Oxford Review of Economic Policy, Volume 25, Number 3, 2009, pp.411–434

The evolution of infrastructure and utility ownership and its implications

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Abstract The paper documents the significant changes of ownership since the infrastructure utilities were privatized and, in particular, the shifts from the initial focus on dispersed retail share ownership through takeovers to more concentrated ownership and the emergence of private equity and infrastructure funds. In the process, there has been substantial financial engineering and balance sheets have been geared up towards exhaustion, with major implications for financing future investment. Increased gearing has, on the one hand, introduced the discipline of debt upon management which had engaged in substantive diversification, and on the other provided an arbitrage between the weighted average cost of capital used to calculate the allowed return, and the lower marginal cost of debt. The paper shows how regulation has determined the allocation of risk, and facilitated the observed changes in ownership and financial structures. Three solutions to the exhausted balance sheets are considered to finance future investment: rate-of-return regulation; the split cost of capital; and a collapse back into not-for-dividend, mutual or state ownership. The default outcome already witnessed in the Welsh Water and Network Rail cases is the latter case, which is inferior to the second option.

Key words: privatisation, ownership, regulation, private equity, utilities, infrastructure, debt, balance sheets, investment, split cost of capital

JEL classification: G32, H54, L90

I. Introduction

At the heart of the privatization programme in the UK in the 1980s and 1990s was the idea that who owned infrastructure and utility assets had a significant impact on performance. This proposition had also been important when these industries were nationalized, mainly after the Second World War. Both Attlee and Thatcher agreed that ownership mattered. Attlee thought monopoly a further necessary condition; Thatcher claimed it was competition that mattered.

Yet economic theory does not provide such a clear and emphatic role for ownership. Part of the explanation for this ambivalence lies with the emphasis on the structure of markets and entry conditions. Competition in product markets has been seen as the more decisive discipline on deviations from profit maximization.

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doi: 10.1093/oxrep/grp025

The evidence, too, is mixed: there have been private failures and public successes. Subtle differences in approach to investment and operating costs have emerged and, in any event, governments have not been noticeable by their absence from influencing the firms after privatization. On the contrary, privatization has been a process as much about sharing risks between firms and government, mediated through regulators, as it has been about replicating ownership structures which pervade the private sectors. Many risks have not been privatized at all.

Ownership matters in subtle and complex ways which neither the nationalizers nor the privatizers fully appreciated. It has been a moving target. Since the initial privatizations in the 1980s and 1990s, there has been a significant change in ownership patterns, with the concentration of shares in the hands of institutions, a wave of mergers, and then the involvement of private equity and infrastructure funds. The financial structures have altered, too. Whereas at privatization the companies were lightly geared, there followed a dash-for-debt, with equity being squeezed. In some cases, equity exited altogether—notably in Welsh Water and Network Rail.

The simplicities have thus given way to a more complex and messy set of ownership and financial structures which, rather than being either private or public, lie between the two. Ownership is less an absolute concept, and more a balance in the allocation of equity risk and incentives. Different sorts of ownership structures have emerged, designed in line with the evolving regulatory structures.

The aim of this paper is to describe these shifting patterns of ownership, and to provide some preliminary attempt to explain them. It is structured as follows. The first step is to establish why ownership matters in theory (section II). The second step is to describe the evolving ownership structures. This breaks down into a series of phases: the ownership structure at the time of privatization (section III); the merger wave that followed the expiry of the governments' golden shares (section IV); the arrival of the financial engineers and private equity (section V); and the emergence of infrastructure funds and global infrastructure companies (section VI). The third step is to consider the rationale for the emerging ownership structure and, in particular, the role of regulation in determining the allocation of equity risk and the financial engineering that has been witnessed (section VII). The conclusions follow (section VIII).

II. Why ownership matters

Why does ownership matter? It may be surprising that the question needs to be asked, but the separation of ownership and control and the plethora of different ownership forms make it a difficult question to answer. The primary focus in the economics literature is on the residual claims to the profits of the firm, and the ability of different ownership forms to frame the behaviour of management. It was the separation of ownership from control which came with the development of the modern corporation (as documented by Chandler (1997) in his aptly titled, *The Visible Hand*) which translated what, in the nineteenth century, had been largely an ideological question between socialists and the defenders of private property into a subject of more detailed theories and empirical study.

The separation of ownership and control is best modelled as a principal–agent problem: shareholders and managers are assumed to have different objectives, and the relationship is characterized by asymmetric information. The problem is that managers will try to capture more of the economic rents than they would if they were profit-maximizing, and spend those

rents through higher salaries, and capital claims on the business through share options and similar mechanisms, and to grow the size of the company beyond the profit-maximizing scale. Given that infrastructure is complementary to the economy, it is an especially pertinent problem for this class of assets.

Though the literature takes the difference of objectives as given, this premise has been much disputed in the public services and in nationalized industries. Indeed, advocates argued that the act of nationalization would lead to the company pursuing the public rather than the private interest, and Morrison's model of corporate governance, developed for London Transport, envisaged that non-executive directors would be appointed to the boards of nationalized industries to pursue that public interest.[1] These would be the 'right sorts of people', having been subjected to an education which inculcated these public values.[2] It is a model very familiar in France, where the élite moves between the civil service and corporate roles, and in the BBC, where the doctrine of public-service broadcasting was famously set out by Reith. For the welfare state, the public-service ethos was also argued to ensure that there would be no gap between the objectives of society and those of the public-sector managers in healthcare and education. To use Le Grand's terms, 'knights' would look after the public interest in public institutions, while 'knaves' characterized the private sector (Le Grand, 1997).

The closing of the objectives gap argument for public ownership was largely discredited by the performance of the nationalized industries—indeed, it was this perception of poor performance which played a key role in developing the broader case for privatization. Economic models were developed to describe the interactions and costs of the principal–agent problem with a less benign government, which, as a vote seeker, would aim to maximize consumer surplus and workers' salaries in addition to profits (Shapiro and Willig, 1990).[3]

Privatization was designed to cut away this assumed public set of objectives from managers: they were to be disciplined in the harsher world of profit maximization. The problem in the utilities was that natural monopoly was the dominant structure, and hence taking the public objectives out of the boardroom meant that they had to be placed elsewhere. This is where regulation came in: now the regulators would be the guardians of the public interest, the new 'good chaps' (Helm, 1994). The agency problem was therefore more complex than that developed in the earlier industrial economics literature—managers would face incentives for internal control from shareholders who may have more relevant expertise than the government, as well as external control from regulators who would attempt to create incentives akin to a competitive product market.[4] This would create a more complex set of trade-offs and associated costs if the objectives of the principals could not be internalized.[5]

This complexity does not render the single-principal models of agency irrelevant, but rather just partial. The concentration on managers' objectives and their private information opened up scope for a number of models. The informational advantages were variously modelled. Following earlier models by Williamson (1963) on growth maximization and Baumol (1959) on sales maximization, more recent examples include Shapiro and Willig (1990) on the impact

[1] See Helm (2004, ch. 2).

[2] Indeed, the development of moral sciences at Cambridge and PPE (politics, philosophy, and economics) at Oxford formed a key part of the educational basis for developing the concepts of public service and the public good (see Skidelsky, 1983).

[3] This critique extended beyond utilities to cover mutuals, too, and the 1990s witnessed a significant shift away from the mutual model—notably for building societies.

[4] A discussion of agency perspectives of privatization is provided by Martimort (2006).

