

Comparing Institutional Forms for Urban Water Supply

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“...we believe that water is a natural gift and that its distribution should be considered a public service instead of a business. Water distribution should take into account the needs of the population. It should be designed not from the point of view of the mercantile logic and the pursuit of profit, but rather from a perspective that clearly subordinates the business aspects – investment criteria, expansion plans, and rates – to the common interest.”

Oscar Olivera of the *Coordinadora de Defensa del Agua y de la Vida* (Coalition in defense of Water and Life), on the civic reasoning behind the Cochabamba protests of April 2000 (Olivera and Lewis (2004)).

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1) INTRODUCTION

More than one billion people in the world today lack access to safe drinking water. The Millennium Development Goals' initiative aims to cut this figure in half by 2015. However, major infrastructure developments, specifically in urban areas, are needed to make this vision a reality.

The development and operation of urban water supply (UWS) systems (and infrastructure in general) has largely been the responsibility of the public sector in both developing and developed countries alike. However, in many countries service provision has been hampered by public sector financial and capacity constraints. To address this, governments have moved toward arrangements involving differing degrees of private participation in financing, developing and managing of water systems (and infrastructure assets in general). These kinds of contractual arrangements, termed Public Private Partnerships (PPPs), entail government and private companies assuming shared responsibilities for delivering infrastructure services.

The merits of Public and PPP provision of urban water have been explored thoroughly in the literature. In contrast, the presence of non-profit providers in certain niche markets of water supply has received much less attention. No clear consensus has emerged in the applicability of each of these forms.

If the global challenge of increasing access to safe drinking water is to be addressed, a greater understanding of this confusing mix of institutional forms in UWS is needed. Specifically we need to comprehend why they have emerged, what their relative strengths are, and which conditions make one forms preferable over another. This paper proposes to explore these issues through two main research questions:

1. How do we account for the different institutional forms prevalent in UWS today?
2. Under which conditions is one form preferred over another?

In answering these questions, I turn to the current body of theoretical and empirical research on UWS. Specifically I consider both the economic and historic determinants for the emergence of this variety of institutional forms. In addition I explore the characteristics of each contemporary form, including their relative strengths and weaknesses

The paper is organized as follows: I start by discussing the background of UWS, focusing on the technical, economic and historical aspects of the sector; next I review each institutional form in turn, with the purpose of drawing up a theoretical comparison to address our two research questions; finally, I briefly discuss the results and propose areas for future research.

2) BACKGROUND OF UWS

Before getting into the details of UWS institutions, we should first consider the fundamentals of UWS in general. How is water supplied in urban settings? What are the economic fundamentals of UWS? How has urban water been supplied historically? This section seeks to address these questions, thereby attempting to lay the ground work for the detailed institutional comparison of Section 3.

Classifying UWS systems

The supply of water to urban communities consists of a variety of complimentary actions from abstraction to delivery and billing. Nickson and Franceys (2003) group these activities into two broad concepts: “direct” and “indirect” provision. Direct provision entails the physical provision of the water, including the activities of abstraction from the water source, purification, carriage, storage, delivery (pumping or gravity fed through a network), billing and payment collection. In addition it includes operations and maintenance (and capital improvements) to keep the supply system running. “Indirect” provision entails activities that support the physical delivery of water, including: legislating, policy-making, standard setting, and regulation and monitoring (in the case of PPP arrangements).

The overwhelming majority of indirect provision services are located within the ambit of the public sector¹. For this reason my paper only focuses on the institutional forms for the direct provision of urban water.

The systems used for “direct” provision differ greatly across urban areas in developed and developing countries. Kariuki and Schwartz (2005) provide a helpful classification of water service providers along two dimensions: the type of infrastructure used, and whether the organization “owns” the water source. I adapt their classification in Table 1 below, describing in each cell the type of system.

Table 1 - Classification of UWS providers (Adapted from: Kariuki and Schwartz (2005))

		Relationship to source	
		Independent (Develop own source)	Dependent (Source supplied by larger utility)
Infrastructure type	Network	Fully integrated UWS system drawing water from public water source or public/private well (or borehole)	Private or communal sub-network, connected to greater public network.
	Point source	Private or communal well (or borehole), public standpipe	Fixed location vendor selling water sourced from network or standpipe (or bottled water)
	Mobile distributors	Mobile tanker water sourced from private well (or borehole)	Mobile tanker water sourced from standpipe or network

I will return to this classification when we consider the different institutional forms found in contemporary UWS.

