Politicising the sustaining of water supply in Ireland - the role of accounting concepts

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Abstract

Purpose

This paper examines how the Irish government mobilised accounting concepts to assist in implementing domestic water billing. While such is commonplace in other jurisdictions and is generally accepted as necessary to sustain a water supply, previous attempts were unsuccessful and a political hot potato.

Design/methodology/approach

We use an actor-network theory inspired approach. Specifically, the concepts of calculative spaces and their 'otherness' to non-calculative spaces are used to analyse how accounting concepts were mobilised and the effects they had in the introduction of domestic water billing. We utilise publically available documents such as legislation, programmes for government, regulator publications, media reports and parliamentary records in our analysis over the period from 1983 to late 2014.

Findings

Our analysis highlights how the implementation of domestic water billing involved the assembling of many divergent actors including the mobilisation of accounting concepts. Specifically the concept of 'cost' became a contested entity. The government mobilised it in a conventional way to represent the resourcing of the water supply. Countering this, domestic water users associated 'cost' with a direct impact on their own resources and lives. Thus, an entity usually associated with the economic realm was embroiled in political processes, with much of what they were supposed to represent becoming invisible. Thus we observed accounting concepts being mobilised to support the gaining of a specific political ends, the implementation of domestic billing, rather than as part of the means to implement a sustainable water supply within Ireland.

Research limitations/implications

This research has some limitations, one being we draw on secondary data. However, our research does provide a detailed base from which to continue to study a new water utility over time.

Originality/value

This study demonstrates the complications that can occur when accounting concepts are associated with gaining of a political ends rather than as a means in the process of trying to achieve a sustainable water supply. Further, the process saw the creation of a new utility, which is a rare occurrence in the developed world, and a water utility even more so; this study demonstrates the role accounting concepts can have in this creation.

Keywords: accounting concepts, sustainable water, actor-network theory, calculative spaces, non-calculative spaces.

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Introduction

Water is essential to the sustaining of human life. It is "a crucial constituent of any society, including cases of excess, as in flooding, or drought, as in deserts; and cases of infrastructure, as in canals and cases of expertise, as in hydro-imperialism or US geopolitics" (Bijker, 2012, p.625). Hence, every country needs to provide its citizens with a sustainable water supply[1]. This typically involves major infrastructure and a delivery system that requires substantial economic resources over time. In theory, it should not matter how a specific government chooses to operationalise their funding. However, in practice if an indirect approach - through general taxation - is taken, there is a possibility of governments utilising these resources elsewhere for political gain. As we will see below, this was the situation in the Republic of Ireland (hereafter Ireland) that provided the motivation for outside agencies to force the Irish Government to instigate a direct resourcing model. This direct model operationalised domestic water billing and ultimately required the establishment of a national water utility. This article investigates how and why accounting concepts were mobilised - and the effects they have - in this process. As will be outlined later, this process has been fraught with issues as exemplified in the following:

> Charging householders for water will be a political hot potato but given the high cost of producing treated water, a government desperately trying to balance its books can rule nothing out (Hickey, 2009).

The above quote from an article in the *Irish Examiner* captures the essence of a decades-old issue in Ireland - billing domestic users for fresh/waste water services (hereafter referred to as water). As revealed later, several attempts were made in the past to charge for water usage, but these failed due to strong householder resistance which had consequences for the political parties in power at the time. The resistance to pay for water did not take account of badly needed capital investment to overcome issues such as high water leakage, increasing urban demand for water and unacceptable water quality in some areas. The following two press excerpts convey some of the outcomes of this lack of investment:

> A broken pipe which has been pouring water on to the west pier in Dún Laoghaire for the past eight months, is the responsibility of the owner to fix [...] the upsurge of water from the underground pipe is causing pot-holes in open spaces with water flooding on to the pier and damaging the surface there (Irish Times, 2014b).

> Former Independent councillor John Murphy of Castlerea lost his seat on the council in the recent local elections. He says telling people, "Vote for me and I will bring clean water to your village, was a difficult sell. It sounded like I was standing in the Third World". The water issue is familiar across Co Roscommon. In Cootehall, locals are in the second year of boil-water notices. Rosemary Bruen drives a 25km round-trip to collect water from a well near Keadue. With six children, she fills 15-20 five-litre bottles in a regular Saturday morning operation that can be significantly delayed because of queuing at the well (Irish Times, 2014a).

The above quotes portray not only increasing costs and decreasing revenue faced by the Irish government in recent years, but also the direct consequences of under-investment over time. While the history of this is revealed later, in the four years to late 2014 Ireland had been bailed out by the

Troika[2] to the tune of €80 billion and domestic water billing had been introduced. The latter as the introductory quote states has been a political hot potato, but now the potato has in effect been eaten.

As noted, our research examines the role of accounting concepts in supporting the establishment of a domestic water billing system. By accounting concepts, we are not referring to a technical meaning of concepts - such as accruals, prudence etc. - but a much broader meaning of the term. For example, cost, investment, budgets and cash flows are all 'accounting concepts' in this paper. In a manner similar to Jones and Dugdale (2002) who studied the "story" of activity-based costing, we use an actor-network theory inspired approach to the analysis of how accounting concepts were mobilised within the journey from a political hot potato to a general acceptance of domestic water billing. At the same time, issues around the provision of a sustainable water supply remained largely invisible. The story is a complex one, with many twists and turns involving issues of politics, accounting, central and local government to name a few. Before detailing the story, we first examine relevant literature to highlight issues of water sustainability. Then, we detail our methodological approach, and this is followed by a detailed analysis of water services in Ireland. Our analysis is presented in two periods; 1) pre-2010 where no government achieved full billing for water usage, and 2) post-2010 to late 2014 where a new state-owned private company was established to manage Ireland's water resources and domestic water billing put on a legal footing.

Literature review

There is increasing academic interest in water use and management (Barnes & Alatout, 2012) focusing on issues of quality, quantity, use, sustainable resource management, company and industry management (Kurland & Zell, 2010). This is not surprising given that fresh water is essential for the sustaining of human life but globally providing a sustainable supply is becoming problematic (Gladwin *et al*., 1995, Rockstrom *et al*., 2009, Whiteman *et al.,* 2013, IPCC, 2014, WWF, 2014). Developed countries that seemingly have plentiful supplies of fresh water, such as Ireland, still have great challenges in ensuring a sustainable supply of water is provided to their citizens (Padowski and Gorelick, 2014).

Given these pressures on water it is also not surprising this has led to research within accounting that examines various aspects of these issues. A recent example is Egan (2014a) who examines the responses of a Sydney university to growing levels of drought experienced in Australia. This study notes that without strong links to systems of accountability, it is unlikely that behaviour will change on how this important resource is managed. He notes this is partly as a result of needing a measurement system, in effect a calculative device (see later), for accountability to function. Further, he notes that as the cost of the water remained low, efforts to attach water management concerns to financial accountability failed. Another example is provided by Egan (2014b), who examines the water management practices of five food and beverage manufacturers also in Sydney, Australia. These two examples demonstrate that issues surrounding water use and management involve many divergent actors, including public and private organisations. These organisations in many situations will involve global agencies. For example. Rahaman *et al.* (2007) demonstrate how global agencies involve and embed themselves in the policy making of developing countries, in this case an examination of the privatization of water in Ghana. Beyond organisations, many other actors - including domestic households - are equally reliant on a sustainable supply of fresh water for their various purposes. Importantly, differing stakeholders can act in a multitude of ways that may either impede or help facilitate (Kennedy, 2011) the process of water services. It is not surprising that water related issues are an important area of political debate, with the participation in debate often seen as a right of all people (Hazelton, 2013). Within this debate, many non-human actors (see below) may be mobilised (for an example of such debate see Apostol, 2015).

Water utilities are key actors in ensuring this reliable and sustainable supply is maintained, particularly as stakeholders may have many competing motivations. This therefore points towards two pertinent questions. The first question is how to organise water utilities to provide a reliable and sustainable water supply? The second question, following on from the first, is how to ensure resources are available to the water utility to achieve this goal? These two questions provide the context for our investigation into the setting up of domestic water billing in Ireland. That is, they are put forward as questions that could be argued should be the focus of water utilities around the world. However, we must also recognise that these water utilities operate within a context of multiple actors with competing aims and motivations that may affect their levels of focus on these important questions. In respect to this, Harvey and Schaefer (2001) examined six privatised utilities in the United Kingdom (UK); two regional electricity providers, two water and sewage organisations, and two organisations that provided both water and electricity. They find these organisations are mostly influenced by the stakeholders with power to regulate over them - for example government and regulators. This suggests that water utilities, public or private, must manage stakeholder expectations to implement and maintain a sustainable water supply. Lennox *et al.* (2011) note that stakeholder engagement, rather than stakeholder management, is an integral part of sustainable water management. Hence, taking the works of Harvey and Schaefer (2001) and Lennox *et al.* (2011) together in terms of the setting up of domestic water billing, this would suggest that the government and regulators are key stakeholders and will take important roles in ensuring that there is a firm focus on providing a sustainable water supply.

