the success of PSP in the WSS sector. Therefore public sector reforms should not be overlooked in the process of engaging private investors in the water sector.

APPENDIX 1
MARKET AND NONMARKET FAILURES: THE ROLE OF THE PUBLIC SECTOR

Understanding the success of the market mechanism may be the best way to comprehend market failures. Toward this end, the success of the market can be measured using the concept of economic efficiency or Pareto optimality.[23] Given resource endowments, technology, and preferences, an economy is said to have achieved efficient allocation of resources if such allocation maximizes social welfare. The most fundamental theorem in welfare economics asserts that a competitive market economy results in economic efficiency. This preferred result of the idealized model of a perfectly competitive market is achieved under a set of restrictive assumptions.[24] Despite the fact that all these assumptions are rarely met in the real world, the perfect competitive market model plays a central role in economic policy analysis.

As asserted by basic economic theory, if the market does this perfect duty of efficient resource allocation, what should be the role of the government? Under a perfect competitive model, the government's role is minimal and confined mainly to providing the enabling policy and institutional environment for the market system to function. These actions include protecting property rights, instilling law and order, maintaining a judicial system, and maintaining macroeconomic and political stability. Apart from these fundamental roles, the governments' action in the economy is largely justified in two instances: (i) when the market fails to achieve Pareto-efficient resource allocations; and (ii) when the market allocation of economic outcomes is inequitable.

A. Market Failures

Market failures occur when the prices of goods and services send false signals about their real value, distorting the communication between consumers and producers. They reflect non-Pareto-efficient resource allocations by the market. The classical market failures include incomplete markets, monopoly and other market imperfections, externalities, public goods, and nonconvexities. A key requirement to avoiding market failure is for markets to be complete, i.e., enough markets should exist to cover each and every possible transaction or contingency so that resources can move to their highest valued use. A natural monopoly exists when there is great scope for economies of scale to be exploited over a very large range of outputs. Externalities are unintended side effects of production and consumption activities that are not traded in the market. A public good is a good whose consumption is nonrival and nonexcludable. Nonconvexities create a situation that makes it difficult to find a unique equilibrium.

In addition to the abovedescribed classical market failures, a number of economists[25] led by Sitglitz and Greenwald have studied the validity of perfect information assumption in the competitive market model (Stiglitz 2002, Kherallah and Kirsten 2001). They argue that when parties to economic transactions have different amounts of information and different objectives, they will behave strategically, often at the expense of the other. Both parties will typically know who has the superior information, and will assume that the better-informed one will use this information to his/her best advantage. This situation constitutes a market failure in the sense that if equal information were available to each party, a socially superior bargain could be agreed upon (Bjornstad and Brown 2004). The information failures can be further elaborated upon as principal-agent problems, which refer to difficulties that arise due to asymmetric information. Principal-agent problems can take the form of either *moral hazard* or *adverse selection*. Moral hazard results in a situation

[23] An economy is said to be at a Pareto optimal state when one person cannot be made better off without making another worse off from further reallocation of resources.

[24] The basic assumptions of the free market model include : (i) free entry and exit to the market; (ii) homogeneous goods and services; (iii) no agent has market power, i.e. they are price takers; (iv) all agents have perfect information concerning market conditions; and (v) there are no market failures.

[25] The economics of information literature includes the seminal papers by Akerlof (1970); Stigler (1961 and 1967); Stiglitz and Weiss (1981); Stiglitz (1985); Greenwald and Stiglitz (1986); Arnott, Greenwald, and Stiglitz (1993).

wherein the principal (e.g., government regulator) cannot observe the actions of the agent (e.g., a water utility). Adverse selection refers to situations in which the principal cannot identify the type or character of the agent. In both these cases, markets do not allocate resources optimally.

Besides the abovementioned market failures, Rodrik (2004) argues that the rationale for government involvement in the economy stems from two key market failures that weaken the entrepreneurial drive to restructure and diversify low-income economies: information externalities and coordination externalities. The former has to do with informational spillover effects involved in discovering new products or services in an economy, while the latter has to do with coordinating investment activities with scale economies. Information externalities discourage innovation because the benefits of an innovation are largely enjoyed by the rest of the economy. Coordination problems occur when upstream and downstream investments are not engaged simultaneously, consequently deterring the development of profitable new industries. Correcting these market failures to ensure efficient allocation of resources is one of the fundamental roles of the government.