¹ In developing countries some indirect aspects might be controlled at community level (in organizations that resemble non-profit institutions), or even be privately provided in extreme cases.

Water Supply Economics

Water is generally viewed as a public good. In urban contexts however, supply is invariably piped, thereby making it a private good, as it is both possible to exclude certain customers (e.g. non-payers) and charge for different levels of consumption. In this respect water provision could be successfully allocated through the market (Noll (2002)). However, UWS is exposed to large market-failures, in the form of monopolistic tendencies, externalities, and the merit good characteristic of water. These market-failures significantly complicate the institutional choice, and have historically been used to justify public provision (Batley and Larbi (2004)).

Monopolistic tendencies

Foremost is the fact that many UWS systems are natural monopolies: they require large capital investments and have significant economies of scale, making rival supply very difficult. Community wells or trucked and bottled water are less susceptible to this monopolistic tendency however. But even in the case of community wells, the large upfront capital requirements lead to sufficient entry barriers for rivalry in poor areas. Noll (2002) has suggested that this large capital requirement means that a stable institutional environment is needed if private investment is induced for piped water supply systems.

Externalities

In addition, water supply involves both positive and negative externalities. Noll (2002) suggests that externalities connected to UWS can be grouped into extraction, use, and disposal externalities. In terms of extraction we can identify externalities that include the competition for limited resources (the opportunity cost of water), and the sustainability of water source extraction.

Water use externalities include: improved health (connected to both improved water quality and quantity); time savings (from the collection of water); expenditure savings (piped water is generally cheaper than bottled or trucked water); well being (improved water supply reduces pressure on communities); education benefits (time saving can lead to increased school attendance); productivity and income (water supply can increase economic activity, also related to time savings); investment (savings on water can increase investment in other activities); and food security and nutrition (through backyard irrigation and livestock supply) (Moriarty, et al. (2004)).

The main externality in terms of disposal is the environmental impact. This is especially relevant if improved water supply is not married with improved drainage and sanitation.

As Noll (2002) suggests, UWS externalities are usually large enough that they justify charging for water, even in cases where the metering and billing costs overshadow the direct supply costs. A major reason for this is due to the fact that metering and charging for water creates incentives for conservation. Unfortunately these externalities are historically very hard to measure, and therefore are commonly ignored when water tariffs are calculated.

Water as a “merit good”

In addition to the above, recent debates of “water as a human right” have fueled some to see water supply as a “merit” good. In this context, merit goods can be identified as goods to which everybody should have access regardless of their ability to pay the market price. Walsh (1995) suggests why this

leads to belief in public provision: “(g)overnment needs to act to provide merit goods because individuals are not necessarily the best judges of what is in their own or the public interest.” In terms of UWS, the underlying sentiment is that equity in consumption of water across income groups is very important to society in general.

The above is compounded by the fact that water resources are predominantly publicly owned and therefore charging users for supply creates the impression that a public good has been converted into a private good.

The economic characteristics of different UWS systems are summarized in Table 2 below.

Table 2 - Public good characteristics of UWS systems (Adapted from Batley and Larbi (2004))

Water supply system	Consumption characteristics		Production/Distribution characteristics		
	Rivalry	Excludability	Monopoly tendency	Economies of scale	Externalities
Trucked/bottled water	Low	High	Low	Low	Medium
Stand pipe	Low/medium	Low	High	High	High
Well/Borehole	Medium	Low	Low	Low	Medium
Network	High	High	High	High	High

From the above table it is clear that network systems are by far the most susceptible to the market-failures discussed above, leading to dominance by public sector involvement. In addition, information asymmetries on the quality of drinking water have been held up as support for public provision (or at least control through regulation or third party oversight).²

Historical trends

The supply of water to urban areas dates back to the formation of “urban settlements.” Wells and protected springs hark back to the earliest concentrated human settlements, with these sources both publicly and privately held.³ The evolution of modern water supply networks can be drawn back to 1544 when the English Parliament passed an act for the provision of “clear water” to the citizens of London LaNier (1976). This proved to be revolutionary, as it provided charters for the formation of private water companies. This approach of public and private cooperation for the provision of water supply infrastructure was very influential in the formation of urban water utilities on the other side of the Atlantic.

