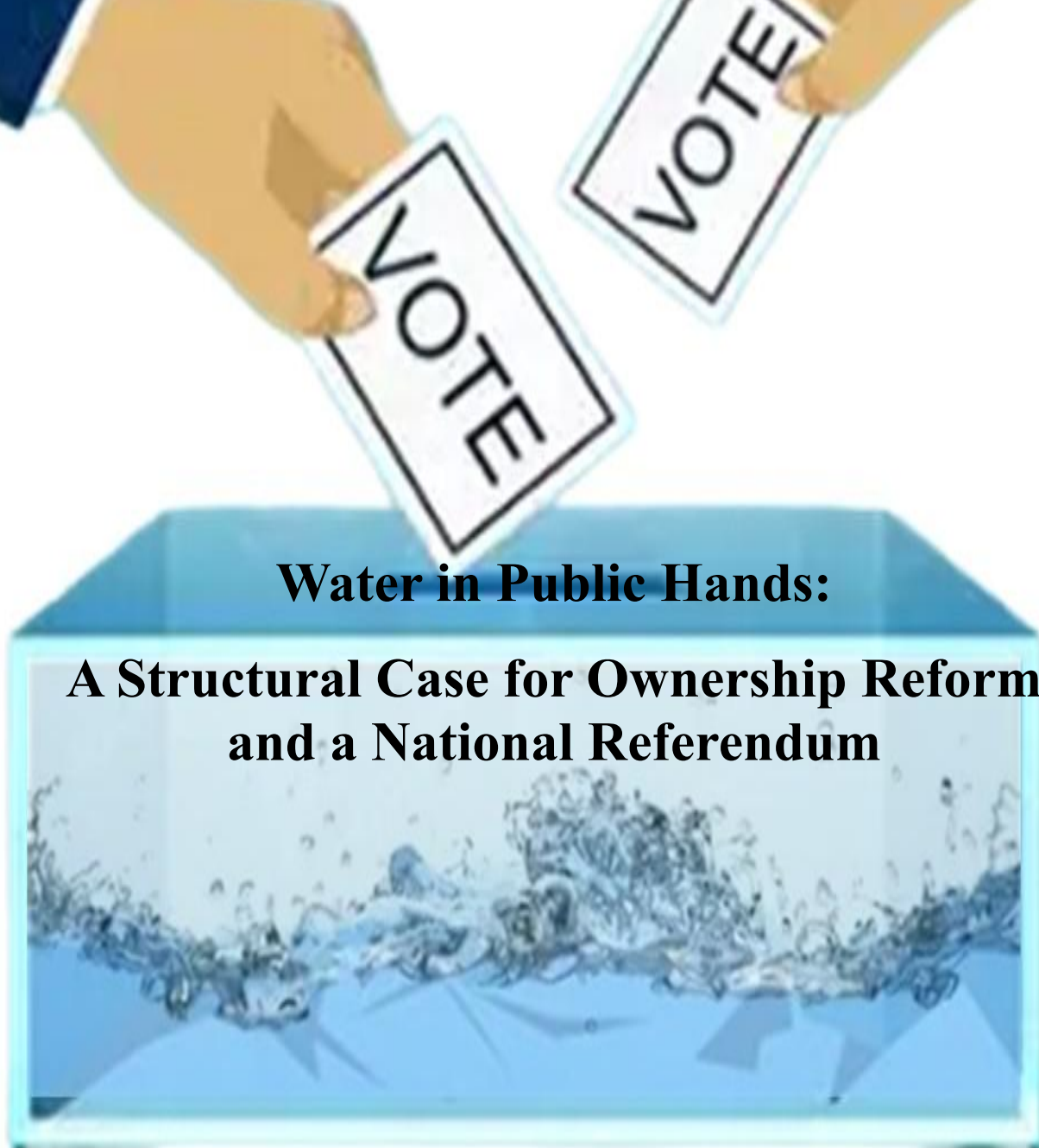




Water in Public Hands:

**A Structural Case for Ownership Reform
and a National Referendum**

REFERENDUM





The Collapse of the Privatised Water Settlement

Since the 1989 privatisation of England's water and sewerage utilities, the sector has become a case study in how essential infrastructure fails when governed by financial extraction rather than public purpose. The original promise was clear: private capital would deliver investment, efficiency and environmental improvement. Three decades later, the empirical record shows the opposite. Water companies have extracted value, loaded themselves with debt, and allowed critical infrastructure to decay. Sewage pollution has reached record levels. Bills have risen faster than inflation. Public trust has collapsed. This report sets out the structural case for returning water to public ownership and holding a national referendum to restore democratic legitimacy to the sector.