Lewis and Russell (2011) note that research that is issue based and focuses on stakeholder perspectives offers much to unpack the complexities of water related problems - later, we will focus on the multitude of differing stakeholder perspectives that compete in the implementation of domestic water billing and how non-human actors are utilised to convey specific perspectives. Further, Lewis and Russell (2011, p.121) note that:

> The notion of regulation, albeit emanating in different spheres and potentially from different types of regulators, may not be universally accepted among social and environmental accountability research scholars […]. For these reasons it is important that future research, again by focusing on specific issues, should focus on where regulation and institutional reform might impact positively or negatively on attempts to bring about change in the acknowledgement of responsibilities and in governance processes.

In terms of the use of non-human actors, with a specific focus on accounting, the literature provides many different perspectives on the effects or potential effects that these have. For example, Chalmers *et al.* (2012) examine the development of general purpose water accounting standards in Australia. These standards are aimed at providing a framework for reporting information on water and water rights. However, these standards require a mature water industry to operate as intended, and are thus more aimed at the providing of an account of the on-going operations of existing utilities and other major water users. This study focuses on the implementation of domestic water billing and, as will be seen below, the setting up of a national water utility is an outcome towards the end of this process. Therefore, it cannot be regarded as having reached a mature state. As such one of the major issues may be which non-human actor(s) to enrol to ensure enough resources are available for its ongoing activities rather than to report on water/water rights.

Resourcing issues are related to water industries in all states of maturity. For example Hunt *et al.* (2013) utilise a new public management perspective to investigate equity aspects of user-pays pricing mechanisms adopted in Queensland, Australia. They argue that “in terms of water reform, issues should be addressed at the economic, financial, environmental and social levels (in terms of the

multiple dimensions of equity) which are potentially politically sensitive due to the range of competing interest within, and across, the domestic and non-domestic consumer groups" (p.1345). Hence, they examine how the Australian government's efforts to charge for water to improve management practices have been complicated by perceptions around how equitable different pricing mechanisms are. As part of this, they note Pack's (1987) discussion of trade-offs between equity, efficiency, economic rationales and other considerations when privatizing the public sector. It is therefore argued that accounting concepts will represent the economic rationales rather than those relating to equity or other considerations. Hunt *et al.* (2013) find that as a result of these concerns around equity, 63.7 percent of Queensland's water utilities are not adopting a user-pays billing system. As will be seen below, our investigation highlights and provides a more nuanced understanding of how these tensions play out in the development of a pricing policy.

As seen above, much of the accounting research that has examined water related issues has utilised Australia as its focus. This is unsurprising given the challenges that Australia faces (Egan, 2009). However, the focus of this research is Ireland where at least the perception is that water is a plentiful natural resource. This perception may have compounded, as will be seen below, poor governance of water within Ireland. As Cashman (2011, p.155) notes "[s]ymptoms of poor governance include: high unaccounted for water, lack of proper metering, ineffective collection of water revenue, uneconomic tariffs, excessive staff of water service provider, lack of accountability and conflict of roles in water management." These symptoms have been pronounced within the management of water within Ireland with no sign that this is particularly changing for the better. We now turn to placing this in the context of the theoretical lens we adopt, and outline the methods we adopt in our analysis.

Theoretical approach

In this research, we utilise concepts from actor-network theory (ANT) (Latour, 1986, 1987, 2005; Callon, 1986; Law, 1986) to scope out boundaries to analyse and understand the events surrounding the implementation of domestic water billing, which also entailed the formation of Irish Water. Specifically, we utilise the notion of calculative spaces and their "otherness" to non-calculative spaces (Callon & Law, 2005). In doing so, we respond to the call to utilise the broader writings of ANT (Justesen & Mouritsen, 2011). This in essence means that we mobilise ANT's focus on the performativity of non-human actors (Latour, 1986, 2005). As will be seen below, calculation is impossible without the involvement of non-human actors (Callon & Law, 2005, p719). We, therefore, consider the effects that these non-human actors have on the actions taken by other actors and the ways and means that actors construct and assemble them to assist with the gaining of their goals; in effect enabling control at a distance (Law, 1986; Robson, 1992). These non-human actors, as will be seen in the case below, may act in a way that has unexpected and unintended consequences (Callon, 1986) as the fate of these assemblages are always in the hands of others (Latour, 1991). Hence, any given outcome is never guaranteed but rather as a result of many negotiations, intrigues, acts and even treason. Further, the gaining of a desired outcome will quickly make its history forgotten (Callon, 1986). Thus, understanding the history of a specific thing, through examining how and why something has become over time, is as important as understanding what the thing is. We focus our research efforts on the how and why of the implementation of domestic water billing in Ireland. In particular, we focus on the mobilisation of non-human actors, specifically accounting concepts, within the many negotiations, intrigues, acts of treason, and various other events as they unfold over time.

The use of ANT to examine the mobilisation of accounting calculations, as one type of non-human actor, has an established tradition. This includes looking at the effects of the implementation of accounting technologies (for example see Briers and Chua, 2001, Emsley, 2008), their effects in inter-organisational arrangements (for example see, Mouritsen *et al*., 2001a; Cuganesan and Lee, 2006;

Chua and Mahama,, 2007; Mouritsen *et al*., 2010), intellectual capital (for example see, Mouritsen *et al*., 2001b; Mouritsen and Flagstad, 2005; Mouritsen, 2006), and accounting for water (for example, see Egan, 2014a).

The appeal of utilising ANT is that it places the calculation at the heart of the research (Justesen & Mouritsen, 2011, p.161). From the ANT perspective, calculation, in its broadest sense (Callon and Law, 2005), involves three steps (Callon and Muniesa, 2005). The first is that the entities that are to be taken into account must be detached and then moved, arranged and ordered in a single calculative space. This step has importance for this research as we examine the construction of the calculative space that will allow for domestic water billing in Ireland. As will be seen below, this involves the assembly of many differing actors including attempts to use accounting concepts as a legitimating device for the way in which the calculative space is constructed. In the second step, associations are formed between these entities through processes of manipulations and transformations. The final step involves the production of the result, which while corresponding to the entities and processes within the calculative space, is a new entity that can move beyond the calculative space and circulate in its own accepted way. These results quite often take the form of inscriptions, a domestic water bill for example, that are mobile, stable and combinable (Robson, 1992). Thinking through these steps allows us to understand that the process of calculation would not be possible without non-human actors - including measuring devices such as water meters - and a place to locate the calculative space such as a national water utility.

Callon and Muniesa (2005) utilise this conception of calculations to examine the collective practices that construct what is usually labelled as a 'market'. In examining these practices they note (p.1245) that they contribute to the often asked question of whether calculations are "hegemonic" in that they become "the only possibility for action". This contribution comes through noting three interrelated subtleties that arise from their analysis. The first is that there is a number of differing ways that calculations can be performed. Following on from this, the second is to note that some actors will have the means to assemble calculations while others will be prevented from doing so. The third is that this may lead to open discussion and public debate over how the calculations have been constructed. We now look at each of these subtleties in turn, examining their implications for this research.

In noting that there are a number of differing ways that calculations can be arranged and performed, this is not only referring to the arithmetical type. Rather a broader notion of calculation is mobilised that, as the above explanation illustrates, begins with the assembling of objects within a distinct spatio-temporal frame: a calculative space (Callon and Law, 2005). This can be likened to the concepts of framing and overflowing (Callon, 1998, 1999, 2007; Christensen and Skaerbaek, 2007), where a frame is constructed within which objects are assembled in order to transact. This analogy allows us to note that through deciding what is to be included within the calculation, what is to be excluded is also determined. This process has many potential outcomes based on the decisions, negotiations and agreements over what is included and what is excluded. The entities that are selected to be included within this calculative space do not predate it in the form they take within it, but rather are translated by it (Callon and Law, 2005, p.719). That is, as the second step of calculation suggests, associations are formed between the many entities that act upon them to manipulate and transform them. Taking the choice of what is to be included with the translations that occur once they are within suggests that there will be an infinite number of variations that these calculative spaces and objects within them can take.