[5] See Beesley (2006).

of private information on profitability and Pint (1991) on the level of managerial effort. The problem, then, is for owners to create incentives to reveal the private information—and to pay 'informational rents'.

These contracts between owners, regulators, and managers are inevitably going to be incomplete, and this brings into play a crucial role for ownership in incomplete contracts, described notably by Grossman and Hart (1986), Laffont and Tirole (1991), and Hart (1995). With unforeseen contingencies and non-contractable managerial effort, ownership is always important because it determines who has the 'residual right of control'.

Regulatory contracts overlay a further set of incentives according to their information requirements, the allocation of risks, and the sharpness of incentives. Pure price-cap regulation places greater cost risk on the firm in return for becoming the residual claimant of the rewards of its efforts and provides sharper efficiency incentives than under rate-of-return regulation. The latter, Averch and Johnson (1962) famously claimed, led to gold-plating investment and operating-cost inefficiencies. However, these incentives cannot be expected to work in isolation. Indeed, if the 'best of monopoly profits is a quiet life' (Hicks, 1935), the carrot of residual profits must be accompanied by the stick from the market for corporate control and a credible bankruptcy threat from the regulator.[6]

The allocation of these residual rights provides opportunities for the regulator to commit not to intervene in the event of failure or to expropriate sunk investments, and ultimately improve external control incentives to manage costs, quality, or investment when uncontracted circumstances arise.

Thus, with the absence of product-market competition to act as a discipline in utilities and infrastructure (because of monopoly), the focus on residual rights has important implications for the role of capital-market competition. Takeovers can be thought of as the mechanism by which shareholders can assert these rights to remove management and steer the company back towards profit maximization. But takeovers are expensive mechanisms for enforcing profit maximization. There are considerable transactions costs, and, as Grossman and Hart (1980) pointed out, existing shareholders can free-ride on raiders, in the knowledge that the raider will attempt to increase the rate of return and hence render their shares more valuable. Thus, not only is it costly to form coalitions of shareholders, but in theory it is self-defeating—the free-rider gets the benefits without the costs. Takeovers, like monitoring, function as public goods.

Part of the answer lies in takeover rules. But it is hard to avoid the conclusion that the more concentrated the ownership, the greater the capital-market discipline. This can apply to takeovers, but also to more detailed aspects of management behaviour. Concentrated shareholders can more successfully intervene on executive pay and remuneration. As we shall see, the wider dispersion of retail ownership in the early post-privatization period did, indeed, facilitate the pursuit of managerial objectives, and the takeover mechanism played a considerable disciplinary role, though not always for the expected reasons.

Owners need to consider a full range of mechanisms both to write the contracts for managers and to determine the constraints placed upon them. In the latter category, financial structure has been argued to play a major role in constraining management behaviour. Dewatripont and Tirole (1994) set out a model in which, with non-contractable actions, capital structure provides a disciplining device for managers, as well as an incentive scheme for outsiders

[6] A useful overview of the effects of privatization on efficiency incentives is provided in Cavaliere and Scabrosetti (2008).

to intervene appropriately. In effect, in their model, equity owners contract out control to bondholders.

The 'discipline of debt' is created by the reduction of the free cash flow—the monies for the pursuit of managerial objectives. In addition, as set out in Dewatripont and Tirole (1994), effective external interference in the company can be achieved through the correlation between control rights and income streams of financial securities. Holders of debt-like securities, for example, which undertake actions that reduce the scope for managerial discretion, such as selling assets or reducing the scale of operations, can take control when low current profits signal that the manager has exerted low (uncontractable) effort. Holders of equity-like securities—which face an incentive to let managers continue with current operations owing to the potential upside in future returns—have control when performance is above some threshold level.

This case for the discipline of debt was to be mounted in defence of the financial engineering which began in earnest in the late 1990s. It was argued that debt would not only be cheaper and more tax-efficient, but that it would force the managers to 'stick to their knitting' by providing the utility services, for fear of breaching debt covenants. This effect on control and the implications of the infrastructure fund model for the agency relationship is examined in section V.

These various 'solutions' to the agency problems assume that the equity owners are themselves motivated by maximizing the sum of future profits, and that they employ a 'suitable' discount rate. However, there is no reason to assume that the private (equity) discount rate is equivalent to the social rate. And, with the arrival of private equity firms on the scene after 2000 entrenching a shorter-term time horizon, with the aim to sell on their acquisitions within a 4–5-year time period, the focus on short-term returns in what are inherently long-term industries created considerable concern—in Germany, private equity firms were described as 'locusts'. Infrastructure funds were to provide a different and ingenious route around this problem, while lowering the cost of capital, to which we return below in section VI.

The regulatory regime is far from passive in setting the context for the playing out of the agency problems between shareholders and managers. In many respects, the regulators have sought to replicate the controls which shareholders might have set. Regulators impose strong regimes for monitoring performance; they define ring-fences to limit the scope of the company; they force managers to certify their ability to finance functions; and they provide a special administration regime which is, in effect, a form of limited takeover mechanism. By making gearing assumptions within price-control reviews, the regulators provide further incentives to increase returns by altering the firm's capital structure, which, at least implicitly, may involve a transfer of equity risk to consumers along with some degree of price variability (De Fraja and Stones, 2004).[7]

The development of this control framework has been incremental, but now in some industries, such as water, electricity, and gas networks, it is pervasive. Some of this is inefficient, duplicating, and blurring incentives. Some of it is distorting towards the short term, of which the 5-year periodic price caps is perhaps the most forceful example. The recent price review papers by Ofwat (2009) and Ofgem (2009) illustrate the detail and complexity of regulatory intrusion into the management of firms.

[7] De Fraja and Stones (2004) show that, with cost uncertainty, optimal regulated prices diverge *ex post* for a high-cost firm and low-cost firm beyond the level of debt at which equity holders lose their entire investment when costs are high. However, at gearing levels beyond this, expected prices are assumed to decline, the first-order effect of which outweighs the second-order detriment associated with increased price volatility.

As regulation has grown, and as regulators have increasingly taken on the functions of monitoring and control, it inevitably gives rise to the question of whether private ownership matters as much as it did in the original privatization model. If investment is financed by debt rather than equity, the role of shareholders is further diminished, and some have argued that mutuals and not-for-dividend companies are superior as a result, since they do not have the costs associated with share ownership.

These models have reappeared in the cases of Welsh Water and Network Rail. It has been argued that the agency problem can be solved directly in these cases: managers' contracts can be tied to the performance and output standards set by the regulators, and then monitored by regulators. This, indeed, is the case for Network Rail. However, such models cannot get round the incompleteness of contracts, and in particular the asymmetry of information. Regulators cannot (any more than shareholders) write complete contracts, and by contractualizing as many of the behaviours as possible, they create their own distortions. Unintended consequences occur, and this brings us full circle to one of the main defences of the private market—that imperfect information requires some party to have a vested interest (a residual vested interest) in the efficiency of the company. While regulators also have an interest in the efficiency, only equity can fulfil this role—taking the residual risk for an undefined return. The 'return' to regulators is altogether more blurred.

Thus ownership matters, and it matters because regulators cannot write complete contracts for managers, any more than ministers could write them for the nationalized industry managers. Indeed, regulators share with ministers their own principal–agent problems. Regulators have their own private objectives (higher salaries, bigger budgets, honours for their senior players, and so on), as do civil servants and ministers. They may be 'independent', but this is a relative and crude concept—independence is set in a particular institutional and agency context. Its design matters greatly, and the efficiency of different forms of utility ownership is endogenous to the regulatory regime and its supporting financial architecture.