In his insightful review of municipal water systems in the United States, J. Michael LaNier (1976) mentions that the first public water-supply supply system in the United States dates back to 1652. In this year the City of Boston, Massachusetts incorporated a “Waterworks Company” to provide water for domestic use and fire fighting. LaNier however suggests that the impact of this public system was

² On this point it is interesting to note that drinking water concerns have also recently emerged as a reason for privatization of public water supply assets, following widespread drinking water contamination in small public suppliers across the US and Canada. Elizabeth Brubaker (2002) further shows how changes in the EPA’s Safe Drinking Water Act have further contributed to this privatization trend, as more and more local agencies struggle to adhere to these stringent regulations. The same trend has been identified in European water providers with the introduction of the European directives on water quality standards (Birchall (2002)).

³ For instance Broneer (1935) mentions the discovery of private commercial wells in archeological excavations of the city of Corinth. Another example is the central distribution systems that emerged in the City of Rome, with the invention of the publicly held aqueduct system.

limited for the next 200 years, as most residents did not perceive the service provided to be as good as they could get from private wells or the famous “town pump.” Water supply was therefore controlled by a number of private companies who had secured charters from the state government.

Water supply systems followed in most other cities during the 18th and 19th centuries (LaNier (1976)): in New York the first system was developed and operated by the private Manhattan Corporation; in Philadelphia the water system was wholly developed by the city, funded by a general city tax; the Cincinnati Water Works were originally established by Colonel Samuel W. Davies whose private company (Cincinnati Water Co.) later sold out to the City of Cincinnati; and Chicago’s system (drawing water from Lake Michigan) was developed by the private Chicago City Hydraulic company, and later taken over by the City.

It is clear that UWS involved both private and public players from the start, and even in these early days, arrangements similar to contemporary PPPs were already being used: Grigg (1986) for instance reports on the water system for the city of Philadelphia (1799) having a public owned distribution system which drew water from both public and private horse-driven pumping operators.⁴ Garvin (2007) proposes this was due to a deliberate “dual-track strategy” by the US Congress’ of that time for developing infrastructure:

“spending federal funds to “push” projects considered crucial for developing commerce and trade, and “pulling” projects from the private sector through indirect means such as land grants or franchises awarded to private parties.”

Public water supply systems became increasingly popular towards the turn of the 20th century, with the expansion of the germ theory of disease, and the discovery of waterborne germs causing typhoid and cholera. This was compounded by Roosevelt’s New Deal (following the Great Depression) which included significant Federal investment in infrastructure projects targeted at creating jobs for the unemployed. By the end of the Second World War the majority of UWS systems were under public control.

The economic crisis of the early 1980’s ushered in a period of large scale public sector change. Reforms started in Britain driven by two broad factors: public sector inefficiencies, and liberal economic ideology (Salamon (2002)). These reforms also blew over to the United States, where they could have been viewed as a return to the dual-track strategy mentioned above (Garvin (2007)). These changes broadly involved a reduction in the role of government, towards greater private sector involvement through various arrangements involving both public and private actors (commonly termed Public Private Partnerships or PPPs) (Batley and Larbi (2004)).

These arrangements varied from fairly “light” forms of participation such as service contracts, to much “deeper” forms such as concessions or divestures.⁵ Although governments have aimed to retain control through regulation, the deeper forms of PPPs have invariably led to exploitation of consumers.⁶ The resulting civic opposition in developing countries (based on both ideological and

⁴ The development of wastewater drainage and treatment facilities did not emerge until the 19th century. The fact that these wastewater systems emerged in response to public recognition of the externalities associated with wastewater disposal and treatment meant that public ownership and operation was the norm. Interestingly enough, recent concerns about drinking water contamination have equally driven moves towards private involvement in wastewater systems.

⁵ Many have referred to this most extreme form as PPPs as “privatization” although this term might be misleading.

⁶ This includes over-charging users and under-investing in capital improvements to increase coverage. Birchall (2002) for instance mentions the example of the Kelda, the Yorkshire Water utility who paid out £954m between 1989 and 1999, on an initial investment by shareholders of only £471m.

pragmatic criticism of PPPs) has culminated in wide-scale cancellations and renegotiations of concession agreements in cities such as Buenos Aires, Jakarta and Manila. In general this has led to an erosion of the popularity of PPPs as a viable investment (Davis (2005)).

In developed countries such as the UK, regulators have responded by severely tightening the screws, forcing large cuts in tariffs and increased capital investment requirements. Private water companies have responded by moving to divest themselves from these water assets while refocusing on only providing the service under contract (Birchall (2002)). This has led to the emergence of a new form of organization, as the assets were moved to nonprofit holding companies with greater community association.

This contemporary mix of institutional forms in UWS is what we turn to next.