The second subtlety involves some actors having the methods and materials (Law, 1992, p390) to assemble calculations and others being prevented from doing so. This recognises that, while no *a priori* assumptions can be made, some actors will, due to the outcomes of past translations, have ability and access to more resources that they can assemble in order to allow their calculations to be

performed. This may include the ability to construct solid centres of calculations (Latour, 1987) or 'organisations', such as Irish Water, that allows the assembling of calculative spaces. As noted above, the creation of a calculative space requires the deciding of what is included and thereby what is excluded. In essence, this is the deciding of what qualifies to be part of a calculation and what does not. Hence "all calculation builds itself with and against noncalculation - and vice versa [and] suggests that they are Other to each other - indeed, separate but also mutually implicated" (Callon & Law, 2005, p.718). This implies that the assembling of entities within a calculative space for calculative purposes requires the shutting down of other potential counter-calculations through the creation of non-calculative spaces.

Thus, the second subtlety notes that the resources that some actors have to form powerful calculations will also be utilised to create non-calculative space. Callon and Law (2005) note two strategies for the creation of these non-calculative spaces and thereby the prevention of counter-calculation. The first is rarefaction, which is the disentanglement of any links to calculative spaces and the withdrawing of the resources required for calculation with a corresponding entanglement in the non-calculative. The second is proliferation, the opening up of things with the inclusion of so many entities that interact with one another in competing ways and thereby the creation of too much entanglement that the very context creates incalculability. We will examine, in the highly politicised arena of introducing a regime of domestic water billing, a calculation, through the creation of Irish Water as a centre of calculation with calculative spaces, whether either of these strategies are deployed as the process unfolds over time. In the examination of whether either of these strategies are utilised it is important to note, and we will return to in the discussion section, that the boundary between a calculative and non-calculative space is not as clear cut as, for example, a geographical boundary. Rather the boundaries are typically blurred, overlapping and reinforcing of each other. It is this that leads Callon and Law (2005) to state that rather than thinking of them as distinct areas, it is better to think of them as 'other' to each other.

This second subtlety also relates to our research aim. As noted earlier, our aim focuses on the role of accounting concepts; such as investment, budgets, cash flows and specifically 'cost'; in the implementation of domestic water billing. These accounting concepts are readily used boundary objects (Star & Griesemer, 1989) that can be classified as visionary objects (Briers and Chua, 2001). Visionary objects are those that have legitimate use within a community, here business and political communities, and are plastic enough to mould to local practices, while robust enough to carry meaning across differing localities. They become visionary objects as they typically, through the education provided during business degrees and their everyday use within the workplace, become taken for granted language utilised by the business and political communities and act upon how these communities are constructed (MacKenzie, 2006) In this sense, they provide a specific notion of how the world around us should be measured and in turn constructed. They, therefore, act upon, through denoting legitimacy, what is to be included within a calculative space and what is to be kept out, Further they suggest once objects are assembled within the calculative space a process of quantification will be pursued. Quantification is a series of translations that involve the assembling of concepts and the assigning of numbers to those concepts, which is a process that is often perceived as rational and scientific for the apparent reduction of ambiguities (Hines, 1988; Robson, 1992). However, performing this reduction of ambiguity requires the creation of equivalence among things that may actually be completely different or even incompatible in practice (Callon, 1991; Law, 1992, MacKenzie, 2009). Hence, calculations mobilised using accounting concepts quantify and in doing so they objectify many things that should not be so and run the danger of all things being seen through "calculating eyes"; or exclude the very thing that should be accounted for (Hines, 1991), such as the management of a sustainable water supply.

As Law (1992, p.390) notes “it could and often should be otherwise.” That is, in line with Callon and Muniesa’s (2005) third subtlety, these accounting concepts are open to many interpretations. This is particularly the case for those that do not have the background that would result in them taking accounting concepts for granted; or for those whose own goals and ambitions make opening up the black box of accounting concepts both practical and desirable. This then will provide an opening for discussion and public debate to what should be included in or even whether there should be a calculative space. The danger, however, is that the results of the calculative space becomes an ‘ends’ in themselves rather than ‘means’ for assisting in the achieving something else (McMann and Nanni, 1995). Hence our examination of the implementation of domestic water billing looks to see how ‘cost’ is mobilised and what assemblages of actors are gathered around it. Specifically we are interested to see whether links are created between these notions of ‘cost’ and the underlying concerns of constructing a reliable and sustainable water supply or whether ‘cost’ becomes more embroiled in the aforementioned political hot potato and becomes an ‘ends’ in itself. In essence, we are examining whether the controversies and disputes that erupt around the forming of Irish Water result in the economic entities[3] being assembled becoming political objects (Muniesa and Callon, 2007).

Method

In this study, we undertake a method similar to that utilised by Jones and Dugdale (2002) in the investigation of the rise of ABC. We follow key actors across time and space as they assemble networks of actors around them in their efforts to implement domestic water billing. We focus on the controversies that arise and the use of non-human actors - particularly the notion of ‘cost’ - that are enrolled in their efforts to move their programmes of action forward. An overview of these events, including some historical background is presented in the section below. To reveal the story of how domestic water billing was introduced, we draw on secondary data. While primary research data is generally preferable for any research project, the story below reveals how domestic water billing has been a contentious and politicised issue in Ireland over the years. We therefore recognised that access to primary data sources during the timeframe of our analysis would not be forthcoming and instead utilised the rich secondary data available. We have utilised publically available documents such as Water Services Acts and other local government legislation, programmes for government, regulator publications, media reports and parliamentary records. All such material has been obtained through the primary website of publication as per Table 1. We should note that the period of analysis for this paper ends with the passing of the Water Services Act (2014), which was effective from 28th December, 2014. This Act included the charges to be paid by Irish households until 31st December, 2018.

Insert Table 1 here

Through analysing the above data we have been able to trace the associations formed and the actors enrolled in the struggle to translate an idea into a taken for granted billing regime and how this involved the formation of a new national water utility. Within this we have been able to focus on the mobilisation of non-human actors, such as the concept of ‘cost’, in the attempts - as controversial and unsuccessful as many of these were - to gather widespread support for domestic water billing. Before we turn to providing an outline of these events in the next section, we first note that while we did not utilise primary data, for the aforementioned reasons, we are confident in the richness provided by the analysis of the secondary data as to provide a plausible (Ahrens and Chapman, 2006) understanding of events that unfolded. This plausibility was further confirmed through informal conversations with key actors who, due to the politicised nature of these events, declined permission for us to utilise them

as interviewees. This approach has been taken previously in such examples as Jones and Dugdale's (2002) examination of the development of activity based costing. Any historical case usually requires the examination of secondary data due to the impossibility of observing events as they unfold or interviewing actors who no longer exist. For example, Carroll (2012) utilises an actor-network approach based on secondary, historical data to investigate the role of water in the construction of the techno-scientific state in California. We now present an overview of the events of interest.

The Irish Water story

From October 1st 2014, domestic water consumers in Ireland have to pay for water, initially on a flat rate basis. Longer term (see below), this will most likely be on a volumetric basis. To explore how this came about, we now outline the history of domestic water issues in Ireland. First, we summarise the situation pre-2010, which included previous failed attempts to charge domestic users, in effect the failure to create a calculative space. Second, we detail the period from 2010 to the introduction of water charges, first on October 1st 2014, with some modifications in late 2014. This period includes the formation of a new utility, Irish Water, which provides a centre of calculation that enables the creation of a calculative space. This is achieved through the assistance of the 'otherness' of non-calculative space.

The story pre-2010

Despite its "Emerald Isle" image and abundant rainfall, Ireland has historically had a treated water problem due primarily to dated water infrastructure - some dates back to the late 19th century[4]. This problem has become more in focus over recent decades as continued lack of investment, coupled with increased population and urbanisation, has seen an understanding develop that the water distribution system was increasingly under pressure (see for example, Irish Water (2015), pp. iii - iv). This is particularly acute in the case of Dublin. The increasing population of the city combined with increasing population density makes, as with all large modern cities, the provision of water an ever increasing physical and logistical challenge.

The ongoing lack of investment in water infrastructure resulted in several issues which could be described as features of an unsustainable water delivery system (as per Cashman, 2011) within Ireland. Before detailing these issues, some historical context setting is useful. As noted by the Commission for Energy Regulation (CER)[5], Ireland was one of only a few OECD countries to not charge for domestic water services until recently (see later). The passing of the Local Government (Sanitary Services) Act, 1962, allowed a local authority to charge businesses for water usage[6], but there were no domestic charges. Instead, domestic households paid rates for services provided by local authorities. These domestic rates were a major funding source for local authorities, who at that time provided water services in their local area. Domestic rates were abolished in 1978, following the 1977 general election. Their abolition was used as an election promise, hence the beginning of the politicising of the economic entities (Muniesa and Callon, 2007) of water billing. This coincided with increased direct taxes and borrowing to fund the local authorities which had previously relied on domestic rates. To replace rates, central government paid a rate support grant to local authorities, and in doing so, excluded the need for a calculative space for domestic billing.