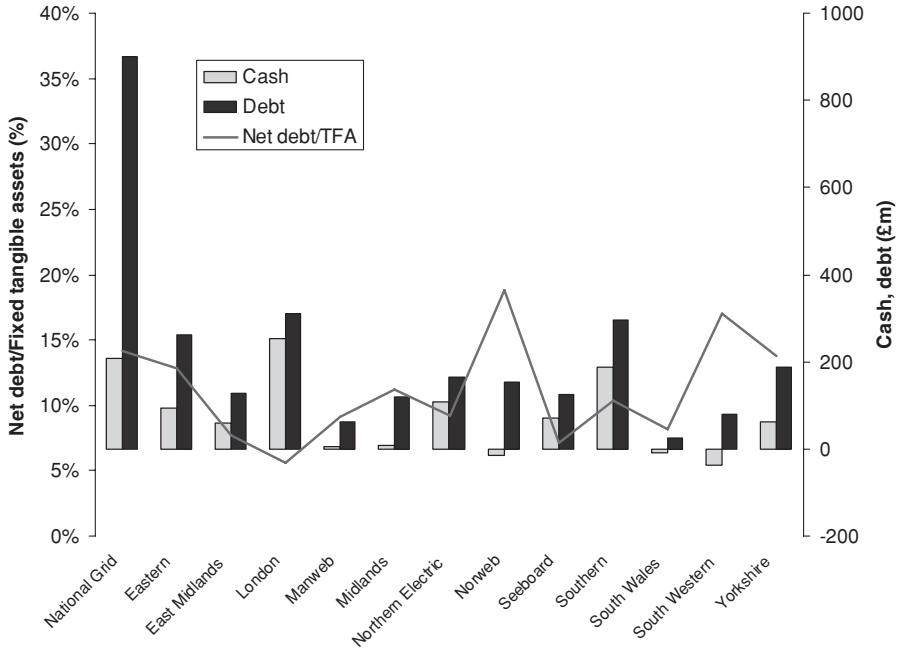
III. Ownership structures at privatization

Privatization was as much a political as an economic project. It neatly married up a series of diverse objectives. Some were related to the financial position of the government: to reduce government spending by reducing subsidies from loss-making nationalized industries; to pay for future investment by borrowing on private balance sheets rather than out of current customers' bills; and to raise money. Some were directly political: to break the power of unions, notably the miners and transport workers; and to create a new class of Conservative voters through the 'share-owning democracy' (especially in respect of council house sales). To these were added an economic rationale: that private ownership would provide the necessary condition for incentives to operate, and that liberalization and competition would bring product-market competition to bear as a check on the abuse of dominance.[8]

Such a complexity of objectives meant that each privatization would be conditioned by the particular interplay at the specific historical moment. Thus, in the case of the privatization of British Gas, the concept of an army of 'Sids'—retail investors who would start to own equity—played a key part. In the case of the electricity industry, it was more about breaking

[8] On the objectives of privatization, see Vickers and Yarrow (1988).

Figure 1: Debt, cash, and capital structure at privatization in electricity



Source: Flotation prospectuses of the regional electricity companies and Oxera analysis.

up the structure and introducing elements of competition to further tame the miners. And in the case of the railways, it was very much about limiting the losses, as well as limiting union power.

In most of the early privatizations, investment was a crucial factor—how to facilitate major infrastructure improvements without immediate recourse to customers or, indeed, the Treasury. In the first of the major utility privatizations, British Telecommunications (later BT), the motive was to finance the System X exchange project outside the public-sector borrowing requirement (PSBR). Early attempts to do this while retaining public ownership through private bonds—the so-called Buzby bonds—failed, and privatization was then proposed as a solution.[9] Thus began a process of creating a private-sector borrowing requirement[10]—in effect, an off-balance-sheet exercise for the public sector, to help meet the overall macroeconomic PSBR targets. Further innovations were subsequently added, notably the Private Finance Initiative (PFI).[11]

To meet the objective of financing real physical capital investment through the private sector balance sheets meant that initial gearing was deliberately set low, and in the water case actually negative.[12] There was no serious debate about 'optimal gearing' as a financial efficiency consideration, or even to reflect taxation. And where initial gearing was positive in examples such as electricity distribution (see Figure 1) and electricity generation, it had

[9] A description of the motives to privatize BT can be found, for example, in Burton (1987).
[10] Helm (2001) sets out this concept.
[11] As set out in DTI (2006), PFIs were introduced by the Conservative government in 1992.
[12] The water industry was given a 'green dowry' cash injection.

more to do with the Treasury's attempts to maximize the proceeds. Even here, it typically worked only after battles with incumbent management who had to be kept on side for the privatizations to be successful.[13]

Competition and restructuring to create competition came late to the process, once privatization had proved possible and successful in the 1980s (and only after Thatcher's third election victory in 1987). In the cases of BT (1984), BAA (1986), and British Gas (1986), they were all privatized as dominant monopolies. In BT's case, a small competitor, Mercury, was created and there was scope built into the regulatory regimes for BT and British Gas for competition to be developed. In BAA's case, the monopoly was entrenched through a deliberate cross-subsidy between the south-east England airports.

It was only when the government came to the privatization of electricity that restructuring was seriously pursued. Even then, National Power was initially to be given 70 per cent of the market in order to carry, and cross-subsidize, the nuclear programme. The motives here included economic efficiency, but of more importance was the government's desire further to weaken the coal miners. The effective abandonment of the large-scale pressurized water reactor (PWR) nuclear programme announced in 1981 enabled a more substantive break-up of electricity generation. Nuclear proved a difficult case: it had to be withdrawn from National Power, to be subsequently privatized. Later experiments in restructuring exercises were less successful, notably in the case of the railway industry.

Because of this complex interplay of political and economic factors, each privatization had its own unique characteristics and, not surprisingly the outcome of the privatization programme as a whole was a messy one. Nevertheless, some common features emerged, which formed the basis of the changes in ownership that followed.

In almost all cases, the privatizations created a largely dispersed set of retail owners, who, through advertising and relatively low prices, were encouraged to buy the assets, creating a bulwark against the threat of renationalization by a future Labour government. These low prices reflected the political imperative that the sales were successful, and here political risk aversion played a big part.[14] In addition, smaller and often virgin equity owners needed the reassurance that buying into something they little understood would be a 'sure thing'. This political trend was marked across many privatizations in OECD countries at the time. As illustrated in Figure 2, retail investors represented over 80 per cent of public offering subscriptions in the first 2 years of the 1990s, compared with around half that by the middle of the decade (OECD, 1999).

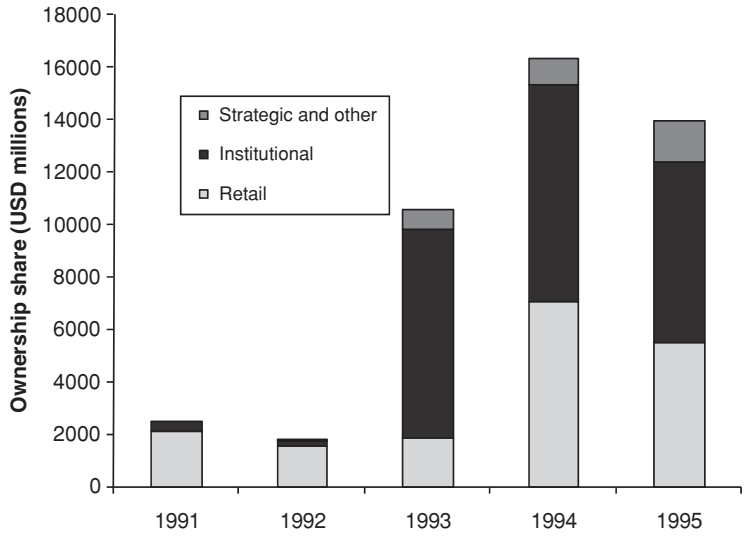
In the case of BT, as Table 1 indicates, over one-third of the equity that was marketed was bought by retail investors. This share grew to two-thirds by the second sale, and by the third sale the Treasury set itself the target that the number of individuals who applied for shares in the public offer should be no fewer than the number who applied in the second sale. Although this was not met, retail investors still accounted for around 60 per cent of the shares sold.