B. Nonmarket Failures

Failures in the market invite government actions in the economy in terms of policy interventions or public provision of goods and services. Thus, market failure is a necessary condition for government to intervene in the economy. However market failure is not a sufficient condition because governments also frequently fail to undertake optimal interventions. Nonoptimal government interventions are generally known as nonmarket or policy failures. The theory of nonmarket failures evolved from parallels drawn by Wolf with the conventional theory of market failure (1978, 1979, and 1988); simplifications to Wolf's theory introduced by Le Grand in the 1990s; and normative approaches proposed by Vining and Weimer in 1991 (Wallis and Dollery 1999).

Wolf (1988) discussed that nonmarket failures can arise as a consequence of internalities, redundant and rising costs (often leading to inefficiencies and resource misallocation), and derived externalities. He also considered inequitable provision of public services as a nonmarket failure. In the public sector, internalities occur when the private interests of public officials diverge from the intended or ideal role of the public agency. Costs also tend to become redundant and increase "where the revenues that sustain an activity are unrelated to the costs of producing it" (Wolf 1988, 63). Using more resources than are necessary to produce a given output, often beyond what is needed to correct the market failure, becomes regular under this circumstance. Derived externalities represent the unintended and unanticipated side effects of government interventions that aim to address market failures. Wolf claimed that nonmarket activities can generate distributional inequities, in that some public actors exercise authority or power over others, encouraging abuse.

Wolf postulates that nonmarket failures occur as a result of peculiarities in the underlying conditions of supply and demand of publicly provided goods and services. He identifies four attributes of nonmarket supply. First, "non-market outputs are often hard to define in principle, ill-defined in practice, and extremely difficult to quantify or to evaluate as quality" (Wolf 1988, 51). Accordingly, inputs are generally used as a proxy measure for output. Second, nonmarket outputs are usually produced by a single public agency often operating as a legally constituted monopoly. The absence of competition makes it difficult to achieve economic efficiency. Third, technology of producing nonmarket outputs is frequently associated with considerable uncertainty and ambiguity, which may consequently worsen economic inefficiencies. Fourth, nonmarket production activity is usually characterized by the absence of any bottom-line evaluation mechanism equivalent to the profit or loss for appraising success in private firms. Often, there is no specified procedure for terminating unsuccessful nonmarket production.

Wolf (1988, 39–50) also describes five basic conditions that create demand for nonmarket goods/services that can lead to failures. First, an increased public awareness of market shortcomings leads to a reduced tolerance of them, and consequently, heightened public desire for state intervention. Second, he attributes the demand for government's actions to political organization and enfranchisement and the resultant increases

in the effectiveness of special interest groups in the political process. Third, these politicians and bureaucrats are rewarded for propagating interventionist solutions to perceived social problems without rigorously studying the costs of their implementation. Fourth, the demand for nonmarket activity is enhanced by the high time-discount of political actors whose short tenure in office tends to focus more on current rather than future costs and benefits. Fifth, demand for nonmarket goods/services is often characterized by the decoupling between those who receive the benefits and those who bear the cost (Wallis and Dollery 1999).

For his part, Le Grand posits that government's intervention through direct provision, taxation, or regulation of a good or service can potentially introduce market distortions that can lead to production inefficiency. Moreover, the absence of any competition can encourage government's monopoly over service provision, which can lead to inefficiencies. Vining and Weimer claimed that where contestability[26] in supply and ownership is low, governments cannot efficiently serve the market (Dollery and Worthington 1996).

The theory of market failures has been well established compared to that of nonmarket failures. Critics of these theories would argue that they are inadequate to explain the shortcomings of both markets and the government, alluding to transaction costs as a better alternative theory (Ballonoff 1999, Wallis and Dollery 1999, Zerbe and McCurdy 1999). Notwithstanding the perception by some authors of the inadequacies of market and nonmarket failure theories, this paper has adopted this framework as a useful point of departure to analyze the shortcomings of both the government and the private sector in supplying WSS.