A change of government in 1983 resulted in a cut to the rate support grant. To compensate, the then government passed the Local Government (Financial Provisions) (No. 2) Act, 1983. This Act allowed local authorities to levy domestic water charges, opening up the potential for the construction of calculative spaces. As is illustrated in the Irish Times (2014c)[7], this was received by the public in terms of a double taxation, as previously increased direct taxes were not reduced. From 1983 to the early 1990's some local authorities levied domestic water charges. The largest local authority, Dublin County Council, did not however despite being the most highly populated part of Ireland. The greater

Dublin area, which includes counties Meath, Kildare and Wicklow had a population of approximately 1.1 million in 1996, which increased to 1.8 million by 2011[8]. To deal with increasing population (and other strategic planning matters) in Dublin, the Local Government (Dublin) Act, 1993 divided Dublin County Council into four new local authority areas - Fingal, Dublin City, South Dublin and Dun Laoghaire/Rathdown. In early 1994, these new authorities - with the exception of Dublin City - introduced a flat water charge ranging from £50-90[9] (approx. €85-115). Intense public protests followed, and the government passed the Local Government (Financial Provisions) Act, 1997 in advance of a general election in June of that year. Section 2 of the 1997 Act states:

> A sanitary authority may make charges for water supplied, whether within or outside their functional area, by them, but after the 31st day of December, 1996, a sanitary authority may not make a charge for a supply by them of water for domestic purposes.

The 1997 Act effectively outlawed local authorities from billing for domestic water. This effectively excluded the possibility of a calculative space and again sees water billing becoming embroiled in the political process.

Given failed efforts to charge for domestic water, local authorities relied on funding from central government. Additionally, a general economic boom from the late 1990's saw increased construction activity throughout Ireland. Local authorities imposed a development levy on the basis of floor area[10], and this was a major income stream from 2004 until the collapse of the construction sector in 2007/8. Despite the favourable economic conditions, total capital expenditure in Ireland remained fairly constant at levels of approximately 5% of GDP[11], albeit a growing GDP. Despite this level of government funding, a more sustainable water supply was not developed during this period as illustrated in the following examples.

During the time period described thus far, the late 1970's to 2008, water services in Ireland faced many on-going issues which, could be said, stem from under-investment. Examples include:

- In 2007 there was an outbreak of waterborne cryptosporidiosis in Galway, which caused illness to over 200 people (RTE, 2007)
- From October 2013 to late 2014, areas of Roscommon county are subject to boil water notices due to the same bacterial infection (Irish Times, 2014a)
- As shown in Figure 1, Unaccounted for water (UFW)[12] averaged 41% in 2008 which the Comptroller and Auditor General noted as "at levels twice the OECD average of 20%" (Report of the Comptroller and Auditor General, 2010, vol. 2, p. 313). Media reports in February 2015 based on data from Irish Water installed meters, put the estimated UFW at 49% nationally. This latter data is more accurate than previous, as more than 500,000 meters had been installed - where none existed previously.

Insert Figure 1 here

According to the Report of the Comptroller and Auditor General in 2010, investment in water services in Ireland by local authorities had totalled €5.2 billion in the period 2000-2010. Most of this amount (€4.2 billion) was invested in new or upgraded water infrastructure in major urban areas, with €1 billion spent on public supply networks. The Comptroller and Auditor General noted:

> While some caution needs to be applied in interpreting the results of a limited examination of water leakage carried out over 15 years ago, present-day losses may be, in many local

> authorities, as high as those found in the mid-1990's notwithstanding an investment of over €1 billion in water supply and conservation in the last ten years. In the light of the *potential cost of UFW* it is necessary that the factors that give rise to UFW be reviewed *and strategies and operational programmes to address the underlying issues contributing to the problem be re-evaluated* (Report of the Comptroller and Auditor General, 2010, vol. 2, p. 313, emphasis added).

Although we provide only a brief summary of water services issues in Ireland above, it would appear that a major potential source of funding needed to sustain (and/or improve) a water supply was untapped, namely revenues from domestic consumers. As the above extract from the Comptroller and Auditor General illustrates the concept of cost, in this case in relation to non-action, was already being mobilised in efforts to justify the need for change that would eventually lead to the implementation of domestic water billing and the construction of a calculative space in the form of Irish Water. Contrasting this, commercial water consumers were charged during this period and contributed to the income stream of local authorities - for example, in 2012 the four councils of the Greater Dublin generated revenues of €56.7 million[13]. The potential motivation for moving towards domestic billing can be seen through noting that according to the 2011 Census, Dublin had 468,100 households[14]. Thus, an annual charge of say €200 per household would yield €92 million - much more than income earned from commercial water charges. However, as illustrated above many of the previous attempts to implement domestic water billing were counter-acted as political parties used them to assist their own aims - gaining or maintaining political power. In the next section we continue the story through explaining some of the key events that occurred from 2010 to 2014.

The story post-2010

In November 2010, the Irish government accepted a bailout package to rescue the economy. This would be a critical moment in the events that led to the implementation of domestic water billing and the formation of Irish Water. Before getting to this point in time, a brief outline of some events leading up to it is useful.

A general election in 2007 saw a change of government with Fianna Fáil and the Green Party forming a coalition. This government continued to not charge domestic users for water services. The combined Programme for Government[15] drawn up by the two parties did include an entry entitled *Protecting our Water*, but specifically did not mention billing. Rather, it laid out plans and goals that would move Ireland towards having a sustainable water supply through, for example, upgrading the infrastructure and introducing measures to protect the quality of supply. Hence while 'cost' was inferred in these plans, the emphasis was strongly on the sustainability of water within Ireland. In October 2009, a Renewed Programme for Government[16] between the two parties first mentioned the introduction of domestic water charges:

> We will introduce charging for treated water use that is fair, significantly reduces waste and is easily applied. It will be based on a system where households are allocated a free basic allowance, with charging only for water use in excess of this allowance. In keeping with the allocation of greater responsibility to local government, Local Authorities will set their own rates for water use (Renewed Programme for Government, 2009. p.5).

In September 2008, the Irish banking sector faced a crisis due mainly to under-capitalisation at Anglo Irish Bank - a commercial bank. On September 30th, 2008, the government guaranteed the liabilities of the main high-street banks in Ireland to the tune of €440 billion[17]. While the time from September

2008 to November 2010 is not for detailed discussion here, it is worth noting that the global economic crisis which began in 2008 had its effects on Irish government revenues. As the overall level of construction dropped off so did tax revenues from this source. The government's budget increasingly went into deficit - becoming the highest in the EU in 2009[18]. This, coupled with the bank guarantee given in 2008, increased government borrowing costs to an unsustainably high level. On November 21st, 2010 the government accepted a bailout package from the European Union and the International Monetary Fund[19].

The 2010 Budget speech which was presented by the Minister for Finance on 9th December 2009[20] to Dáil Eireann (Lower House of Parliament) noted:

> The Renewed Programme also contains a commitment to introduce a system of water metering for homes. Preparations are underway. Water charges, when introduced, will be based on consumption above a free allocation.

This demonstrates the focus on assembling divergent actors, specifically here water meters, in order to assist with the construction of a calculative space to enable domestic billing. However, as yet the form that this calculative space would take still remained unknown.

The government also published a *National Recovery Plan 2011-2014* around the same time. This plan provided more detail on the government's intentions for domestic water charges. First, the 2011-2014 Plan made it clear the government wished to introduce a new revenue stream to "improve the General Government position" (p.78). Second, it noted it is intended that domestic water charges will cover local authorities' operational costs and a proportion of the capital costs of providing water services to domestic consumers (p.78). Hence, we see the mobilisation of the accounting concepts of 'revenue' and 'cost' as visionary objects to provide a sense of legitimacy to the government's plans for recovery.

At the same time as the National Recovery Plan 2011-2014 was being drafted, Ireland was also agreeing a Memorandum of Understanding (MOU) with its bailout partners, which contributed an €85 billion rescue package to the Irish economy (Economic Adjustment Programme for Ireland, 2011). Within the MOU, the commitment to recover the cost of water service provision is noted as "we are also planning to move towards full cost-recovery in the provision of water services". These commitments are in line with the EU Water Framework Directive (WFD), Article 9, which states "Member States shall take account of the principle of recovery of the costs of water services"[21]. Hence, we see the gathering and enrolling of more key actors - MOU, bailout partners, and WFD - in the efforts to construct a calculative space and again the appeal to 'cost' to give this process legitimacy. The importance of these key actors - along with the vast number of meters to be installed, the National Recovery Plan 2011-2014, budget speeches, Renewed Programme for Government and a host of other similar actors being assembled - is that they not only began the construction of a calculative space, but also provided for the construction of a non-calculative space. That is, the enrolment of so many actors into the supporting of the construction of a calculative space can be seen as a strategy of proliferation in that it aimed to form so many associations between millions of entities in order to limit the possibility of counter-calculations. A key aspect of this was the enrolment of, and legitimacy provided by, the visionary objects that are accounting concepts.