In the case of BAA, applications from the public, BAA employees, and pensioners led to their part of the offer being nearly ten times subscribed. The final allocation of fixed price shares sold to retail investors and free allocations to employees was equal to around 50 per cent of the total shares sold.

[13] In the case of PowerGen, the government invited the Hanson Trust to consider a direct purchase when management proved reluctant to take on initial debt. The threat had the desired effect.

[14] As a Labour victory became ever more likely in the 1990s, so the 'success' of sales was correspondingly more threatened. In the case of the railways, this led to a low price and very small balance sheet—a crucial factor in the subsequent collapse of Railtrack.

Figure 2: Public offerings in OECD countries by type of buyer



Source: OECD (1999).

Table 1: Share of retail owners in privatizations

	Final allocation (%)
British Telecommunications	38.6
Second sale: British Telecommunications	67
Third sale: British Telecommunications	60
BAA	47.3
British Gas	62
Twelve regional electricity companies	54.6
ScottishPower and Hydro-Electric	56.2
British Energy	43
National Power and PowerGen	49.4
Second sale: National Power and PowerGen	63
Water Authorities of England and Wales	44

Note: Between 1995 and 1996 there was an additional sale of government residual shareholdings in BT, BAA, water and regional electricity companies, but no specific allocation to the public was made at this time.
Source: National Audit Office (NAO, various years from 1985 to 1999).

In the case of British Gas, applications from the public, BG employees, and pensioners led to the offer being four times subscribed. As a result 40 per cent of the shares offered overseas and those allocated to institutions were recalled and added to the public offer. The subsequent allocation to the public after share clawback was some 62 per cent.

In the electricity industry, over 50 per cent of the public offering of the regional electricity companies (RECs) was taken up by individual investors, encouraged by marketing and incentives.[15] Individual shareholdings were of a similar proportion a year later in the sale of

[15] As set out in the National Audit Office report (NAO, 1992*b*), incentives (such as bonus shares and electricity bill vouchers) were designed to encourage individuals to register their interest in applying for shares, and to invest in their local company.

Table 2: Profits following privatizations

	Water and sewerage companies	RECs	Electricity generators
Expected first-year post-tax profits (£m)	666	756	750
Actual post-tax profits (£m, average in years 1–4)	1,391	1,276	1,219
Ratio of outperformance	2.1	1.7	1.6

Note: Expected first-year post-tax profits are forecasts of profits for the first year after privatization.
Sources: Flotation prospectuses, Datastream, and Oxera calculations.

the majority of the two generating companies, National Power and PowerGen, with the final proportion being extended from the initial allocation.

In the case of water, share clawback mechanisms were also important. Within the retail allocation, preference was given to the water companies' customers rather than non-customers, and the final share to the UK public was increased in the event of over-subscription of the shares initially offered to the general public. The result of this mechanism led to a final allocation to the UK general public of 44 per cent.[16]

The share ownership pattern that emerged in the early 1990s offered only weak constraints on management. By design, shareholdings were not concentrated—the budget constraints of retail investors implied low concentration, in addition to the restrictions that accompanied the government's golden shares.[17] This intentionally left the golden share with the role of monitoring and oversight—and inhibited takeovers and hence direct capital-market discipline.

The results of this lack of control were manifest in the behaviour of management in the early years after privatization. The managements of the newly privatized industries, protected from takeover, appeared focused on increasing their salaries and share options both directly and indirectly through expanding the scale and scope of their companies by deploying their cash flows towards acquisitions rather than returning them to shareholders. They protected their monopolies against competitive pressures where possible. In industries where the marginal cost was typically very much below the average costs, the scope for anti-competitive pricing practices was considerable. They also played games with the regulators—arguing for large capital expenditure (CAPEX) and operational expenditure (OPEX) budgets *ex ante* at privatization and at subsequent periodic reviews, and then cutting back sharply *ex post*. In many cases, notably water and electricity distribution, the resulting rates of return far exceeded their costs of capital, as summarized in Table 2.

The water companies and the RECs provided telling examples. In the case of water, North West Water and Thames Water led the way with ambitious—and ultimately unsuccessful—overseas expansions. In the case of RECs, the acquisitions were numerous and rarely with much by the way of a strategic rationale. They included hotels and consumer retailing. Table 3 provides a number of examples.

It was apparent that ownership did, indeed, have a major impact on performance, though not entirely in ways anticipated at privatization. Operating efficiency did improve markedly,[18]

[16] See NAO (1992*a*).

[17] In some cases this restricted total foreign shareholdings, and with others, for example in the case of BAA, individual holdings were limited to 15 per cent.

[18] See, for example, Burton (1987).

Table 3: Non-core acquisitions by water and electricity companies

Year	Acquirer	Target	Target country
1993	Kelda	Alcontrol Group (food testing and analysis)	UK
1996	Scottish Power	Teledata Ltd (telecommunications services)	UK
1996	Scottish Power	Woodend Group Ltd (telecommunications services)	UK
1997	South West Water	Hydrolab (machinery)	US
1997	South West Water	Greenhill Enterprises Ltd (mining)	UK
1998	South West Water	Terry Adams Ltd (transportation)	UK
1998	Severn Trent	Procis Software Ltd (computers and electronic services)	UK
1998	Severn Trent	Patterson Quarries Ltd (transportation)	UK
1998	Yorkshire Water	ACS Food Analysis Ltd (professional services)	UK
1998	Severn Trent	Elsag Bailey Process Automation NV (computers and electronics)	Netherlands
1998	Scottish Power	Demon Internet Ltd	UK
1998	Thames Water	Underpressure Engineering Plc (chemicals, plastic)	UK
1998	National Power	Malakoff Bhd (agriculture)	Malaysia
1998	Yorkshire water	Biochem Laboratonium BV (professional services)	Netherlands
1999	Kelda	Fugro Milieu Laboratorium NV (professional services)	Netherlands
1999	Thames Water	Memtech (UK) Ltd (construction)	UK
1999	Centrica	Automobile Association Ltd (auto repair)	UK

Source: Oxera.

though this was probably as much to do with the design of the regulatory regime as compared with what might have happened under rate-of-return regulation. But the use to which the profits were put was hard to square with maximizing the interests of the new (predominantly retail) investors—and that is exactly what agency theory could have predicted as a result of a widely spread retail share register.

IV. The expiry of golden shares and the merger wave

The early ownership model was always likely to be temporary. First, the combination of low offer prices and strong balance sheets in order to make the sales a success led to rapid appreciation in the value of the utilities' shares and, in turn, to large and immediate capital gains for those retail investors prepared to sell. Second, government was committed to relinquishing its golden shares in water in 1994 and in the RECs in 1995. In other cases, the golden share had no expiry date, although the stake in BT was redeemed in 1997, while that in BAA was ruled illegal by the European Court of Justice in 2003.