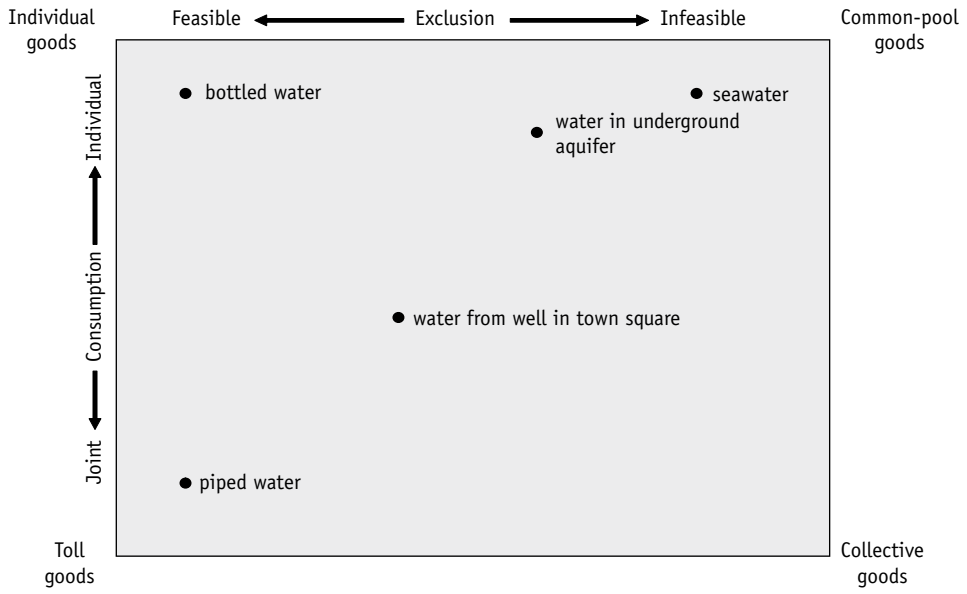
C. Water: An Extraordinary Good

Compared to other forms of infrastructure (telecommunications, roads, and electricity), providing water to households is fraught with difficulties. This is partly due to the extraordinary nature of water as an economic good. By its very nature, water can satisfy the definitions of both public and private goods. Pure public goods are said to be nonexcludable and their consumption is nonrival. Exclusion ensures that those who are unwilling or cannot pay are "excluded" from using the good. Nonrivalry precludes joint consumption (Hanemann 2005, Savenjie 2001, Savas 2000, Ostrom and Ostrom 1977). However, some goods fall within the sphere of "publicly-provided goods" that are distributed by tax-collecting governments.

Appendix Figure A.1 shows four idealized types of goods. In their purest form, individual goods (often called "private goods") are consumed individually for which exclusion is completely feasible. Toll goods are jointly consumed and exclusion from use is feasible. Common-pool goods can be individually consumed, but exclusion of usage is infeasible. Collective goods can be jointly consumed and exclusion is infeasible (Savas 2000). Along a spectrum of properties based on exclusion and rivalry in consumption, certain variants of water can be best provided by the government (e.g., water in underground aquifers) while others can be best supplied by the private sector (bottled water). However, some form of water present problem of "natural monopoly" (e.g., piped water supply), where cost per user decreases as the number of users increases, making it most economical to have a single supplier. In the case of piped water, this sole provider can either be the public or the private sector. In many instances, this sole provider is subject to regulation so that the owners do not exploit their monopoly privileges.

[26] A market may be described as perfectly contestable if no barriers to entry or exit exist (Dollery and Worthington 1996, 7).

Appendix Figure A.1
Exclusion and Consumption Properties of Water Supply



Source: Savas (2000).

Given the diversity of water goods and varying peculiarities associated with each form, this paper limits the discussion to household water supply and sanitation.

APPENDIX 2
EVIDENCE OF NONMARKET FAILURES IN WSS

Government's inefficiency in providing water supply in many developing economies has often been traced to the divergence between personal and social goals reflective of Wolf's internalities, poor financial management characterized by rising and redundant costs, imbalance in the concentration of power and resources implying distributional inequity, and adverse consequences or derived externalities arising from poorly studied policies.