March 2011 saw a change of government and a new government programme spanning 2011 to 2016. This programme introduced a differing view on operationalising the previous government's commitment to levy domestic water charges. The programme[22] states:

> The new Government will create Irish Water, a new State company that will take over the water investment maintenance programmes of the 34 existing local authorities. It will

> supervise and accelerate the planned investments needed to upgrade the State's inefficient and leaking water network (Programme for Government, 2011-16, p.14).

This government programme commitment was followed through with the passing of the Water Service Act 2013. This 2013 Act was the first piece of legislation to permit the levying of domestic water charges since the legal basis to levy was removed by the Local Government (Financial Provisions) Act, 1997. Thus, not only were more actors; such as the new government, the new government programme, and new legislation; assembled and enrolled into the creation of a calculative space but also a centre of calculation was created, Irish Water, giving a location for these calculative spaces for the first time.

The Water Service Act 2013 (ss. 4, 5) created a private limited company, Irish Water, to assume responsibility for aspects of water treatment and delivery in Ireland. Under the 2013 Act, the ownership of Irish Water is vested in the Minister for the Environment, Community and Local Government, the Minister for Finance and Bord Gáis Éireann (Irish Gas Board). In a legal sense, Irish Water is a subsidiary of Bord Gáis Éireann (BGE), which is currently state-owned. This formation method means delivery of water to domestic consumers in Ireland is controlled by a separate legal entity, and not embodied with multiple unincorporated local authorities as in the past. Irish Water assumes the assets (pipes, treatment plants etc.) from the local authorities, and water-related staff also became employees of Irish Water. This sees the gathering of the remaining necessary actors for the construction of this centre of calculation and the ability for the calculative space to be formed.

Part 3 of the Water Services Act 2013 vests power in Irish Water to install water meters at domestic premises. Meters installation began in 2014. These meters are important as they allow information to be taken into the calculative space - manipulated, transformed, and associated with other objects - so that results can be created. These results, namely individual bills for domestic water consumers (see Figure 3, later), can then leave and be transported back to the same domestic water consumers. They, therefore, allow a multitude of associations to be formed between Irish Water, the centre of calculation, and the vast numbers of domestic water users that are spatially dispersed over Ireland. As we will see below this importance is not lost on those who would attempt to create counter-calculations.

At this stage the measuring of water consumption is in contrast to the flat rate charged in the 1990's, and follows the "polluter pays" principle set out in the EU WFD. In terms of the charge to be levied on domestic consumers, the Water Services Act 2013 has two key provisions. First, under Section 29, it removes the clause from the Local Government (Financial Provisions) Act, 1997 which removed the power of an authority to levy a charge for domestic water use. Second, Section 27 appoints the Commission for Energy Regulation (CER) as the regulatory authority who will oversee Irish Water's operations, protect consumer interests and approve charges for the provision of water services to domestic consumers. Proposals on tariffs were sent to the CER by Irish Water, which the CER reviewed and decided upon - Figure 2 shows the key features of this decision. The CER decision applied to the period from October 1st 2014 to December 31st 2016, at which time Irish Water may submit new proposals to the CER. Commercial water charges are not within the remit of the CER's decision and remain with local authorities at this time.

Insert Figure 2 here

The approved Irish Water Charges Plan (2014c, p.16) also provided annual charges where consumers do not have a meter installed - for example, in an apartment complex. These charges are based on estimated annual usage and the number of household occupants. As per Figure 2, a transition period of nine months was decided upon by the CER, whereas Irish Water (CER, 2014b, p.54) proposed a

transition period of six months. During this transition period, all metered households would also have this same average charge applied.

Following the publication of the above mentioned charges (per Figure 2) by the CER, a period of nationwide protest followed. The protests were largest in Dublin, and were organised by various groups. Some smaller protest actions also directly targeted political leaders and were increasingly threatening - for example, a bomb threat was made to the constituency office of the Minister of the Environment (Irish Independent, 2014a). These protests illustrate that while the government utilised a strategy of proliferation and an appeal to the visionary objects of accounting concepts, they did not fully succeed in constructing a non-calculative space to 'other' the calculative space they were constructing. This can partly be seen through the nature and interpretation of the visionary objects utilised. Specifically, while the concept of 'cost' had specific meaning and legitimacy with political and business communities, it took on a different meaning within the domestic water user community. As can be seen in the Irish Times (2014c), 'cost' was not associated by this community with the provision of reliable infrastructure, seamless processes, and skilled employees to support the ongoing needs of water provision. Rather this community associated 'cost' with the direct impact that this would have on their own resources and the implications of this on their lives[23].

The protests were also used to enrol support around actions necessary to open up the possibility for counter-calculations. This included encouraging people not to register with Irish Water or pay subsequent bills (Irish Times, 2014e). However, to achieve a counter-calculation there was a need to overcome one of the main tools of proliferation, the meter. While some people had previously taken action to stop the installing of meters at their homes (Irish Times, 2014c), during the protests people distributed caps to cover the hole left if a meter is removed and ensure continued supply (Irish Times, 2014e). These attempts to enrol support continued subsequently to the protests. For example, a number of different groups, calling themselves 'Fairies', started campaigns using social media such as Facebook (Irish Independent, 2015). Through the setting up of Facebook pages and similar activities on other social media, these groups distributed images and videos depicting actions that can be taken to open up the possibility for counter-calculations. For example, a video posted on YouTube and shared on the Dublin South Water Meter Fairies Facebook page gives detailed instructions on how to remove a water meter[24]. It is important to note, however, that under the Water Services Act 2007, it is a criminal offence to remove or destroy a water meter.

The incomplete construction of the non-calculative space to 'other' the calculative space being created can be seen in that the protest movement did achieve a response from the government. Specifically it created a realisation among many members of the coalition that the ongoing issues surrounding domestic water billing may affect their ability to be re-elected in the next general election (Irish Independent, 2014b). By the third week of November 2014, the Minister for the Environment announced a flat charge of €260 for a family household and €160 for a single occupancy household, as exemplified in Figure 3 below. A water conservation grant of €100 was also made available to all households that registered with Irish Water. However, recent figures suggest that only seventy percent of domestic users had registered with Irish Water by the deadline to be eligible for this grant (Irish Times, 2015b). These new charges over-ruled the CER's recommendation, and were embodied into the Water Services Act, 2014. Domestic consumers with meters installed can choose to pay based on the volume used if lower than the standard charge - the "meter charge" and "capped charges" in Figure 3. The 2014 Act contains several other provisions of interest to this study. First, the flat charge introduced in the 2014 Act applies until the end of 2018 - well into the middle of the next government term. After this time, a flat charge may continue or be replaced by a volumetric charge. Second, the Act prohibits the reduction or cut-off of water supply. Third, in response to protest concerns, the Act provides that Irish Water shares can only be sold following a plebiscite - effectively preventing

privatisation. Fourth, it provides for the establishment of a Public Water Forum to, amongst other functions, represent the interests of Irish Water customers.

The 2014 Act was the subject of many hours of debate time in both Houses of the Oireachtas (parliament)[25]. While the government was criticised for rushing the Act through the Houses before and during Christmas holidays, the primary reason to enact the legislation by the end of the year was to permit Irish Water to commence domestic billing – see Figure 3. The governing parties had a sufficient majority in both Houses of the Oireachteas to pass the Act. It was signed into law by the President on 28th December, 2014. Hence, while the creation of the calculative space was not as entirely envisaged it did result in the establishment of the centre of calculation. This leaves open the possibility of the implementation of this calculative space as envisaged sometime in the future.

Insert Figure 3 here

Postscript

While we conclude the examination of the implementation of domestic water billing in Ireland with the Water Services Act 2014, it is of interest to note some points prior to moving to the discussion section. By mid-2015 data has been collected from installed meters. This data has been transported to the calculative space at Irish Water and transformed to appear on the first bills. These have been sent out to customers (see Figure 3). However, reports suggest that there is resistance to paying these bills with Irish Water receiving as little as half the amount it has billed for (Irish Times, 2015c). The calculative space has allowed Irish Water to also start reinforcing the non-calculative space it partially implemented through the use of proliferation of such entities as water meters. That is, through the transformation of the data collected from the water meters they are able to state that leaks within the boundaries of peoples' homes is resulting in the loss of 46 million litres per day, with Irish Water declaring that they will assist with measures to rectify this issue (Irish Times, 2015d).