Concentration of share ownership began almost immediately, but it was the prospect of takeovers which markedly accelerated this trend. Large cash balances, low levels of debt, and high revenues from an initially lax price control made the privatized utilities takeover targets

for corporations seeking to strengthen their own balance sheets and looking for a strong and stable source of revenue growth.

(i) Early balance sheet motives

Anticipating this opening of the market for corporate control and after the completion of the first periodic review for the RECs in 1994, a company which has long ceased to exist called Trafalgar House made a bid for Northern Electric. The details of the bid are of historical interest only, except for the second defence put up by Northern, which ushered in the extraordinary bout of financial engineering which had only run its course by 2008.[19]

Northern, in attempting to see off Trafalgar, proposed to mortgage its assets. In effect, it proposed to borrow against its assets, gear up its balance sheet, and return £5 in cash to every shareholder who had paid just £2.40 in 1990. What was remarkable about this was that it broke the link between the gearing and the real physical capital expenditure it was supposed to finance. Borrowing for financial engineering purposes replaced borrowing for investment. The regulator stood aside, leaving financial structure to the companies to optimize.

On almost any basis, gearing in the utilities in the mid-1990s was below that which could be carried while maintaining credit ratings. What made it particularly attractive to swap debt for equity was that the regulators calculated the allowed rates of return on the basis of a weighted average cost of capital (WACC) and on the assumption of low gearing. Since the marginal cost of debt was below the WACC (by definition) there was obviously an arbitrage to be made. In due course, it was achieved, either through acquirers, or by incumbents fighting off takeovers. We return to the impact of debt on performance below—and the impact of the role of the new bond-holders as creditors on not only the managers, but the regulators, too.

(ii) Multi-utilities—in networks and supply—and vertical integration

The first years of activity appeared to represent a mainly national market for corporate control, which saw vertical integration in the electricity sector (Scottish Power's purchase of Manweb) as well as diversification by the water companies into electricity (with South Wales Electricity Board bought by Welsh Water—later Hyder, and Norweb bought by North West Water—later United Utilities).

The motivation for vertical integration is well understood, and although from a competition perspective it brings the danger of foreclosure in downstream markets, in other contexts it can also be welfare-enhancing. The rationale for the early UK 'multi-utilities' also has some grounding. The early expansions brought together water and electricity supply in the acquirer's home region, providing economies of scale in IT, billing, and operational planning.

(iii) The arrival of the Americans and then the Europeans

The two or three years to follow were dominated by acquisitions by US utilities such as Cinergy, AES and TXU and were largely focused on the electricity sector. The motivations for these takeovers were various, but a combination of the balance sheet capacity and free cash

[19] The details are described in Helm (2004, pp. 214–16).

flows, the US regulatory regime, and a desire to enter the new competitive markets all played a part.[20] Much of this was a mirror of the agency problems in the UK: US shareholders failed to control management, as did their UK counterparts. The targets were across the electricity industry, with Southern Electric International starting off with a bid for the small South Western Electricity Board (SWEB). Quite what a Dallas-based energy company had to add to the management of customers and networks in the south-west of England was far from obvious. Yet the government was keen that this foreign takeover process continued, in part to see off the political threat from a Labour government and its windfall tax proposal to cover wider public expenditure increases. It was believed that US companies would be more likely to seek legal redress for the windfall tax and to exert diplomatic pressures, too.[21]

These REC takeovers were followed by more audacious bids. National Power was targeted, and meanwhile Enron entered with a merchant combined-cycle gas turbine (CCGT), and then took over Wessex Water.

The new overseas owners were poorly equipped to monitor their overseas investments. Investing overseas largely for the first time since the relaxation of laws following the passing of the US Utilities Holding Companies Act of 1992, the UK investments offered strong balance sheets and hopes of returns similar to those experienced in the first years since privatization, although subject to a significantly different regulatory regime than the rate-of-return mechanism in their home markets. Tighter regulation following the early price-control reviews and the windfall tax in 1997, which was to punish these investors for the gains realized by previous owners, led the majority to withdraw, so that, by the end of the decade almost all of them had gone, in the case of Enron via bankruptcy. Foreign owners remained, but most of these, notably in energy, brought energy expertise and integration with the European markets. Direct overseas ownership remained for the successors of Northern and Yorkshire Electricity (ultimately by Warren Buffet's Berkshire Hathaway), South Wales and South Western (PPL Corporation), and for Wessex (YTL Corporation).[22]

(iv) The European energy companies arrive

If political actions and mistaken expectations were to lead to a 'winner's curse' in the first round of ownership changes, efficiency in the market for corporate control may at least have led to sales of the electricity generation, supply, and distribution companies in the EU acquisition wave to follow—the acquisitions being made by European national champions, with a more clear view of how to operate the assets.

The merger wave across Europe was a response to the liberalization agenda. The dominant EU energy companies began an extraordinary period of consolidation without much by way of limitation from the Competition Directorate at the European Commission. In the process, E.ON was created from a chemical and electricity conglomerate to form an integrated gas and electricity business, acquiring Ruhrgas and, in the UK, PowerGen. RWE added the remnants of National Power, and EDF acquired London Electricity, SEEBOARD, Eastern

[20] The American takeovers are described in Helm (2004, pp. 226–32).

[21] The former did not transpire, the latter did.

[22] For details of ownership details see Wessex Water (2009), Western Power Distribution Holdings Ltd (2008), MidAmerican Energy Holdings (2009).

Table 4: A chronology of changes in ownership, 1995–2005

Company at privatization	Change in ownership	Date
	1. Early UK consolidation	
Eastern Electricity	Acquired by Hanson (UK)	1995
South Wales Electricity	Acquired by Welsh Water	1995
South Western Electricity	Acquired by Southern Company (USA)	1995
Manweb	Acquired by Scottish Power (UK)	1995
Norweb	Acquired by North West Water (UK)	1995
	2. US acquisition wave	
Midlands Electricity	Acquired by GPU/Cinergy	1996
Northern Electric	Acquired by CalEnergy/Kuwait	1996
East Midlands Electricity	Acquired by Dominion Resources	1997
London Electricity	Acquired by Entergy	1997
Yorkshire Electricity	Acquired by AEP	1997
Wessex	Acquired by Azurix	1998
Eastern Electricity	Acquired by TXU	1998
South Western Electricity	Controlling stake acquired by PPL	1998
	3. Second UK consolidation and EU acquisition wave	
Scottish Electric	Merged to become Scottish and Southern Energy (SSE)	1998
Scottish Electric transmission	Merged to become SSE	1998
Southern Electric	Merged to become SSE	1998
London Electricity	Acquired by EDF	1998
Welsh	Acquired by Western Power	2000
Thames Water	Acquired by RWE	2000
South Wales Electricity	Acquired by Western Power distribution	2000
Welsh Water	Assets transferred to Glas Cymru	2001
East Midlands Electricity	Acquired by E.ON	2002
SEEBOARD and Eastern	Acquired by EDF	2002
Railtrack	Assets transferred to Network Rail	2002
Southern	Acquired by Scottish Power	2003

Source: Oxera.