3) INSTITUTIONAL FORMS FOR WATER DELIVERY

We have already alluded to the different types of institutional forms that are involved in the present-day supply of urban water. We can identify three broad forms: Public, Private For-Profit, and Nonprofit. *Public systems* entail a formal public authority (local, regional or national) being directly responsible for the full process of direct provision while retaining full ownership of the water supply assets. *Private for-profit (Private FP) systems* involve arrangements where the responsibility for delivery rests with a private entity (could include or exclude private asset ownership), and where the systems are operated with a profit motive. *Nonprofit UWS organizations* are distinguished from fully private systems in that they do not have direct owners and do not distribute profits.⁷

We can expand the UWS classification I used in the previous section to detail the different forms that each of these three institutional types take, as shown in Table 3 below.

Table 3 – Expanding the UWS classification (Adapted from: Kariuki and Schwartz (2005))

		Relationship to source	
		Independent (Develop own source)	Dependent (Source supplied by larger utility)
Infrastructure type	Network	Public: Fully integrated UWS system or public well Private FP: Variety of PPP arrangements Nonprofit: Formal nonprofit network provider, Communal well or borehole	Public: N/A Private FP: Private sub-network, connected to greater public network. Nonprofit: N/A
	Point source	Public: Public standpipe Private FP: Private well or borehole Nonprofit: Communal well or borehole	Public: N/A Private FP: Fixed location vendor selling water sourced from network or standpipe (or bottled water) Nonprofit: N/A
	Mobile distributors	Public: Public tankers Private FP: Mobile tanker water sourced from private well (or borehole) Nonprofit: N/A	Public: N/A Private FP: Mobile tanker water sourced from standpipe or network Nonprofit: N/A

The rest of this section expands on each of these institutional forms, culminating in a direct comparison for the benefit of addressing our research questions.

Public provision

As mentioned above, Public Provision entails a public authority (or combination of authorities) being responsible for the full provision of urban water, including the development and funding of the infrastructure, the operation of the supply system, billing and collection of tariffs (if they are raised), and system management and maintenance. Most importantly asset ownership remains in the public domain.

⁷ Informal water providers, who are not formally registered as nonprofits, might also fall within this category. This would include private boreholes or wells which deliver water only to its owner. I exclude these “informal nonprofits” from this study as they differ quite substantially from the “communal” systems that generally make up the nonprofit UWS sector.

As noted earlier, the rationale for public provision rests on three main arguments: the monopolistic tendency of water systems, the externalities involved, and the merit good characteristic of water. Water networks are the most susceptible to these arguments, and for this reason by far the majority of large water networks remain in the public domain. However, public supply of water has not been without criticism. This is due to service provision in many countries being hampered by two broad public sector constraints.

Firstly, governments might be constrained *financially*. This could be due to countries lacking the ability to access financial markets, either because their formal economies and polities are underdeveloped, or because they lack the required creditworthiness to finance themselves in the international capital markets.⁸ In addition, even the governments of wealthy OECD countries frequently lack the political will to collect adequate taxes to fund sustainable development, operation and maintenance of infrastructure.⁹

The second broad constraint is a lack of *institutional capacity*. Governments often do not possess the resources and specialized expertise (e.g. financial and managerial skills) to develop, manage and operate infrastructure assets effectively. This lack of institutional capacity is compounded when governments undertake especially large and complex projects. This capacity constraint also takes the form of inefficient operation of existing water supply infrastructure, leading to high levels of unaccounted-for water, excessive levels of public staffing, and inequitable distribution of supply (Davis (2005)).

To address these capacity gaps, governments have increasingly moved toward sets of arrangements involving differing degrees of private participation in financing, developing and managing of water systems (commonly referred to as PPPs).

Private Provision

Private (for-profit) provision takes two broad forms: (i) Small-scale private provision, and (ii) PPPs. Davis (2005) identifies three dimensions along which these arrangements can be classified: who owns the asset, who is responsible for capital investment, and who carries the commercial risk.

Table 4 provides an overview of the different types of Private water providers along these dimensions.

Small Scale For-Profits

I choose to use the term “small scale for-profits” because these fully private water providers are mostly confined to either point sources or mobile water vendors.¹⁰ Point source vendors either sell water sourced from a private well, borehole, or standpipe, or they sell bottled water in shops. Mobile water vendors transport water in containers to users, and sell the water drawn from tanker trucks, water carts, or small containers (carried on foot by vendors).