While protests over the introduction of the domestic water billing are still active and ongoing, they are no longer widespread or large on number. It is worth noting that some of these on-going protests have been violent, with questions asked on how democratic such actions can be (Irish Times, 2015e). Further, the protests are linked with broader issues. For example, one of the main organising groups, Right2Water, has presented a policy platform that includes demands for the right to decent work, an end to the banks' veto on mortgage resolutions as well the abolition of water charges (Irish Times, 2015f).

Discussion

As we utilise an actor-network theory approach, thereby avoiding a distinction between 'description' and 'explanation' (Briers and Chua, 2001, Latour, 1991), in this section we provide some reflective comments. Specifically we return to reflecting upon the contribution of Callon and Muniesa (2005, p.1245) to whether calculations are "hegemonic" as they are "the only possibility for action". The first subtlety that they add was in relation to there being a number of differing ways that calculations can be performed. Earlier, we problematised if it should matter whether or not water utilities are resourced through direct or indirect methods. We noted that in theory either model is adequate, but in practice if an indirect method is utilised, it is problematic due to the ability to subvert resourcing to other areas where more visible political gains can be made. After all, it has been argued that water is inherently political (Bakker, 2012). This was demonstrated in the section above in that the provision of water within Ireland suffered in terms of quality of supply through a lack of investment in infrastructure. We outlined how a government came to power in 1977 through the promise, which was delivered in 1978, to abolish domestic rates (which included an element of water charge). This was followed by two decades of water resourcing being a political hot potato. That is, for two decades various attempts to

instil a direct resourcing method that aimed to address the shortcomings of the indirect method were undermined through politicians using the issue to gain their own 'ends'. Most importantly, with the dominance of the indirect model, there was a reliance on finding alternative sources for the funding for water services. Two relevant issues arise from this situation. The first is that the resources devoted to the provision of water from these alternative indirect sources were only sufficient to maintain the service levels already in place. This resulted in many issues - such as quality, infrastructure deterioration, and reliability - that threatened the ongoing ability to provide a sustainable water service. The second was that the indirect model became reliant on the sustaining of the alternative sources, such as placing a levy on the building industry. This worked well while the building industry continued to grow. However, with the beginning of the economic recession of 2007/8 these alternative sources began to disappear. For instance, as the building industry contracted during the recession, the revenue the government received from the levy significantly decreased, meaning that the resourcing of water services also came under pressure.

What our exploration of Ireland's water services highlight, therefore, is that switching to a direct model of resourcing is also not unproblematic. This shows that while there are many differing ways that calculations can be performed, the actual construction of a calculative space is not always without issue. In this sense, while Callon and Muniesa's (2005) second subtlety notes that some actors, due to the outcome of translations in the past, will have better access to the means to assemble powerful calculations; it still may require a considerable amount of effort to bring it into being. This may include the need to enrol a whole host of supporting actors.

It is of interest in addressing our research question that we note that accounting concepts, such as cost, were enrolled by the Irish government. These were enrolled in an effort to solidify the governments' programme for setting up the calculative space or domestic water billing. However, like all non-human actors enrolled into efforts to achieve a certain goal, these accounting concepts are mediators and as such are likely to entail unintended consequences (Latour, 2005). The above data demonstrates this by noting that the Programme for Government of the Fianna Fáil/Green Party coalition in 2007 was one of the few examples that appeared during the time of investigation where there seemed to be a focus on providing a sustainable water supply. As we noted, 'cost' was inferred within this document but only as a 'means' to providing the sustainable water supply. However by 2009, the Renewed Programme for Government placed the focus back on domestic billing, with 'cost' again being mobilised to justify this. Hence, the issue arises with the mobilisation of accounting concepts - such as 'cost' - that they will not adequately represent the underlying issue of a sustainable water supply. As demonstrated in our discussion above, to the domestic water user, rather than these accounting concepts representing the need for direct resourcing to build a sustainable water supply, they represented an extra burden upon their household. As seen in Figure 3, "meter charge" and "capped charges" do not translate into providing a sustainable water supply but rather extra money that a household will need to spend. This, therefore, demonstrates that the understanding of accounting concepts, such as cost, is not as set in stone as portrayed in the education given within business degrees or as taken for granted in their everyday use within business and political communities. Further, as we have argued above, and will return to below, for the successive governments 'cost' becomes an 'ends' of itself.

Enrolling accounting concepts alone was not sufficient for the establishment of a calculative regime for domestic water billing. Rather powerful (Latour, 1986) actors needed to be enrolled to accomplish this, specifically the bailout partners. That is, the MOU between the bailout partners and the Irish government gave the latter the ability to state that direct billing was at the bequest of the former. As we outlined in the previous section, the way in which the MOU was worded focused fully on 'cost' of provision and 'cost' recovery through domestic billing. Hence, the focus began to be fully on 'cost' and 'cost' recovery rather than on what the specific 'costs' were a representation of. 'Cost'

is commonly understood to be a representation, albeit an incomplete one, of resources consumed. It therefore can only ever be a partial representation of what is required for the provision of a sustainable water supply. The involvement of the bailout partners also exemplifies some of the efforts the government enrolled to prevent counter-calculations from being performed. The need for such measures can be seen in the data above. As events continued to unfold the mobilisation of the visionary object of 'cost' did not silence those that it tried to placate. As Callon (1986) notes, for anything to become taken-for-granted requires the silencing of all actors that are being assembled. Hence, when the new government came to power in March of 2011, they constructed a new actor, the Water Services Act 2013, with the intention of moving the levying of domestic water through to a taken-for-granted state. This was to be achieved through the formation of a national water utility, Irish Water, a centre of calculation within which calculative spaces could be established. Further, the government utilised a strategy of proliferation to create a non-calculative space to 'other' that of Irish Water. This entailed mobilising many actors - including 'cost', 'cost' recovery, leaking pipes, bacteria, local government, greater Dublin, the Trioka, the MOU, the CER, various legislation, technology and most especially the meters - in order to prevent the possibility of counter-calculations to be made.

Proliferation was implemented by the government through the introduction of so many entities that the possibility of counter-calculations became an insurmountable task. The installation of millions of meters throughout Ireland provides a good illustration of this. Many actions - such as protestors blocking their installation, groups of 'Fairies' helping them to 'disappear', and videos of how to uninstall them shared on social media - were undertaken to counter the actors that would assist with the populating of the calculative space for domestic water billing. However, whether it is through the threat of prosecution, apathy, genuine support for the new billing regime, or any of a multitude of other motivations, the vast majority of meters remain fixed where installed and continued to collect the required data. It is therefore interesting to see that the meters are important actors for the creation of both the calculative and non-calculative spaces. Specifically, meters are required to gather volumetric data that is taken within and helps to construct the calculative space. This illustrates what Callon and Law (2005) meant when they suggested that the boundary between the calculative and non-calculative space are best not thought of as in the geographical sense. Likewise, the sheer number of meters enables the possibility for shutting down counter-calculations and in doing so assists with the construction of the non-calculative space.

While attempts at counter-calculations were only partially 'successful', they do exemplify, in line with Callon and Muniesa's (2005) third subtlety, open discussion and public debate over how these calculations are constructed. Further, the government's backtracking from charging based on volumetric usage to a flat fee also demonstrates that "it could and often should be otherwise" (Law, 1992, p.390). In effect, the attempts at counter-calculations are akin to the counter-accounts used by groups within civil society in disputes over a natural resource examined by Apostol (2015). However, the difference here is that Irish Water was an organisation that came into being as a result of the many problematisations and failed translations over the past few decades, and the assembling of many differing actors as a result to construct a calculative space. Apostol's (2015) examination was of an existing organisation that already contained calculative spaces and mobilised the outputs of these in attempts to achieve its aims. Further, while differing forms of protest can be considered as counter-accounts (Spence, 2009), in this case it was not the description provided over the actions of an organisation that was being disputed, but rather what the meaning of a mobilised accounting concept was to be. In other words, was 'cost' going to represent the need for billing domestic water users and the fulfilling of the terms of the MOU, or was it to represent the imposition of further burden on household funds of the families of Ireland during a time of austerity? In effect, what was intended as a visionary object was having its very meaning fought over.