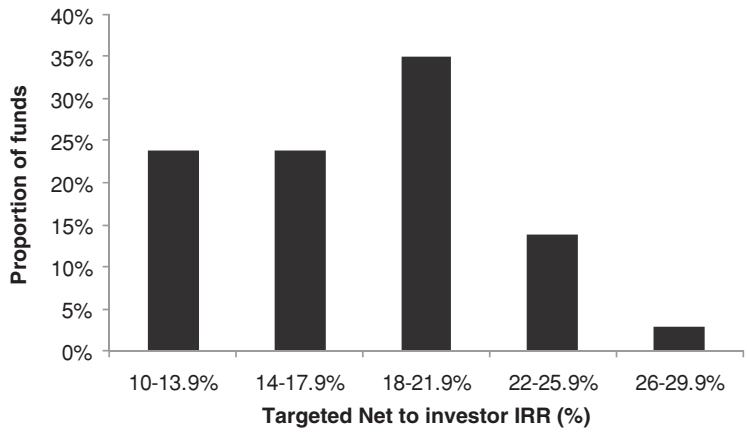
Electricity, and the supply arm of SWEB. It then added most of British Energy, too.[23] Iberdrola acquired ScottishPower, so that, by 2009, only Scottish & Southern Energy, Centrica, and Drax remained major quoted British energy public companies. Table 4 chronicles the takeovers.

The rationale for these takeovers was, at core, an argument about the role of size and vertical integration, although market power was also a result. Even the EU's attempts at unbundling the networks from generation and supply had little practical impact.

From the perspective of the impact of ownership on management, these European-driven takeovers replaced broad shareholder registers with direct control from the parent companies. This arguably dealt with the agency problem, but nevertheless raised its own set of concerns. Most notable here was that of foreign ownership *per se*, and the possibility that the European energy companies might put the interests of their own domestic national consumers ahead of those in the UK, both in the event of security-of-supply problems, but also in respect of

[23] Under financial pressures following the acquisition of British Energy, EDF announced in 2009 its intention to sell its distribution business.

Figure 3: Targeted internal rate of return (IRR) by infrastructure funds



Source: Preqin.

prioritizing capital investment. It is notable that Germany, France, and Italy have held on to the national-champions ownership model, and that Spain put up fierce resistance to the attempt by E.ON to take over Endesa.

V. The arrival of financial engineers—private equity and infrastructure funds

The exodus of the Americans from the RECs was followed by the arrival of new financial players in the utility and infrastructure sectors. These comprised private equity and infrastructure funds.

Private equity specialized in relatively short-term financial engineering. Typically the acquisitions would be followed by the replacement of much of the equity with debt, and the sale of the assets (sometimes to other private equity firms) within a 4–5-year timeframe. These acquirers had little or no obvious interest in the longer-term quality and robustness of the networks. Rather, the combination of the WACC creating an arbitrage for the regulatory asset base (RAB) in respect of the marginal cost of debt; the protection of the RAB through the duty to finance functions; and the very low real interest rates following the stock-market collapse in 2000, together provided high returns to equity and its exit via replacement with debt and the eventual sales. Further enhancement of returns came from short-term reductions in OPEX and CAPEX.

This financial engineering over the short term explains how private equity targeted returns (15+ per cent) could be extracted from regulated entities whose WACC was set at around 5 per cent—as listed in Figure 3.

In effect, private equity extracted a return from the difference between the WACC and the marginal cost of debt to the benefit of stakeholders, leaving the customers with balance sheets which were exhausted. The private equity funds therefore finalized the subversion of the original intention at privatization that the balance sheets would be used for the real physical CAPEX. The resulting gain was a transfer of wealth from customers to shareholders, since

customers would no longer benefit from the lower marginal cost of debt which feeds through into regulated prices. To give some idea of the scale of this transfer, in the water industry, the RABs are in aggregate about £45 billion. A 1 per cent arbitrage is therefore worth around £450m per annum. Hence the gains from the financial arbitrage greatly outweigh the scope under RPI–X for efficiency savings in OPEX and CAPEX. But once the (large) gains, from the financial arbitrages had been exhausted, returns dropped back towards the WACC, below the hurdle rates of return for private equity. Thereafter the companies could be sold on, though the credit crunch put a stop on the rotation of ownership, at least in the short term.

The infrastructure funds model is a variant of the private equity approach. Infrastructure funds engaged in the same sorts of financial arbitrage, choosing highly geared structures. There was, however, a further rationale for these takeovers: that the ownership structure of the privatized companies remained sub-optimal, in that the risk profiles of the businesses were not well-matched to those of their owners. In the early days, the companies had tried to increase the risk/reward balance by investing outside the utility regulated cores, and there had been a great emphasis on 'unregulated earnings'. At the limit, Anglian Water tried via the takeover of the Morrison construction group to turn itself into a 'support services' business to gain a much higher price-to-earnings ratio.[24]

The infrastructure funds took a different view. They saw utilities and infrastructure as inherently low-risk—either as patronage assets or regulated businesses. In effect, they bought the companies from the equity owners, and sold them to pension funds and other long-term financial institutions. Sometimes they did this directly, with pension fund monies financing the deals; sometimes it was achieved through the eventual floating of the funds.

The key difference from conventional private equity is the timeframe: infrastructure funds do not need a rapid turnover of assets, and even where there is an exit via flotation, they often retain a management role. Here the longer term matters. They aimed at two sources of economic rent—the financial arbitrage and then the matching of ownership with the lower but less cyclical returns—whereas private equity was based largely on just the first source of economic rent.

The 'taken private' approach of private equity and the infrastructure funds had a significant impact on the agency problem. The gap between owners and managers is internalized within this 'partnership model', and the informational asymmetries are as a result changed. By 2008, the share ownership structure had been radically altered, as Table 5 illustrates.

VI. Leverage, RABs, and the discipline of debt: regulatory accommodation

The merger wave was both possible owing to the strong balance sheets of the acquiring firms, and attractive, given the relatively little debt in target firms which increased the pay-offs to subsequent financial engineering. It is therefore to be expected that this period coincided with increased leverage, as highlighted in Figure 4. However, these changes would not have been possible without accommodation of the regulatory and political environment.

[24] As discussed in Helm (2003), while water companies were trading below their RABs—and hence at low price-to-earnings (p:e) ratios, support service companies had a much higher rating (in the boom, p:e ratios were typically about 30).

Table 5: A chronology of changes in ownership (2005 to present)

Company at privatization	Change in ownership	Date
4. 'Take-private' wave		
North of England (gas)	Acquired by a consortium of infrastructure companies (90 per cent United Utilities and Cheung Kong) and pension funds (10 per cent SAS Trustee corporation)	2005
Wales and the West (gas)	Acquired by a Macquarie led infrastructure funds	2005
South of England (gas)	Acquired by a consortium of infrastructure companies (50 per cent SSE), infrastructure funds (25 per cent Borealis), and pensions funds (25 per cent Ontario Teachers Plan)	2005
Scotland (gas)	Acquired by a consortium of infrastructure companies (50 per cent SSE), infrastructure funds (25 per cent Borealis), and pensions funds (25 per cent Ontario Teachers Plan)	2005
Thames (water)	Acquired by Macquarie-led infrastructure funds	2006
Anglian (water)	Acquired by a consortium of infrastructure funds (51 per cent Colonial First State and Industry Funds Management), pension funds (32 per cent Canada Pension Plan Investment Board), and private equity (15 per cent 3i)	2006
BAA (airports)	Acquired by Grupo Ferrovial	2006
Southern (water)	Acquired by a consortium of infrastructure funds (77 per cent including IFF Internation, Challenger, and UBS) and pension funds (10 per cent)	2007
NORWEB (electricity)	Acquired by a consortium of infrastructure funds (50 per cent Colonial First State and 50 per cent JP Morgan)	2007
Yorkshire (water)	Acquired by a consortium of infrastructure funds (100 per cent comprising Citi, GICSI, and Infracapital)	2008

Source: Oxera.