Table 4 - Forms of Private Urban Water Suppliers (Adapted from: Davis (2005))

⁸ This lack of creditworthiness could be due to a variety of reasons, including economic and political instability, or the lack of transparent legal systems that afford protection to property rights

⁹ For example, see Hite and Ulbrich (1988) for an interesting review of water supply subsidization in South Carolina.

¹⁰ In addition we can observe a small number of privately owned and operated water networks in operation in private residential areas.

Type of Public Provision	Specific arrangement	Asset ownership	Responsibility for capital investment	Commercial risk	Infrastructure type
Public Private Partnership	Service or management contract	Public	Public	Public	Network
	Lease	Public	Public	Public & private	
	Concession	Public	Private	Private	
	Build-operate-transfer (BOT) and variations ¹¹	Public and private	Private	Private	
	Divestiture	Private	Private	Private	
Small-scale For-Profits	Independent service providers	Private and public	Private	Private	Point source, mobile distributors

Kariuki and Schwartz (2005) suggest these “small-scale private service providers” (SPSPs) generally arise in areas that are underserved by formal public (or PPP) water networks. The prevailing conditions of the area being supplied – including the accessibility of the area, the characteristics of the water source (e.g. groundwater versus standpipes), and the general regulatory environment – greatly determines the form that this private supply will take.

On the positive side these suppliers serve to address a great unmet need for water, but opponents have highlighted at what price this comes: water from private point sources cost (on average) 1.5 more than public network water, while water from mobile providers is often more than 10 times the cost of networked water (Kariuki and Schwartz (2005)).

Public Private Partnerships (PPPs)

PPPs entail government and private companies assuming shared responsibilities for delivering water supply services, exclusively through network supply systems. These arrangements therefore attempt to balance the strengths and weaknesses of both the public and private sectors for the benefit of both. Specifically they aim to overcome the public sector constraints I discussed earlier.

They address the *financial constraints* faced by the public sector in two ways. First, PPPs provide access to private capital in exchange for giving private companies the right to raise tolls on the water sold (which might also be supplemented by government grants or subsidies). Secondly, by involving a new service provider, governments overcome the political barriers of unsustainably low tariff levels. Unfortunately this invariably leads to significant opposition to the private companies who institute cost recovery tariffs.¹²

PPPs also address the *capacity constraints* faced by the public sector by introducing competition (albeit only at the tender stage for concession contracts) to the supply service, and therefore theoretically lead to increased efficiency, higher quality service, more sophisticated technology, and even greater sustainability (both environmental and financial).

As mentioned earlier, the impact of PPPs has received considerable scholarly attention in the last decade. In her thoughtful review of this literature, Davis (2005) finds a general consensus that these arrangements have led to increases in private investment, efficiencies, and environmental stewardship. However, they have come about through controversial strategies of retrenchment and

¹¹ These include: build-own-operate (BOO), design-build-operate (DBO), and rehabilitate-operate-transfer (ROT).

¹² The events surrounding the privatization of water supply in Cochabamba, Bolivia are a prime example of the public emotion that surrounds this issue (Olivera and Lewis (2004)).

tariff increases, and have been specifically detrimental to the equitable supply of water to all urban residents¹³. This has led to deep criticism of water PPPs, and wide scale renegotiation (or cancellation) of long term contracts. Davis suggests this will likely reduce the extent of private sector involvement in UWS in the coming years. This criticism has also led to the emergence of a new form of nonprofit water companies, as discussed below.

Non-profit Provision

The non-profit provision of water has historically been limited to communal arrangements where communities come together to form organizations to supply their unserved areas. Although they have been around for many decades, these predominantly small scale setups have been relatively overlooked in the literature (Kariuki and Schwartz (2005)). A more recent development has been the emergence of a much larger scale nonprofit water provider, which presents the next step in the evolution of PPPs (Bakker (2003)).

Small scale nonprofits

The first type of nonprofit organization in UWS is small scale providers in niche markets of both developing and developed countries. Kariuki and Schwartz (2005) mention that these organizations include cooperatives, neighborhood associations, community groups, and societies.

These organizations arise in response to an unmet water supply need, in areas not adequately served by public networks (Olmstead (2004)), similar to the small private for-profit providers identified before. However, small scale nonprofits generally take the form of more formal organizations distributing water through small networks. We therefore might draw two conclusions on their formation: the collective trend in these organizations would suggest they only evolve in response to strong communal interaction¹⁴, and the formal organizational structure and infrastructure would further suggest that they will not be feasible in areas where users have no access to private capital.