In many government-run water utilities, the actions of the service providers reflect more their personal goals, often leading to behavior and outcomes that deviate from ones that are socially preferable (Dollery and Worthington 1996). Reflective of Wolf's so-called internalities, Krueger (1990) sees the government as consisting of various actors including politicians who, like those in the private sector, are concerned with their self-interest, which may focus on survival, promotion, reelection, or other rewards, oftentimes at the expense of broader social welfare goals. In the water supply sector, short-term political goals are especially evident in tariff setting. In Latin America during the 1990s, water was treated as a political commodity and priced unreasonably low to satisfy the electorate. Such low prices encouraged inefficient water usage, drove up system losses and costs, preventing operators from financing business expansion.[27] Low prices caused the average return on equity of water operators in Peru to fall to 0%, and revenue per connection to average only 50% of operating costs in Honduras (Savedoff and Spiller 1999). The World Bank estimated in 1994 that water utilities in developing countries recovered on average, only around 30% of their total cost. As a result, utilities have neither incentive nor capacity to deliver services to large sectors of the population, especially the low-income households (Cowen and Cowen 1998).

The divergence of personal from social goals has been exhibited in its extreme form as corruption. Plummer and Cross (2007) describes how corrupt practices in Africa's water sector led to resource abuse—theft and embezzlement from budgets and revenues, corruption in procurement, administrative corruption in payment systems, and corruption at the point of service delivery. Estache and Kouassi (2002) estimated that ridding African utilities of corruption would enhance their efficiency and reduce their costs by as much as 64%.

Many water officials propagated their self-interests by acquiring and controlling information to wield influence or power. In documenting instances of rent seeking and corruption in South Asia's (India and Pakistan) water supply and sanitation, Davis[28] (2004) cited the prevalence of contractor cartels that defied the goals of competitive bidding. Where there are no cartels, contractors competed against one another by partnering with elected officials and senior bureaucrats, who could provide inside information and/or carefully manipulated tender documents to subvert even the best tendering systems. The value of kickbacks to public officials normally ranged from 6% to 11% of the contract value. Corruption also took the form of bribery or informal payments to junior staff of public WSS agencies for illegal connections. Agencies were under intense political pressure against disconnecting these illegal connections because the involved households are perceived to be lower-income residents. Service theft accounted for roughly one third of the unaccounted-for-water and about 8% of the service delivery costs. While service theft was not costly from a revenue perspective, removing illegal connections posed serious political repercussions.

Politicians and officials responsible for water sector policies were seen to build up opportunities for rent seeking by influencing the focus of policy and investment priorities. The main bone of contention was coming up with a system of credible regulation, because no one could expect the government (who owned and operated the water system) to regulate itself. Regulatory capture was rife in some African countries wherein

[27] Savedoff and Spiller (1999) studied selected utilities in Argentina, Chile, Honduras, Mexico, and Peru.

[28] The information was gathered from more than 350 staff and 730 customer interviews in both urban and rural contexts, as well as from meetings with more than 320 elected officials, researchers, activists, journalists, and development professionals in South Asia (Davis 2004).

politicians and other stakeholders could pay regulators to formulate biased standards and regulations or to allow projects to bypass established standards or procedures (Plummer and Cross 2007).

Poor financial management became evident in redundant and rising costs. In developing countries, the cost of providing water is often inflated by overstaffing, also viewed as a form of internality whereby water ministries or departments tend to maximize employment instead of maximizing social welfare. Excess staff meant difficulty in monitoring the performance of public employees (Ostrom and Ostrom 1977) and low productivity of public water utilities. In developing countries, water utilities report a ratio of 5 to 10, or more than 20 staff per 1,000 connections compared to about 2 to 3 staff per 1,000 connections in developed countries (Tynan and Kingdom 2002, Idelovitch and Ringskog 1995). Prior to reform, the Enterprise Nationale de Distribution de l'Eau Guinéenne, the public agency responsible for water supply in Conakry, Guinea was grossly overstaffed as it was subject to the government's policy of guaranteeing employment to university graduates. By 1984, the agency reported a ratio of 34 employees per 1,000 connections (Clarke and Wallsten 2002). Excessive manpower has also burdened the National Water Supply and Drainage Board in Sri Lanka (McIntosh 2003). Despite the availability of only a few well-documented examples, overstaffing in public water utilities seem to be a rule rather than an exception in many developing countries.