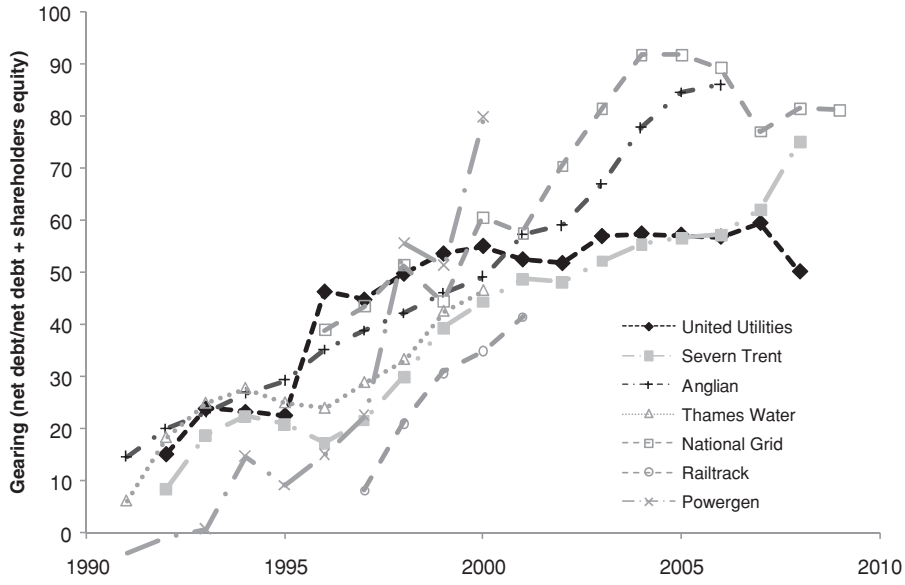
Regulatory accommodation of higher levels of debt was in part due to the incentives created by the RPI–X framework. Designed as a deliberate counter to US-style rate-of-return regulation, the idea was to mimic competitive markets by setting prices *ex ante* in fixed-price/fixed-period contracts. Equity risk which had been with customers would be transferred to shareholders and, as a result, the efficiency incentives would be sharper, but at the cost of a higher cost of capital.

As the architecture to put RPI–X into practice progressed, so too did opportunities for the regulators to influence the capital structures that would emerge. First, the cost of capital needed to be estimated and then the RAB established. Of these, it was the RAB that provided the foundation for the financial engineering that followed.

The question reduced to whether regulators or the companies were best placed to decide the 'optimal' capital structure. In the Northern Electric case referred to above, the regulators had the opportunity to protect the balance sheet but opted not to—financial engineering was seen as just another response to the incentive structure of RPI–X regulation. As in unregulated industries, within the RPI–X framework there are incentives to alter the firm's capital structure in order to minimize the cost of capital, and thereby beat the regulator's cost assumptions.

Regulatory accommodation was not inevitable, but it would have required either a direct extension of regulation to the balance sheets or the removal of the incentives created by setting

Figure 4: Gearing of UK listed utilities



Note: Calculated as net debt/(net debt plus equity).
Sources: Datastream and Oxera calculations.

the WACC within the price control and a move towards a more sophisticated approach to setting the cost of capital. Regulators explicitly rejected both approaches.

In addition to the arbitrages in the WACC, there was a second positive motivation for the increased use of debt to reduce the agency costs of separating ownership and control by reducing the amount of free cash-flow available to managers to use at their discretion—the discipline of debt. This is the efficiency argument for the financial engineering that took place.

As noted in section II, the incentives on debt and equity holders to monitor managers are different owing to the nature of their pay-offs (Dewatripont and Tirole, 1994). The concavity of the debt pay-off (increasing with the value of the firm up to the value of the debt repayments) provides the incentive for debt-holders to monitor managers to limit the risks they take. In contrast, the convexity in equity-holders' returns increases their wish for management to take more risks as they share in the upside but have limited downside exposure. These effects are magnified as a company's gearing increases, since the risk of default increases, providing greater motivation for monitoring by debt holders, and also increases the variability of the expected cashflows received by equity-holders, and hence increases the cost of equity.

This efficiency benefit of the discipline of debt has to be weighed against the consequences of gearing up the balance sheets on investment and other concerns. The increased role of debt has a number of features that are likely to give greater cause for concern. In particular, the securitization concept adopted in the floating infrastructure funds has some similarities to the risk structure embodied in collateralized debt obligations (CDOs).[25] Repackaging and selling on infrastructure investments introduces moral hazard on the part of the fund, with incentives

[25] Acharya *et al*. (2007) discuss the monitoring and agency problems associated with public secondary debt markets.

Table 6: Overview of main investment models

	Traditional equity model (pension funds, retail)	Infrastructure funds	Private equity
Business model	Target stable long-run growth	Target stable long-run growth	Target high short-run returns
		Hold assets in perpetuity	Exit within 3–5 years
	Hold assets in perpetuity	Value creation through 'partnership model' with management	Value creation through cost reductions or restructuring (though less radical in infrastructure sector)
Target equity returns	Moderate (8–12 per cent)	Moderate/high (10–15 per cent)	Very high (20–25 per cent)
Gearing and finance	Moderate (50 per cent)	High (75 per cent)	Very high (85 per cent)
	Corporate bonds	Long-term investment grade bonds	Bank debt and high yield bonds
Implications for cost of capital	Moderate (relatively low cost of debt with strong credit rating)	Low/moderate (provided cost of debt only marginally higher than traditional model)	High (increased cost of debt and equity)

Source: Oxera.

for prudent management and the appropriate capital structure resting on the reputation effects on the fund and the desire to float future funds. However, given the reputation of the banking sector in light of the financial crisis, this may serve to incite greater risk aversion from these funds than the scope for increased risk appetite from securitization.

The return requirements in Table 6 may provide some comfort that the infrastructure-fund model may also facilitate the large capital-replacement programmes facing the utility sector owing to its effect on the cost of capital. Relatively high levels of gearing can create a lower average cost of capital than the traditional equity model if increases in the cost of debt with higher levels of gearing do not rise significantly. This was, after all, the point of privatizing the utilities with little gearing so that investment could be debt-financed. However, such a presumption clearly requires access to the debt markets, and a balance sheet, which has the capacity to finance physical CAPEX by debt, and must avoid the risk aversion to debt seen by ratings agencies and equity owners since the credit crunch. As the limits of financial engineering are reached, the advantage drops away.

VII. Financial corpses and the return of the mutuals

At the end of the great financial engineering exercise, virtually all the privatized utilities ended up with much more highly geared and, in some cases, exhausted balance sheets. They had not been used for the purposes intended. There was, however, no let-up in the physical capital investment required. Helm (2009) estimates that the total infrastructure CAPEX requirement may be in the region of £500 billion over the period to 2020. There is, then, a problem of

how to marry up the potentially or actually financially stressed utilities with the infrastructure needs of the British economy.

If the balance sheets are indeed exhausted, there are three broad solutions to financing future investment: the transfer of equity risk to customers or taxpayers; a move to rate-of-return regulation and pay-as-you-go; and the split cost of capital and hence the facilitation of rights issues.