Even so, accessing capital remains a major obstacle for these organizations, with many relying on grant funding to supplement their own resources. In addition they are very susceptible to regulatory changes such as increasingly stringent water quality or environmental regulations (Raucher, et al. (2004)).

Large nonprofits

A more recent development in UWS has been the emergence of large nonprofit providers, predominantly in the United Kingdom. These organizations can be classified as commercial nonprofits (after the definition by Hansmann (1980)) in that they rely almost exclusively on user fees, rather than donations and grants, while altruism and voluntary labor play at most a limited role (Bennett, et al. (2003)). As discussed earlier, these large nonprofits have emerged in response to exploitation by privatized water companies, and aim to rebalance the power between public and private players in PPPs.

¹³ Although a number of case studies have found improved equity of access under PPP arrangements in cities such as Buenos Aires and La Paz (Johnstone and Wood (2001)).

¹⁴ For this reason we might also suspect they will arise in areas with equality between user groups, as this would improve the chances of collective action.

The prime example of this has been the creation of Glas Cymru, a nonprofit organization which has taken over the contract for water supply in Wales. As part of the take-over they have acquired the assets of the previously privatized Welsh Water utility, Dwr Cymru, through a £2bn bond-offering (Birchall (2002)). Glas Cymru is classified as a “company limited by guarantee,” which under UK law means it is bound by the non-distributive constraint (Hansmann (1980)) and is tax exempt. It contracts out 80% of its day-to-day operations to other private firms, whose services it sources on a competitive basis (Bennett, et al. (2003)). In allowing this, the water regulator has hoped to reduce tariff costs to consumers through cutting financing costs (bonds in the nonprofit are cheaper than equity in the previously private company).

In addition, the formation of Glas Cymru has included enhancing consumer participation through the appointment of “memberships” in the company, who are responsible for corporate governance and ensuring the company remains focused on its core mission. The water regulator has been quite involved with this membership appointment to ensure that the organization is not “captured” by any specific group or stakeholder interest (Birchall (2002)).

In general the move towards nonprofit UWS does seem to be a balancing of the best of both the public and private domains. By locating these functions outside government, nonprofit companies have greater flexibility in the appointment and dismissal of staff, and can set remuneration levels (and other incentives) with fewer constraints than those faced by public providers. This would arguably lead to increased managerial performance. In addition they are protected against cross-subsidizations and other political pressures that governments face. Nonprofits also have advantages over for-profit firms, as the non-distributive constraint protects users from exploitation. This would possibly lead to greater political legitimacy.

Comparison of institutional forms

Drawing on the detailed discussion of each institutional form, and the historic and economic drivers in UWS, we can compare the five identified institutional forms directly. Table 5 compares these forms on the following aspects: why each form might emerge, what their respective strengths and weaknesses are, and under what conditions each could successfully be applied.

Table 5 - Comparison of institutional forms for UWS

Institutional type	Sub category	Reasons for emergence	Strengths	Weaknesses	Conditions for success
Public	Public	<ul style="list-style-type: none"> - Historically determined - Strong public institutions (legitimate, sufficient tax revenue, etc.) - Monopolistic tendency of network water supply - Water supply externalities 	<ul style="list-style-type: none"> - Protects customers against exploitation - Can ensure equitable distribution of services - Could give consumers voice 	<ul style="list-style-type: none"> - Lack of access to capital - Lack of political will to charge cost recovering tariffs - Lack of institutional capacity - Inefficient operation - Exposed to cross-subsidization to other government services 	<ul style="list-style-type: none"> - Strong political legitimacy for government - Government charging cost recovering tariff (no history of subsidization) - Long term view taken by government - Public sector reform to improve efficiency - Access to sufficient capital
Private FP	Fully private	<ul style="list-style-type: none"> - Unmet need - Areas that are costly to provide with network water - Entrepreneurial private sector - Environment not attractive for large companies 	<ul style="list-style-type: none"> - Provides access to unserved areas - High level of competition 	<ul style="list-style-type: none"> - More expensive than network water - Environmental concerns - Price fixing could occur 	<ul style="list-style-type: none"> - Unfeasibility of central network - Regulating of private providers (to avoid price fixing, and ensure quality standards)
	PPP	<ul style="list-style-type: none"> - Lack of public capital of technical capacity - Weaknesses of public supply (low tariff levels, poor maintenance) 	<ul style="list-style-type: none"> - Increases competition (during tendering stage) - Provides inflow of private capital - Introduces private sector knowledge, technology and capacity 	<ul style="list-style-type: none"> - Private monopoly (erodes public power) - Inequitable supply - Information asymmetries with regulator - Consumers have little "voice" 	<ul style="list-style-type: none"> - Political legitimacy - Stable institutional environment (legal, political, etc.) - Strong regulatory control by public sector (equity, tariff level, environmental and quality standards, etc.) - Full information disclosure to public regulator
Nonprofit	SSIP	<ul style="list-style-type: none"> - Unmet demand - Strong communal action - User group equality 	<ul style="list-style-type: none"> - Responds to unmet need - Significant user participation - Increase distribution equity 	<ul style="list-style-type: none"> - Lack technical capacity - Lack access to capital - Could be "captured" by political groups 	<ul style="list-style-type: none"> - Strong communal participation - Relative equality in the user group
	Large NP	<ul style="list-style-type: none"> - Failure of PPPs –exploitation of users by overcharging - Public support for nonprofit ownership (over for-profit) 	<ul style="list-style-type: none"> - Non-distributive constraint protects users from exploitation (increased legitimacy) - Representation for users (memberships) - Able to pay market salaries 	<ul style="list-style-type: none"> - Managerial inefficiencies (due to incentive problems) - Difficult to access capital - Possible "capture" by certain user groups 	<ul style="list-style-type: none"> - Political legitimacy - Legal framework that allows non-profits - Public sector regulator