Regardless of the differences between this research and that of Apostol (2015), they do collectively provide implications for future research. In this study, we examine the implementation of a regime for domestic water billing with the establishment of a publically owned utility. In contrast Apostol (2015) examined the case of a private company wanting to establish a new venture within a specific country. They both can therefore be said to be examining attempts at establishing new economic entities and therefore be said to be focusing on processes of 'economization' (Calıskan and Callon, 2009, 2010). What is striking, however, is that both examine the attempts to counter the establishment of these new economic entities through political processes with the use of counter-accounts and protests. While many actors will label these attempts of countering as outside of the economic frame or as market failures (Callon, 1998, 2010) it is notable that both studies reinforce how entwined within the process of 'economization' these actions are. Further, in both studies it was the enrolment of so many citizens that allowed these attempts of countering to gain a level of 'success'. This raises the questions of whether democratic action is just confined to voting at an election and if we allow for it to be a broader set of processes then how do they interrelate with those of economization? Of course, there is already accounting literature that has studied aspects of how these processes interrelate. Here, however, we are suggesting that examining the use of accounting in the processes of 'economization' may benefit from also seeing how this interacts with and forms part of the processes of 'democratization'. For example, in this study we saw how accounting concepts, entities associated with the processes of 'economization', became embroiled in the processes of 'democratization' through the Irish government successively attempting to draw on a specific legitimacy they may provide. That is, the Irish Government sought to enrol the visionary properties of accounting concepts, especially cost, in order to associate domestic water billing and the formation of Irish Water with economic rationale. As such they were seeking to place these actions within the processes of 'economization' rather than allow them to become political. In this sense, this opens up the question of whether and how accounting concepts are used to assist in efforts to prevent processes of 'democratization' from occurring. Hence it would seem that there is much future research that looks at how different entities get constructed and move between these differing but interrelated processes.

Part of this may require re-examining the notions of change that we mobilise within our research. The formation of Irish Water came about as part of the means utilised to implement domestic water billing. While it is now a taken-for-granted occurrence it was not always so, with the organisation not even being mentioned, let alone constructed, until very recently. Indeed, our description demonstrates how it was only as a result of decades of events - that could be labelled as politicising, intrigue, deception, manipulation, deceit, etc. - that finally led to its formation. Further, it only came about as an attempt to create a centre of calculation for the required calculative space for billing of domestic water users. This implies that rather than being a so-called rational process of creation, the formation of Irish Water was much more a process of 'drift' (Quattrone and Hopper, 2001) that emerged from the mundane daily practices of people trying to enact and balance many competing rationalities for the management of water within Ireland. That is, there were many competing ideals as to what constituted the 'right' and 'wrong' way to provide resources to cover the ongoing costs of water delivery that made any given solution problematic. It should be noted that other options exist (see for example, Marquardt & Russell, 2007) beyond the use of mechanism of cost recovery for water utilities if the goal is to implement a sustainable water supply. As such the examination of how and why specific outcomes are achieved may extend our knowledge of accounting's role within both the processes of 'economization' and 'democratization'.

This study has allowed us to understand that in attempts - both pre- and post- bailout - that 'cost' was enrolled as a visionary object in efforts to promote and establish a solution to the various issues of water supply in Ireland. However, the initial usage of 'cost' proved so problematic and

unpopular that it influenced the make-up of successive governments. It was not until the government assembled many differing actors, including those from outside Ireland such as the Trioka, to create a calculative space and attempts to 'other' this with a non-calculative space that the ability to establish domestic billing became possible. In effect, the corralling of many actors (Briers and Chua, 2001) was required in order that the current government could eat what had been previously a political 'hot potato'. This highlights that the use of boundary objects, such as the visionary objects provided by accounting concepts, is not unproblematic. As Star & Griesemer (1989, p.393) note "[t]he creation and management of boundary objects is a key process in developing and maintaining coherence across intersecting social worlds." Here, we have examined the mobilisation of the visionary object of 'cost' and note that it is circulated without a calculative technology in support. This results in it being mobilised in contrasting ways by actors and counter-actors. Thus for the government, in implementing billing of domestic water users the concept of 'cost' was mobilised in line with the economic rationales around resourcing and meeting the terms of the MOU. For those protesting against the government and Irish Water's moves to implementing a billing system, 'cost' was in terms of the inequitable burden that it would place on private citizens, again illustrated in the "meter charge" and "capped charges" in Figure 3. This adds nuance to the findings of Hunt *et al*. (2013) in that they suggested that accounting and its concepts would be mobilised for the economic rationale argument alone with such mobilisation silencing equity concerns. Here, while our findings are generally in line with those of Hunt *et al*. (2013), we find that it is the dispute over what these accounting concepts should represent that resulted in the outcome of a flat rate charge being imposed by the government rather than the original intention of billing in a user-pays, economic rationale way. The mobilisation of 'cost' to mean the impact on household budgets (and hence attach it to notions of equity), acted upon, and in turn enrolled and mobilised large numbers of Irish citizens as seen in protests. This in turn gave to the government the realisation that unless they changed the proposed billing system, the outcome of the ever nearer election may be swayed and overshadowed by this alternative mobilisation of the visionary object, 'cost'. Hence, the ability to mobilise 'cost' in relation to equity concerns made it possible to overcome the arguments of economic rationalisation. In turn, we again see the entwinement of the processes of 'economization' and 'democratization'.

Regardless of the outcome of this dispute over the meaning of 'cost' it has one important effect in relation to the focus of this research - it shifts the focus away from providing a reliable and sustainable water supply, to what the impact and charges will be for the domestic water user. There is a move away from water as the 'ends' of concern. In effect, 'cost' is not being treated as a 'means' to providing a reliable and sustainable water supply, but is treated as an 'ends', in terms of the direct 'cost' to the domestic user. For example, reports in the Irish Times (2015a) suggest that when billing began on October 1st 2014 - on a then volumetric basis - average water usage across the greater Dublin area[26] fell by around 20 million litres per day. After the flat rate billing was introduced the average daily water usage returned almost to the levels seen prior to October. If we put this in the context of Figure 3, what is striking is the difference between the "meter charge" and the "capped charges". The householder in Figure 3 would be charged almost double the amount if meter charges were used rather than the capped charge. Therefore, this household has no explicit incentive to enter into water conservation efforts. This is in line with Egan's (2014a) finding that without a method of accountability in place that it is unlikely behaviour will change to support water conservation efforts. Further, in the present case the measurement system to potentially allow accountability to function - namely metered charge - is in place but not allowed to operate as intended. As such, with the lower capped charges it seems unlikely that this will remain the case. It would seem therefore that the focus on 'cost' has limited the chances of it providing a 'means', or at least part of the 'means', to implement a sustainable water supply. Only time will tell if these processes move on to a point where

Irish Water, regardless of the nature of billing, can establish a sustainable water supply within Ireland and how this is resourced.

Concluding remarks

In this paper we have aimed to investigate how and why accounting concepts have been mobilised in the implementation of domestic water billing in Ireland and the effects they have in this process. We specifically track the efforts of successive Irish governments to construct a calculative space and how this eventually resulted in the forming of a centre of calculations, Irish Water. Further, we have overviewed how the Irish government utilised a strategy of proliferation - the assembling of many actors including the Troika, crumbling infrastructure, meters, MOU, new legislation, media releases, speeches, etc. - in attempts at the creation of a non-calculative space to 'other' the calculative space they were constructing. The aim of this non-calculative space was to inhibit the ability for counter-actors to calculate. They utilised a strategy they thought would limit the possibility of counter-actors with anti-programs to create counter-calculations that in the past had limited the ability of previous governments to implement domestic water billing. In effect, this is an example of what Callon and Law (2005, p.731) note:

> "And though we have not sought to show this here qualculation [calculation in its broadest sense] depends, reciprocally, on the absent presence of noncalculation; places and processes where matters are not summed up; places and processes where actions happen without the benefit of qualculation. Qualculation always discovers its limits."

Within this process the Irish government mobilised accounting concepts, specifically 'cost', as visionary objects to give legitimacy to these efforts through attempting to make domestic water billing seem more rational or the "right" course of action. The use of 'cost' as a visionary object had only limited success. 'Cost' was mobilised in terms of economic rationality - as understood in political and business communities – by the government. In turn, it was mobilised in relation to the burden on private citizens and households by those protesting the introduction of domestic billing. Further, 'cost' was mobilised by the government while having no calculative technology in support of it. This was retrospectively created in the formation of Irish Water, a centre of calculation, which would establish the required calculative space. That is, the last of the three steps of calculation (Callon and Muniesa, 2005) is the result that can then circulate beyond the calculative space, which is constructed in the first step. However, here we see appeals to the conceptualisation of the result of a calculation, 'cost', in order to create time to construct the calculative space itself.

Finally, we also note that all of this "politicising" has meant that any focus on providing a sustainable water supply has been side-lined by 'cost' moving from being a 'means' for this to an 'ends' in itself. However, this is an area that needs further research. As mentioned above when billing began on a then volumetric basis average water usage across Dublin fell dramatically but rose again after the flat rate billing was introduced. It would seem then that while the focus became to be on 'cost' as an ends in itself, there may have also been effects of domestic billing that at least reduced the pressure on the already crumbling water service infrastructure. This is alluded to by Egan (2014a, pp.277-278) who notes that "[a] practical implication for water regulators is that organisational networks focused on water efficiency might become more durable, if cost is more effectively utilised to contribute to addressing water scarcity."