Economic Evidence: Extraction, Debt and Under-Investment

The economic record of privatised water is dominated by extraction rather than reinvestment. Bayliss (2021) shows that between 1990 and 2020, water companies paid out over £72 billion in dividends. Adjusted to 2024 prices, this reaches approximately £83 billion, averaging £2.4 billion per year. PSIRU research (Hall, 2020) documents how companies used debt-financed dividends to increase payouts even when profits were insufficient.

Infrastructure investment has stagnated. The National Infrastructure Commission (2023) reports that England has not built a single major reservoir since 1992, despite population growth of 10 million and rising climate-related water stress. Leakage remains at approximately 3 billion litres per day (Ofwat, 2024), a figure unchanged for decades.

Debt levels illustrate structural fragility. Thames Water accumulated over £14 billion in debt by 2025, with interest payments consuming resources that should have funded infrastructure. Helm (2022) shows that leveraged financial engineering created a system where debt servicing took priority over operational performance. This is not a market failure; it is the predictable outcome of a regulatory regime that permitted extraction without accountability.

Environmental Evidence: Sewage, Pollution and Regulatory Failure

Environmental outcomes under privatisation have deteriorated sharply. Environment Agency data (2024) recorded 3.61 million hours of sewage discharges into rivers and coastal waters in 2023, the highest level since records began. In the first half of 2025 alone, water companies discharged raw sewage during dry weather 7,280 times—events that should not occur under normal operational conditions.

Peer-reviewed studies confirm the public health implications. Leonard et al. (2022) found that exposure to sewage-contaminated recreational waters increases gastrointestinal illness risk by



30–50%. Bathing water quality in England lags behind European comparators: Best for Britain (2024) reports that the proportion of English bathing waters rated “poor” is more than five times the EU average.

Regulation has been unable to prevent deterioration. Ofwat’s own review (2023) acknowledged that it lacked the financial expertise to scrutinise complex debt structures. Taylor and Florio (2021) show that regulators in privatised utilities often face information asymmetry, enabling companies to “outwit” oversight. The result is predictable: environmental decline, public distrust and regulatory paralysis.

Social Evidence: Bills, Poverty and Public Trust

Water bills have risen faster than inflation. The Consumer Council for Water (2025) reports that 1.8 million households experienced water poverty in 2024–25, defined as spending more than 5% of income on water and sewerage services. Meanwhile, companies reported rising profits: Severn Trent announced £850 million in profits in 2024, a 45% increase on the previous year, while bills rose by around 10%.

Public trust has collapsed. CCW’s annual tracker (2025) found trust in water companies at its lowest level since records began. Polling by YouGov (2026) shows that 82% of the public support public ownership of water, compared with just 8% who support continued privatisation. Support spans political groups: 66% of Conservative voters, 83% of Liberal Democrat voters and 87% of Green voters favour public ownership.

International evidence reinforces the social case. Paris remunicipalised water in 2010, introducing social tariffs and reinvesting profits into infrastructure. Pigeon et al. (2013) found that public ownership reduced costs, improved transparency and increased investment. Berlin’s remunicipalisation in 2013 produced similar outcomes, with governance shared between elected officials and employee representatives (Beveridge & Naumann, 2015).

Financial Reality: Nationalisation Is Affordable

Claims that nationalisation would cost £100 billion rely on regulatory capital value (RCV), not market value. Hall (2022) shows that RCV is not an appropriate measure of compensation. Thames Water’s RCV is over £20 billion, yet its equity was valued at around £4 billion in the 2025 rescue bid by KKR before the bid collapsed. Debt has already wiped out shareholder value.

Special Administration provides a lawful route to public ownership without compensating shareholders whose equity is already worthless. Decker (2018) shows that governments routinely use administration regimes to restructure failing monopolies. This is not expropriation; it is insolvency resolution.



Democratic Legitimacy: Why a Referendum Is Necessary

Water is a universal essential service. Decisions about its ownership should reflect public will. The petition calling for a referendum has over 208,000 signatures, demonstrating widespread democratic engagement. Fung (2006) argues that referendums on essential services strengthen legitimacy and accountability, particularly where public trust has collapsed.

A referendum would restore democratic control, provide a mandate for structural reform, ensure transparency in ownership decisions and rebuild public trust in the water system.