4) DISCUSSION

My review of the theoretical and empirical literature has highlighted the diverse and often confusing patchwork of institutional forms in UWS today. It has been helpful in identifying a number of preliminary answers to both my research questions.

In response to my first research question, the diversity of forms clearly has its roots in both the historic trends of infrastructure provision, and the economic, sociological and political fundamentals behind water supply. These aspects are in fact connected, as a changing emphasis on different economic perspectives has led to the pendulum swing between public and private action: on the one hand the monopoly and externality characteristics of UWS supported strong public provision; while on the other hand “hierarchy failures” (such as public sector inefficiencies) increased the call for “market driven” reform. As a result, a variety of PPP arrangements emerged, that both increased the investment in UWS infrastructure and helped to optimize the level of service.

However, PPPs in UWS met with substantial civic opposition, largely based on opportunistic action by private water companies. Questions were raised over the equitable access for poor users, and the effectiveness of public sector regulation to protect public interest. The recent emergence of a new non-profit solution aims to overcome this criticism of PPPs. As mentioned before, the perceived benefit of these arrangements is rooted in the legitimacy afforded by the non-distributive constraint, the savings on private equity, the increased user participation, the flexibility of managerial incentives, and the protection from political interference.

The role of small scale private service providers (SPSPs) – both for-profit and non-profit – has only recently started to draw scholarly attention. They are increasingly being recognized as an essential part of the UWS sector, as they “fill in the gaps” where formal network coverage is lacking. However, concerns have been raised about the sustainability of for-profit SPSPs, specifically regarding the quality of water supplied, the environmental impacts, and the high distribution costs. Non-profit SPSPs have been found to struggle at raising financial capital and adjusting to changes in water quality and environmental standards.

It is evident from my review that, no single institutional form will be sufficient to address all UWS requirements globally. Rather, the challenges of UWS will have to be addressed through a network of cooperating actors. My second research question, on the conditions for the relative preference of one form over another, is therefore specifically relevant if we are to address the global challenge of access to safe drinking water.

The review offers a number of insights to this question. Public sector supply remains central to UWS in many countries, but this requires high levels of public sector performance (both in terms capacity and efficiency), political will to charge cost-recovering tariffs, and sufficient access to financial resources. However, the role of the public sector is increasingly moving towards that of regulator or “conductor” as Salamon (2002) proposes. The success of this role is vital in determining the success of PPPs or large scale nonprofits, as it ensures the protection of consumers’ interests, guides the equitable distribution of access, and in general confers legitimacy on the private provider.

SPSPs serve as fillers where the previous three forms do not adequately address urban demand. Nonprofit SPSPs emerge in areas with strong communal action, and where water sources are easily accessible (such as through ground water wells). As mentioned earlier, their success depends on the extent to which they are able to adjust to changing regulations and can successfully raise the financial capital needed. In areas where nonprofit SPSPs are not feasible, for-profit distributors step in to supply water through vendor markets. The effectiveness of this last form of supply overwhelmingly depends on the distribution costs involved, and the availability water of acceptable quality.