The disconnect between the bearers of costs and beneficiaries provides a conducive environment for keeping water tariffs below costs. Short-term political incentives, as discussed earlier, has exacerbated the situation by spawning a cycle wherein low tariff levels encourage inefficient water use, which in turn drive up operating costs and prevent system expansion. Water service deteriorates, inducing consumers to avoid payments, leaving few resources to sustain the public water utility's operations. The utility then tends to rely on subsidies, which many developing economies find difficult to sustain in the long run (Figure 2).

These financially ill-equipped public water utilities also often failed to serve the poor in many developing countries. In particular, public water utilities often found it problematic and risky to supply water to informal settlements or slum areas where residents do not have a formal tenure. Besides questionable tenure, high technical specifications required to ensure quality of water could not be readily adapted to informal settlements due to high costs, haphazard layout and/or difficult geophysical characteristics of these areas. In many cases, failure to supply water to informal settlements resulted from the lack of political will, as evident in the rigid or outdated water policy legislation of Ethiopia, Nigeria, and Tanzania (WUP Africa 2003).

Generally, subsidizing a good or service is discouraged because lowering the price of a good or service below its market level may result in allocative inefficiency. Moreover, generalized subsidies provide the wrong incentives, leading to overconsumption of water (OECD 2004). Subsidies that are not properly targeted do not guarantee equity. Experience has shown that subsidized water prices tend to benefit the wealthy since they are more likely to be connected to the network and to consume the service (Gunatilake et.al 2006, van den Berg et al. 2006, Clarke and Wallsten 2002). While it is generally agreed that subsidies should be targeted to the poorest households, some countries do not provide criteria relating to income level, causing leakages in the benefits of subsidies. In other countries, criteria for targeting the subsidy were unclear, allowing most consumers to benefit. In Burkina Faso, for example, the connection cost is subsidized unevenly by other consumers or through losses incurred by the utility, while subsidies in Benin are awarded indiscriminately (WUP Africa 2003).

Though well-meaning, government interventions can have unintended and unanticipated adverse side effects, referred to by Wolf as derived externalities. One such instance flows from public regulation of utilities. Permissible profits are typically calculated on the basis of return on capital, with the intention of holding prices closer to marginal costs. But the regulated utilities often respond by inefficiently substituting capital for labor so that they can raise their allowable profit base. In another instance, decentralization could pose negative side effects, as delegating powers to subnational entities do not always work well. Experience has shown that indiscriminately devolving powers to local officials could be unsatisfactory because towns (small- and medium-size) lacked the capacity to provide beyond the very basic level of public services, including water. Many tend to agree that decentralization would not yield all of its expected benefits without stronger governance skills at the local level (Usui 2007, Kingdom 2005). Evidence that corruption tends to be greater at the local, rather than the national level, is common in India for instance. In studying rural water supply in Central India, Asthana (2003) claimed that the decentralization process became more political rather than participative, and was more liable to capture by the local elites. This led to installing standposts and handpumps near influential households, rather than closer to the disadvantaged sections of the population.

APPENDIX 3
PRIVATE SECTOR INVESTMENTS IN THE WSS SECTOR

Appendix Table 3.1
Number of Projects by Type of Private Participation
(percent share to total number)

FINANCIAL CLOSURE YEAR	CONCESSION	DIVESTITURE	GREENFIELD PROJECT	MANAGEMENT AND LEASE CONTRACT	TOTAL NUMBER
1991	50.0	0.0	0.0	50.0	2
1992	33.3	0.0	33.3	33.3	6
1993	50.0	0.0	25.0	25.0	12
1994	47.1	0.0	29.4	23.5	17
1995	50.0	5.6	16.7	27.8	18
1996	25.9	3.7	33.3	37.0	27
1997	41.0	5.1	23.1	30.8	39
1998	54.5	3.0	36.4	6.1	33
1999	31.0	19.0	19.0	31.0	42
2000	64.4	6.7	13.3	15.6	45
2001	29.3	2.4	31.7	36.6	41
2002	52.3	6.8	18.2	22.7	44
2003	27.9	2.3	48.8	20.9	43
2004	50.0	0.0	38.5	11.5	52
2005	31.6	0.0	52.6	15.8	57
2006	27.1	0.0	45.8	27.1	48
Grand Total	40.5	4.0	32.5	23.0	526