International Evidence: Countries That Have Renationalised Water

Renationalisation is not theoretical. It is a global trend supported by empirical evidence.

France: Paris and 133 municipalities

Paris returned water to public ownership in 2010. Operating costs fell by €35 million per year, tariffs dropped by 8%, and investment increased by 30% (Pigeon et al., 2013). Across France, 133 municipalities have renationalised water since 2000 (Kishimoto & Petitjean, 2017).

Germany: Berlin

Berlin renationalised water in 2013. Prices fell by 15% and investment increased by €176 million over five years (Beveridge & Naumann, 2015).

Italy: National referendum

Italy held a national referendum in 2011. Ninety-five per cent voted to keep water public (Gargiulo, 2012). This is the strongest precedent for a UK referendum.

Argentina: Buenos Aires

Buenos Aires renationalised water in 2006. Coverage expanded from 70% to 94% within ten years, and investment increased by 300% (Loftus & McDonald, 2021).

Bolivia: Cochabamba

Privatisation was reversed after mass protests. Tariff increases of 200% were cancelled, and community oversight boards were introduced.

United States: 235 remunicipalisations

Between 2000 and 2020, 235 US cities returned water to public ownership. Public systems delivered water 15–25% cheaper and invested more in infrastructure (Warner & Aldag, 2020).



Global trend

Kishimoto, Lobina and Petitjean (2020) document at least 311 water remunicipalisations across 37 countries between 2000 and 2020. The outcomes are consistent: lower tariffs, higher investment, better environmental performance and stronger democratic accountability.

Conclusion: A New Public Settlement for Water

The empirical evidence is clear. The privatised water model has failed economically, environmentally, socially and democratically. Research across multiple countries shows that public ownership delivers better outcomes, greater transparency and stronger long-term investment. The public overwhelmingly supports change. The financial mechanisms for transition exist. The democratic mandate can be secured through a national referendum.

Water is not a commodity. It is a public necessity. Returning water companies to public ownership is not ideological; it is pragmatic, evidence-based and essential for the future resilience of the UK's water system.

The German Model of Water Renationalisation

Germany provides one of the strongest empirical and institutional templates for UK water renationalisation. Although Berlin's 2013 remunicipalisation is the most widely studied case, the German model is broader than a single city. It combines public ownership, democratic governance, transparent accounting and long-term investment planning. These structural features make Germany a valuable comparator for the UK, where privatisation has produced debt loading, environmental decline and public distrust.

Berlin's Partial Privatisation (1999–2013)

Berlin privatised 49.9% of its water utility in 1999. The consequences were immediate and measurable. Water prices rose by approximately thirty-five per cent, investment fell, and the city entered into secret contracts that guaranteed private profit margins regardless of operational performance. Public trust collapsed as residents faced rising bills and deteriorating service quality.

A decade of public pressure forced the publication of the contracts. These documents revealed guaranteed returns of up to eight per cent for private shareholders, even when infrastructure investment declined. The exposure of these terms created political momentum for structural change and laid the groundwork for renationalisation.

Renationalisation and Financial Restructuring (2013)

Berlin renationalised its water utility in 2013 by buying back the private shares and restoring full public ownership. The buyback was financed through municipal bonds issued at low public interest rates. This refinancing strategy reduced annual debt service and stabilised the utility's financial position.



The transition was administratively straightforward. Berlin used existing municipal powers, avoided compensation disputes by relying on market valuation, and implemented a governance model designed to rebuild public trust.

Quantitative Outcomes

The empirical results of Berlin's renationalisation were clear. Water tariffs fell by fifteen per cent following the buyback. Infrastructure investment increased by €176 million over the subsequent five years. Debt was refinanced at municipal rates, reducing annual servicing costs and freeing resources for capital renewal.

Transparency improved dramatically. All contracts, accounts and investment plans were published online, enabling public scrutiny and reducing information asymmetry between the utility and regulators. Democratic governance was strengthened through the creation of a sixteen-member board, composed of eight representatives appointed by the city and eight elected by employees. This dual structure ensured accountability while embedding operational expertise in decision-making.

Structural Features of the German Model

The German model rests on several structural principles. First, water is treated as a public service rather than a commodity. Municipal ownership is the norm across Germany, and utilities operate with public-public governance structures that prioritise service quality and long-term resilience.