(i) Transferring equity risk to customers or taxpayers

The first and most obvious is that the equity risk is moved to customers or taxpayers. In the Welsh Water case, it was the former; in Railtrack's case the latter. Equity ownership has, therefore, transferred either to the customers (through the creation of mutuals backed by a regulator with the duty to ensure that functions are financed), or been nationalized through a government guarantee of the debt. For as long as the companies cannot earn the marginal cost of equity, rights issues will continue to be for distress only, and hence of limited relevance to enabling the balance sheets to carry the investment programmes.

The return of the mutual model is perhaps the most surprising consequence of the gearing. As discussed in section II above, the problem of the mutual is that the residual claims of equity are removed, so that the agency problem leaves the managers to pursue their own agendas. There is no location for incentives, and hence no direct form of control. The argument is that this has in effect been replaced by regulators who monitor performance and set output targets. Then, as long as management bonuses are tied to the regulators' contract, there is a convergence of objectives between managers and customers, and hence there is no principal–agent problem.

A sophistication of this model is that the operating and capital expenditure is contracted out through competitive auctions. Welsh Water has, in effect, followed this approach. However, the question that remains is: what is the residual function of the companies' management? What does it do? If its role is to monitor contracts, its informational position is now much closer to that of the regulator, and it is therefore largely redundant, other than to hold the auctions of contracts and to provide a company treasury function. Welsh Water is largely a company in which the regulatory function is shared between the management and the regulator.

Network Rail provides a similar example, in that it has no equity. It has, however, three differences from Welsh Water: some of its revenues come indirectly from the taxpayer, and hence it is beholden to the Treasury and the Department for Transport as well as the regulator; it has a guarantee for its debt; and control is exercised through a comparatively large number of 'members'. Network Rail tried the contracting-out route, but this proved relatively unsuccessful and it has since retreated. The members are an amorphous group and cannot claim seriously to hold the management to account. Managers are rewarded with bonuses tied to the regulatory outputs, but again this has proved very difficult to make effective.

As an ownership model, mutuals and not-for-dividend companies have not proved noticeably more successful. It is reasonable to ask whether full nationalization would be superior. Though comparison is made with the experience of mutual building societies, these functioned in competitive markets, so the ownership and control relationship may have mattered less, faced with the disciplines of the product market. In the monopolies case, this does not apply. With regulators setting the outputs and competition determining the operating and capital costs, the mutual is perhaps best seen as a public delivery agency.

Table 7: Bank of England bond purchases (25 March to 15 May 2009, £m)

EDF	19.7
Iberdrola	9.1
National Grid	65.1
Electricity North West	24.8
SSE	0.0
Wessex Water	3.0
Northern Electric	3.8
Centrica	22.9
Scotia Gas Networks	10.9
United Utilities	1.9
Severn Trent	2.1
BG Energy Trading	6.5
RWE	13.1
E.ON	1.1
Total utilities	**183.9**
Total corporate bonds	**618**
Utility share	30%

In both the Welsh Water and the Network Rail case, the ability to carry on borrowing rests on a guarantee. In the case of Welsh Water, it is the duty on the regulator to ensure that the company can finance its functions. Even if a special administrator is brought in, debt-holders are relying on the protection of the value of the RAB. Welsh claims that it does in fact have equity in the business through the retention of earnings, but these are withheld customer monies. If these are at risk, then it is customers who are holding the equity risk. No individual customer is in position to exercise control, so there is no equity control.[26]

Debt does not have to be directly guaranteed: it can be owned by the government. In response to the credit crunch, the Bank of England's quantitative easing programme has included significant purchases of utility bonds. This is, in effect, also the case in respect of the transfer of the failed Metronet to Transport for London (TfL) within the London Underground. Table 7 indicates Bank of England purchases of utility bonds in mid-2009.

The Bank of England may intend to sell these bonds back into the market in due course, but it may not be easy to effect.

(ii) Rate-of-return regulation and pay-as-you-go

A second approach to solving the investment problem is a version of the first. The regulatory regime could move towards rate-of-return regulation, in effect transferring the equity risk to customers. Customers would then be facilitating 'pay as you go' financing for capital expenditure. This has been the approach across a number of countries in the twentieth century where private ownership continued. The most conspicuous example is the USA, and for much of the post-war period utility equity behaved like bonds. The beta coefficients were very low, and rights issues refreshed balance sheets with the cost-pass-through guarantee. Germany and Japan also pursued rate-of-return regulation.

The rate-of-return regime has the advantage of a low cost of capital, and the ability to keep raising finance. But it suffers from serious efficiency incentive problems. As noted in section

[26] See Ofgem's submission to Ofwat on the consultation on the set-up of the mutual (Ofgem, 2002), and a wider discussion on the effects of capital restructuring on risk sharing in DTI (2004).

II, Averch and Johnson (1962) classically demonstrated that rate-of-return regulation leads to operating-cost inefficiencies and gold-plating, and this critique was a major motivation for its rejection in the UK in favour of RPI–X. Rate-of-return regulation does not therefore solve the agency problem.

(iii) The split cost of capital

A third approach is to adopt the split cost of capital, providing the marginal cost of equity for the CAPEX and OPEX, and the marginal cost of debt for the RABs.[27] This recognizes the special status of the RAB, and its protection by the duty to finance functions on the one hand, and the equity nature of the OPEX and CAPEX on the other. The regulatory regime assigns the cost of debt to the RAB, and solves the time inconsistency problem by allowing cost-pass-through of the RAB's cost of finance. For the operations and investment side of the businesses, a cost of equity is provided to reflect the risks under the RPI–X periodic contracts, incentivizing the pursuit of cost efficiency.

The control features of this model combine the guarantee to the debt component, and the ability to finance a rising RAB through time, while at the same time facilitating rights issues to build the equity side of the operations of the business. There will also be some debt to finance the CAPEX projects, which on completion are sold into the RAB.

This third model rescues the companies from the exhaustion of their balance sheets, by sorting out the allocation of equity risk. The costs of the completed CAPEX are passed through to customers or, if they cannot pay, to the government. There is nothing that management can do to influence the RAB, hence there are no agency control problems. In the rest of the business there is a clear agency problem, and equity in the context of an appropriate regulatory price cap incentivizes the managers to pursue cost minimization, as price-takers. Where the OPEX and CAPEX are subject to competitive tender, the agency problem is solved in the product rather than capital market.

VIII. Conclusions

Ownership of infrastructure utilities has been far from stable. Neither nationalization nor privatization provided efficient or even stable solutions, and the privatized ownership structures have changed markedly. Regulation has allocated regulatory risks, and the precise form of financial regulation has triggered major financial engineering and an exit of equity. The results have been far from satisfactory. The balance sheets are widely exhausted, yet the investment needs have, if anything, got bigger.

Short of default, which would have systematic consequences for the cost of capital, and be hard to engineer given the legal duty on regulators to finance the functions, customers and taxpayers are lumbered with the very considerable debts. This is probably the inescapable consequence of the regulators allowing the enormous financial arbitrage which has been associated with the privatized companies.

[27] See Helm (2007), Ofwat/Ofgem (2006), Ofwat (2007), and Competition Commission (2007).

The debt overhang inhibits the ability of the privatized companies to finance the investment required. Of the three solutions available, a return to rate-of-return regulation, with customers financing investment on a pay-as-you-go basis, has obvious efficiency drawbacks. The split cost of capital retains the equity incentives, while minimizing the cost-of-capital effects, but it requires regulators to change their approach to financial regulation, and, in particular, to setting a WACC. That leaves only a collapse back into mutuals and nationalization. It is an approach which has obvious drawbacks, which motivated the original privatization programme. Short of regulatory reform, a return to the *status quo ante* cannot be ruled out.

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