Appendix Table 3.2
Investment in Projects by Type of Private Participation
(percent share to total investments, in US$ million)

FINANCIAL CLOSURE YEAR	CONCESSION	DIVESTITURE	GREENFIELD PROJECT	MANAGEMENT AND LEASE CONTRACT	TOTAL INVESTMENTS
1991	100.0	0.0	0.0	0.0	75
1992	100.0	0.0	0.0	0.0	284
1993	97.5	0.0	2.5	0.0	6,629
1994	70.9	0.0	27.9	1.2	1,362
1995	85.2	1.1	12.4	1.4	1,835
1996	9.3	2.7	85.7	2.1	1,312
1997	90.2	4.9	3.3	1.6	10,161
1998	72.0	11.4	16.5	0.0	2,327
1999	26.0	68.0	5.3	0.7	6,488
2000	84.2	6.5	9.2	0.1	8,589
2001	49.3	2.4	40.6	7.7	2,309
2002	62.6	20.0	14.1	3.3	1,648
2003	55.4	4.5	38.2	2.0	1,452
2004	71.5	4.6	20.0	3.9	4,659
2005	41.5	0.8	56.0	1.8	1,678
2006	59.7	0.0	18.0	22.4	2,003
Grand Total	70.9	12.2	14.6	2.3	52,811

Source: Based on figures from the World Bank PPI Database.

APPENDIX 4
STUDIES ON FIRM-LEVEL EFFICIENCY

APPENDIX TABLE 4.1
SUMMARY OF STUDIES ON FIRM-LEVEL EFFICIENCY IN THE WATER AND SANITATION SECTOR

REGION	DATA	REFERENCE	METHOD	FINDINGS ABOUT OWNERSHIP AND EFFICIENCY
England and Wales	29 water utilities	Erbetta and Cave (2006)	DEA-based two stage approach and SPF	Shows that the downward revision in regulated prices in 1999 has improved technical efficiency significantly. This is in contrast to the 1994 upward price revision yielding no clear efficiency impacts. One possible explanation is that lower prices may motivate water and sewerage operators to reduce inefficiency and hence costs, in order to achieve desirable profit levels.
US, UK, and France		Renzetti and Dupont (2003)	SPF, cost functions, and CFM	These studies reveal that there is no compelling evidence to date of private utilities outperforming public utilities, or that privatizing water utilities leads to unambiguous improvements in performance.
England and Wales	1985–1990 pre-privatization period and the 1990–1999 post-privatization	Saal and Parker (2001)	Use proxy efficiency indicators; use nonparametric methods to determine labor and total factor productivity growth rates	Estimates of productivity growth, derived using quality-adjusted output indices, suggest that despite reductions in labor usage, total factor productivity growth has not improved since privatization in 1989. Furthermore, total price performance indices reveal that increases in output price have outstripped increases in input costs, a trend largely responsible for the increase in economic profits that has occurred since privatization.
US	225 public water and 32 private utilities in 1992	Bhattacharyya, Parker, and Raffiee (1994)	DEA	Finds evidence that public water utilities are more efficient than private utilities on average, but are more widely dispersed between best and worst practices.
US		Lambert, Dichev, and Raffiee (1993)	DEA	Publicly owned enterprises are found to be more efficient overall, as well as in the technical efficiency associated with the employment of labor, capital, energy, and material inputs. No significant differences are found in scale efficiencies between the two classes of enterprise.
US	68 public and 59 private water utilities in 1976	Byrnes, Grosskopf, and Hayes (1986)	Focus on measuring technical and scale efficiencies relative to a production technology.	Find no significant difference in efficiency across ownership types.

continued next page.