Our research does have a number of limitations. As we have noted, one of the major limitations of the paper is the reliance on secondary data. However, given our informal discussions with a number of key actors involved with these events, we are confident that we have presented a plausible (Ahrens and Chapman, 2006) understanding and analysis of events as they unfolded. This is

also a significant area of promise for future research. It is not often that major new utilities are formed within any country, and some commentators have noted it may be a decade or more before the utility is up to full speed. Another limitation is we only detail the story thus far, to late 2014. As the saying goes "a day is a long time in politics" – the Irish Water story is not over and it has a particularly rich potential for investigating many issues beyond what has been covered in this paper.

Notes:

1. In this paper what we mean by a sustainable water supply is a water supply that can sustain service quality rather than an approach to supplying water that has social and ecological concerns at its core. We also acknowledge that to have the former in the long run will require implementing the latter. However, a focus on the latter and its links to the former is beyond the scope of this paper.
2. This is the media tag given to the European Central Bank, European Commission and the International Monetary Fund, all of whom contributed to the bailout of the Irish economy.
3. By economic entities (Muniesa and Callon, 2007) we mean any object or actor that is assembled in an actor-world (Callon *et al*, 1986) that is primarily associated with economics or the economy. As the statement above alludes to this is an artificial segregation but a useful one that has been deployed in the extensive ANT literature that focuses on economic markets. So for our purposes economic entities are accounting concepts, rate bills, domestic billing, organisations such as Irish Water, and any other actor that can be seen to primarily exist in an economic actor-world.
4. See http://debates.oireachtas.ie/dail/2011/12/01/00013.asp
5. See http://www.cer.ie/customer-care/water/faqs
6. For the purposes of this paper, we focus on mains connected domestic water consumers. Ireland has many small group domestic water schemes, akin to those studied by Marquardt and Russell (2007), which are not the focus here.
7. On a recent visit to Ireland one of the authors took a taxi ride from Heuston Train Station to their hotel. During this trip the taxi driver spoke about the troubles that Ireland was experiencing, including issues of gross inequality, political ineptitude, and the impacts these were having on the 'common person on the street'. Towards the end of the conversation the taxi driver turned his attention to domestic water billing and the formation of Irish Water. Specifically, he perceived billing was in effect a double taxation for the very same reason that the previously increased indirect taxation had not been reduced.
8. Population Census of Ireland, 1996, 2011, available at census.cso.ie
9. See Irish Independent, 6 January 1994, p.3.
10. These levies were permitted under the Planning and Development Act 2000, but not implemented until 2004.
11. See http://ec.europa.eu/ireland/economy/irelands_economic_crisis/index_en.htm
12. Unaccounted for Water is the difference between the volume of water entering the infrastructure and making it through to the final consumer. It is expected that moderated losses will be incurred through inevitable leaks.
13. Source - Annual Financial Statements
14. See http://www.cso.ie/quicktables/GetQuickTables.aspx?FileName=CNA33.asp&TableName=Number+of+private+households+and+persons+in+private+households+in+each+Province+,+County+and+City&StatisticalProduct=DB_CN
15. See http://www.taoiseach.gov.ie/attached_files/Pdf%20files/Eng%20Prog%20for%20Gov.pdf

16. See http://www.defence.ie/WebSite.nsf/72804bb4760386f380256c610055a16b/2a49a2267d0f095b80257754004d3e17/$FILE/94315182.pdf/Renewed_Programme_for_Government,_October_2009.pdf
17. See http://www.centralbank.ie/regulation/industry-sectors/credit-institutions/pages/governmentguaranteescheme.aspx and http://www.independent.ie/business/irish/anglo/anglo-irish-bank-timeline-30438279.html
18. See for example, http://www.rte.ie/news/2010/0422/130167-economy/
19. See http://www.telegraph.co.uk/finance/financialcrisis/8150137/Ireland-forced-to-take-EU-and-IMF-bail-out-package.html
20. See http://budget.gov.ie/budgets/2010/FinancialStatement.aspx
21. See http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32000L0060
22. See http://www.taoiseach.gov.ie/eng/Work_Of_The_Department/Programme_for_Government/Programme_for_Government_2011-2016.pdf
23. Although the total cost to a family may have been no more than €400 per annum, this additional cost was "one tax too far". Tax increases, new taxes and pay cuts in the years since 2008 reduced income of Irish households dramatically (see for example, Irish Times, 2014d).
24. See https://www.youtube.com/watch?v=2YgS_NUuo3E&feature=youtu.be and https://www.facebook.com/pages/Dublin-South-Water-Meter-Fairies/909641872430601?fref=ts
25. See http://www.oireachtas.ie/viewdoc.asp?DocID=27710&&CatID=59.
26. Greater Dublin represent about one third of Ireland's population.

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Document type	*Source*
Legislation	www.irishstatutebook.ie
Programmes for Government	websites of political party or www.oireachteas.ie
Regulator publications	www.cer.ie
Parliamentary records	debates.oireachteas.ie
Media reports	Leading daily broadsheets such as Irish Times and Irish Independent; state broadcasting service (RTÉ).

Table 1 - data sources

	2008 %	2009 %	2015 %
Lowest UFW rate	16.8	21.4	21.0
Highest UFW rate	58.6	58.5	62.0
Average UFW rate	41.2	41.4	49.0

Figure 1 - average UFW - sources: 2008 and 2009, Report of the Comptroller and Auditor General, 2010, Volume 2; 2015, http://www.rte.ie/news/2015/0213/679825-water/, accessed February 13, 2015.

Feature	Extracts from CER documentation
Charging principles	Maintain a balance between cost recovery and public utility (2014c, p.7) Charge for water supply and/or waste water (2014c, pp. 8-9) Water supply charged on volumetric *metering* (2014c, pp. 8-9)
Standing charge	Domestic Customers will not be subject to a Standing Charge (2014c, p.10)
Allowances	30,000 litres per annum free, additional 21,000 litres per annum for each child under 18 (2014c, p. 15)
Price per volume measure for incoming water	€2.44 per 1,000 litres (2014c, p.11)
Charge for waste water	€2.44 per 1,000 litres (2014c, p. 11)
Transition period	Until June 30th, 2015 (or meter install date plus nine months), charges will be capped based on a volumetric *assessment* equal to average household usage (2014c, p.17)

Figure 2 - key water charge features (Source: Response Paper on Domestic Water Tariff Principles and Proposals, CER, 2014a; Water Charges Plan Consultation, CER 2014b, Irish Water Charges Plan, CER 2014c)

1 cubic metre (1m³) is 1,000 litres

Your consumption in more detail

Metered consumption for this period (A) Actual (E) Estimate

Meter number	To	From	Volume
14MU144300	100.895 (A)	61.932	38.963m³
Total metered consumption			**38.963m³**

Children's water allowance

Allowance brought forward		0.000m³
Allowance this period	21m³ / 365 days x 90 days x 2 children	10.356m³
Allowance used this period		-10.356m³
Allowance to be carried forward		0.000m³
Metered consumption less allowances		**28.607m³**

Your charges in more detail

Metered charges for this period	Volume	Rate	Amount
Water supplied	28.607m³	€ 1.85	€ 52.92
Wastewater removed	28.607m³	€ 1.85	€ 52.92
Metered charge			**€ 105.84**

Capped charges for this period

01/01/2015 to 31/03/2015 Two or more adults € 260 / 365 days x 90 days	
Capped charges for this bill (90 days)	**€ 64.10**

Metered bills

Irish Water will usually send you a bill every three months. Metered charges will be capped until the end of 2018. The charge for households with one adult is not more than €160 per year for both services (water and wastewater), €80 per year for a single service. For households with two or more adults, the charge is not more than €260 per year for both services, €130 per year for a single service. You will be charged the lower amount if your metered charge is less than the capped charge: meaning you could save money if you conserve water. A children's water allowance of of 21m³ (21,000 litres) a year per service is applicable for each child aged 17 years and under. Customers who have not registered with Irish Water are charged €260 per year by default. The charge is based on the number of days in the billing period.

Payment

Please use your Irish Water account number for all payments to ensure payments are processed correctly.

Direct Debit

Please complete the Direct Debit Mandate with this bill or you can sign up to Direct Debit at www.water.ie or by phoning us.

Online Banking / Electronic Fund Transfer / Standing Order

Please use Irish Water's bank account details from the payment slip with this bill.

Mybills.ie

You can pay through An Post's online service at www.mybills.ie.

Cash

Bring your bill to pay at any retail outlet where you see PayPoint, Payzone or PostPoint signs or at any Post Office. The minimum payment is €5.

Cheque

Figure 3 – an example of the first domestic water bill sent in early 2015 (Source: Authors)