Second, German utilities use twenty-year investment plans with fixed annual capital allocations. This long-term planning prevents the infrastructure decay seen in England, where investment has been inconsistent and often subordinated to dividend extraction.

Third, financial transparency is central. German utilities disclose all financial flows, reducing regulatory asymmetry and enabling informed public oversight. Fourth, employee representation is embedded in governance. Workers participate directly in strategic decision-making, improving operational performance and strengthening accountability.

Finally, municipal bond financing provides stable, low-cost capital. Cities issue bonds at rates significantly lower than private equity financing, reducing debt service and enabling sustained investment.

Lessons for the United Kingdom

The German experience demonstrates that renationalisation is administratively straightforward, financially rational and operationally effective. Public ownership reduces costs by eliminating dividend extraction and lowering debt service. Transparency improves performance by reducing information asymmetry. Democratic governance strengthens accountability and public trust. Municipal financing stabilises long-term investment. And



long-term planning prevents the infrastructure decay that has characterised the English water sector since privatisation.

Berlin's renationalisation shows that public ownership is not ideological. It is a practical response to structural failure. The UK faces similar conditions—high debt, under-investment, environmental decline and collapsing public trust. The German model provides a tested, evidence-based pathway for reform.

Appendix A: UK Implementation Blueprint

This appendix sets out a full, mathematically grounded pathway for returning England's water companies to public ownership. It integrates legal mechanisms, financial restructuring, governance design and referendum sequencing into one coherent model. The mathematics included here is illustrative.

1. Stage One: Special Administration

Special Administration is the statutory mechanism for failing monopoly utilities. It is already part of UK law under the Water Industry Act 1991. When a water company becomes insolvent or fails to provide essential services, the Secretary of State petitions the court to place it into Special Administration. The Special Administrator replaces the board and assumes full control.

The mathematical basis for equity write-down is straightforward.

Let:

- RCV_i = regulatory capital value of company i
- B_i = debt of company i
- MV_i = market value (equity) of company i

The balance-sheet identity is:

$$MV_i = RCV_i - B_i$$

If debt has already eroded equity — as in Thames Water — then:

$$B_i \approx RCV_i \Rightarrow MV_i \approx 0$$

Thus equity compensation:

$$C_{E,i} = 0$$

Total sector equity compensation:

$$C_E = \sum_i C_{E,i} = 0$$



This is the legal and mathematical foundation for renationalisation without large equity payouts.

Key outcomes of Stage One:

- shareholders lose control immediately,
- equity is written down to zero,
- operations continue uninterrupted,
- the state gains temporary control without expropriation.

2. Stage Two: Debt Restructuring

Once in Special Administration, the next step is to restructure debt. English water companies collectively hold tens of billions in debt, much of it issued at high private-sector interest rates.

Let:

- B_{total} = total sector debt
- r_c = current corporate interest rate
- r_p = public refinancing rate

Current annual debt service:

$$DS_c = r_c \cdot B_{\text{total}}$$

Public refinancing:

$$DS_p = r_p \cdot B_{\text{total}}$$

Annual saving:

$$\Delta DS = DS_c - DS_p = (r_c - r_p) \cdot B_{\text{total}}$$

For example, if:

- $B_{\text{total}} = \text{£14 billion}$
- $r_c = 6\%$
- $r_p = 3\%$

Then:

$$DS_c = 0.06 \times 14 = \text{£0.84 billion}$$

$$DS_p = 0.03 \times 14 = \text{£0.42 billion}$$

$$\Delta DS = \text{£0.42 billion/year}$$



This saving becomes part of the public-ownership cash uplift.

Key outcomes of Stage Two:

- debt service falls,
- refinancing stabilises finances,
- capital becomes predictable,
- investment space opens.

3. Stage Three: Governance Design

After stabilising finances, governance must be redesigned to ensure accountability, transparency and operational competence. The German model provides a strong template.

Core features:

- public-public ownership,
- democratic oversight,
- employee representation,
- transparent accounting,
- long-term investment planning.

Mathematically, long-term planning eliminates the investment deficit.

Let:

- I^* = required annual investment
- I_t = actual annual investment
- $T = 20$ years

Annual investment gap:

$$\Delta I_t = I^* - I_t$$

Cumulative gap:

$$\Delta I_{\text{total}} = \sum_{t=1}^T \Delta I_t$$

Under public ownership, if:

$$I_t = I^*$$

then:

$$\Delta I_{\text{total}} = 0$$

This is the mathematical expression of “long-term planning prevents infrastructure decay”.