Appendix Table 4.1. *continued.*

REGION	DATA	REFERENCE	METHOD	FINDINGS ABOUT OWNERSHIP AND EFFICIENCY
US	156 US public and 20 private utilities in 1981	Fox and Hofler (1986)		Concludes that, in terms of aggregate cost, no statistical difference can be found between technical efficiency estimates for public and private firms, although allocative efficiency differences were observed.
US	57 private and 262 public water firms in 1970	Feigenbaumand and Teeples (1983)	Comparing hedonic from a nonhedonic cost function	Despite differences in production technology of water operations, the models suggest that there is no difference in cost-of-service equations for government versus private companies
US	24 private and 88 public firms from 38 states in 1970	Crain and Zardkoohi (1978)	Cost function approaches	Shows that operating costs are significantly higher in public water utilities. Also shows that lower productivity per unit of labor input in the public firms would imply that relatively more employees would be required for any given expansion of output than in comparable private firms.
Africa	21 African water utilities	Estache and Kouassi (2002)	SPF and 2nd stage Tobit model	Finds that private ownership was associated with a lower efficiency score. However, only three firms in the sample had any private capital, and levels of corruption and governance were far more important in explaining efficiency differences between firms than ownership variable.
Africa	110 African water utilities, of which 14 are private	Kirkpatrick, Parker and Zhang (2004)	SCF/DEA with 2nd stage regressions	Finds no significant difference between public and private operators in terms of cost once environmental factors have been accounted for. Regulation has no significant impact either.
Africa	Low-income African countries 1994–2000	Clarke and Wallsten (2002)	Using demographic health surveys	Reported greater service coverage under private ownership. On average, they found smaller supplies for lower-income households (proxied by educational attainment) where there was a state sector operator. Despite high coverage, there may be offsetting service difficulties and higher charges when supplies are privatized.
Africa (Guinea)	Société Nationale des Eaux de Guinée (SONEG)	Clarke, Menard and Zuluaga (2002)	Cost-benefit analysis using a comparative method	Notwithstanding the difficult political circumstances at the time of the introduction of private sector participation in the sector, all indicators show that performance improved significantly under the new arrangement. Water and service quality improved.
Asia	50 firms in 19 countries 1997	Estache and Rossi (2002)	SCF	Finds no statistically significant difference between public and private operators in the sector.

continued next page.

APPENDIX TABLE 4.1. *CONTINUED.*

REGION	DATA	REFERENCE	METHOD	FINDINGS ABOUT OWNERSHIP AND EFFICIENCY
Argentina	Four provinces 1992–2001 (unbalanced panel)	Estache and Trujillo (2003)	TFP	Finds a significant improvement resulting from the 1990s reforms in the sector. Also shows that one of the renationalized companies has managed to maintain private gains. Shows that ignoring the multiproduction nature of the operator business (water + sewerage) leads to misleading policy conclusions as regards the performance of operators.
Argentina	Buenos Aires Water Concession	Alcazer, Abdala and Shirley (2000)	Case Study	Finds dramatically improved performance, as evident in the 14% reduction in water tariffs following privatization; increased annual investment of Aguas Argentinas in the first six years of the concession; improved operating efficiency; higher product and service quality; as well as increased coverage.
Brazil	20 state utilities 1996–2000	Tupper and Resende (2004)	DEA with 2nd stage Tobit	Ranking of operators. Makes the case for yardstick competition.
Brazil	Around 4000 (depending on the year) municipalities 1996–2002	Seroa da Motta and Moreira (2004)	DEA with 2nd stage regression	Private operators stimulate catching up but there is no significant difference between public and private operators in terms of the total variation in productivity. Regional operators benefit from scale economies but have the lowest productivity levels. Municipalities have the highest productivity levels.
Peru	43 operators 1996–1998	Corton (2003)	SCF	Cost models account for location, disperson, size in production, and size in administrative responsibility (number of districts covered). These factors account for 90% of the difference in costs. Makes a cost-based case for mergers of some of the companies. Documents the lack of incentives of operators.
Peru	45 operators 1998–2000	Alva and Bonifaz (2001)	DEA with 2nd stage regression analysis of efficiency measure	Ranking of operators for a 3-year period. Finds returns to scale. Finds an important role for environmental variables.

SPF = stochastic production frontier; SCF = stochastic cost frontier; DEA = data envelope analysis; TFP = total factor productivity index number; CFM = cost frontier methodologies; UK = United Kingdom; US = United States.

Sources: Adapted from Kirkpatrick, Parker, and Zhang (2006); Parker and Kirkpatrick (2005); Estache, Perelman, and Trujillo (2005); Faria, da Silva, Souza, and Moreira (2005). Megginson and Netter 2001 list various studies done on privatization but do not clearly identify which studies tackled the water sector. Various case studies of water supply were cited in Davis (2005).

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