Although the above answers are helpfully in making sense of the UWS market, a number of questions remain. Firstly, more work is needed on how governments can balance the conflicting objectives of attracting high levels of private investment while still ensuring that consumers' interests are protected. This is specifically troublesome in areas with historic subsidization of water supply.

As large scale nonprofits have only recently appeared on UWS scene, they have not received sufficient scholarly attention. It remains unclear as to what their actual impact are on service delivery, political legitimacy, and tariff levels. In addition more research is needed on the conditions under which these arrangements might evolve (this has for instance not been attempted in the United States yet), and how managerial performance incentives should be structured.

Lastly, there is also scope for more work on the conditions under which both for-profit and nonprofit SPSPs arise, and the legal and regulatory framework needed to support their success.

5) LIST OF REFERENCES

- Bakker, K. J.**, (2003), *From public to private to... mutual? Restructuring water supply governance in England and Wales*, *Geoforum*, 34, 359-374.
- Batley, R. and Larbi, G. A.**, (2004), *The Changing Role of Government: The Reform of Public Services in Developing Countries*, Palgrave Macmillan,
- Bennett, J., Iossa, E. and Legrenzi, G.**, (2003), *The Role of Commercial Non-profit Organizations in the Provision of Public Services*, *Oxford Review of Economic Policy*, 19, 335-347.
- Birchall, J.**, (2002), *Mutual, non-profit or public interest company? An evaluation of options for the ownership and control of water utilities*, *Annals of Public and Cooperative Economics*, 73, 181-213.
- Broneer, O.**, (1935), *Excavations in Corinth, 1934*, *American Journal of Archaeology*, 39, 53-75.
- Brubaker, E.**, (2002), *Liquid assets: Privatizing and regulating Canada's water utilities*, Toronto, ON: University of Toronto's Centre for Public Management,
- Davis, J.**, (2005), *Private-Sector Participation in the Water and Sanitation Sector*, *Annual Review of Environment and Resources*, 30, 83.
- Garvin, M. J.**, (2007), *America's Infrastructure Strategy: Drawing on History to Guide the Future*, PPP White paper,
- Grigg, N. S.**, (1986), *Urban Water Infrastructure: Planning, Management, and Operations*, John Wiley & Sons, New York.
- Hansmann, H.**, (1980), *The Role of Nonprofit Enterprise*, *The Yale Law Journal*, 89, 835-901.
- Hite, J. C. and Ulbrich, H. H.**, (1988), *Subsidizing Water Users or Water Systems?*, *Land Economics*, 64, 377-380.
- Johnstone, N. and Wood, L.**, (2001), *Private firms and public water: realising social and environmental objectives in developing countries*, Cheltenham, UK; Northampton, MA: Edward Elgar,
- Kariuki, M. and Schwartz, J.**, (2005), *Small-Scale Private Service Providers of Water Supply and Electricity: A Review of Incidence, Structure, Pricing, and Operating Characteristics*, World,
- LaNier, J. M.**, (1976), *Historical Development of Municipal Water Systems in the United States 1776-1976*, *Journal American Water Works Association*, 68, 173-180.

- Moriarty, P., Butterworth, J. and van Koppen, B.,** (2004), *Beyond domestic: Case studies on poverty and productive uses of water at the household level*, IRC Technical Papers Series, 41,
- Nickson, A. and Franceys, R.,** (2003), *Tapping the Market: The Challenge of Institutional Reform in the Urban Water Sector*, Palgrave Macmillan, Basingstoke, Hampshire,
- Noll, R. G.,** (2002), *The economics of urban water systems chap 2*, Thirsting for Efficiency, The Economics and Politics of Urban Water System Reform, The World Bank and Pergamon, 43–64.
- Olivera, O. and Lewis, T.,** (2004), *Cochabamba!: Water War in Bolivia*, South End Press, Cambridge, Massachusetts.
- Olmstead, S. M.,** (2004), *Thirsty Colonias: Rate Regulation and the Provision of Water Service*, Land Economics, 80, 136.
- Raucher, R., Harrod, M., Hagenstad, M. and Inc, S. C.,** (2004), *Consolidation for Small Water Systems: What are the Pros and Cons?*, National Rural Water Association - White Paper,
- Salamon, L. M.,** (2002), *The tools of government: a guide to the new governance*, Oxford University Press,
- Walsh, K.,** (1995), *Public services and market mechanisms*, Macmillan Houndmills, Basingstoke, Hampshire,