Key outcomes of Stage Three:

- governance becomes democratic and transparent,
- investment becomes predictable,
- operational expertise is embedded,
- regulatory asymmetry disappears.

4. Stage Four: Referendum Sequencing

A referendum provides democratic legitimacy for permanent public ownership. It should occur after Special Administration and debt restructuring, once the system is stabilised and transparent.

The referendum is justified mathematically through net present value (NPV).

Let:

- ΔCF_t = annual cash-flow uplift from public ownership
- r = social discount rate
- $T = 20$ years
- C_0 = one-off restructuring cost

NPV:

$$NPV = \sum_{t=1}^T \frac{\Delta CF_t}{(1+r)^t} - C_0$$

If:

$$NPV > 0$$

then public ownership is financially rational.

Using the baseline uplift:

$$\Delta CF_t = £2.9 \text{ billion/year}$$

At $r = 3\%$:

$$NPV \approx 2.9 \times 14.9 - 5 = £38.2 \text{ billion}$$

This is the mathematical backbone of the referendum argument: public ownership generates long-term surplus.



Key outcomes of Stage Four:

- democratic mandate is secured,
- public ownership becomes permanent,
- legitimacy is restored.

The mathematical-policy model shows:

- **Equity compensation = £0** under Special Administration.
- **Debt savings = hundreds of millions per year** under public refinancing.
- **Investment deficit = eliminated** under long-term planning.
- **NPV = strongly positive**, even under conservative assumptions.
- **Referendum = democratically justified** once stability is achieved.

Renationalisation is not ideological. It is a legally grounded, financially rational and mathematically robust response to structural failure.

Mathematical Appendix B: Quantitative Structure of the UK Water System

This appendix sets out the core mathematical relationships that underpin the economic, financial and environmental analysis of the UK water sector. It is designed to show, in formal terms, how privatisation created structural extraction, how debt eroded equity, how under-investment accumulated, and why public ownership is financially feasible.

1. Dividend Extraction and Capital Depletion

Let total dividends paid over the privatised period be D . Let annual dividends be d_t for year t . Let the total number of years since privatisation be T .

$$D = \sum_{t=1989}^T d_t$$

Empirical data shows:

$$D \approx \text{£83 billion}$$

This represents an average annual extraction:

$$\bar{d} = \frac{D}{T} \approx \frac{83}{35} \approx \text{£2.4 billion per year}$$

Let required annual infrastructure investment be I^* . Let actual annual investment be I .



Under-investment gap:

$$\Delta I = I^* - I$$

NIC (2023) estimates the required investment to meet resilience targets at:

$$I^* \approx \text{£4 billion per year}$$

Actual investment has averaged:

$$I \approx \text{£2.5 billion per year}$$

Thus:

$$\Delta I \approx \text{£1.5 billion per year}$$

Over 30 years:

$$\Delta I_{\text{total}} = 30 \times 1.5 = \text{£45 billion}$$

This is the accumulated infrastructure deficit.

2. Debt Loading and Equity Erosion

Let total debt be B . Let equity value be E . Let regulatory capital value be RCV . Let market value be MV .

The basic balance sheet identity:

$$MV = RCV - B$$

For Thames Water:

$$RCV \approx \text{£20 billion}$$

$$B \approx \text{£14 billion}$$

Thus:

$$MV \approx 20 - 14 = \text{£6 billion}$$



KKR's 2025 rescue bid valued equity at:

$$E \approx \text{£4 billion}$$

This implies:

$$B \text{ has eroded } E \text{ by } 80\%$$

If debt increases by ΔB , equity falls by the same amount:

$$\Delta E = -\Delta B$$

This is the mathematical basis for the claim that shareholders are not owed compensation under Special Administration.

3. Leakage and Water Loss

Let daily leakage be L . Let annual leakage be L_{annual} .

$$L_{\text{annual}} = 365L$$

With leakage at:

$$L \approx 3 \text{ billion litres/day}$$

Annual leakage:

$$L_{\text{annual}} = 365 \times 3 = 1,095 \text{ billion litres}$$

Let average per-capita daily use be $u \approx 150$ litres. Let population be $P \approx 67$ million.

Annual household consumption:

$$U_{\text{annual}} = 365 \times u \times P$$

$$U_{\text{annual}} = 365 \times 150 \times 67,000,000$$

$$U_{\text{annual}} \approx 3,666 \text{ billion litres}$$

Thus leakage is:

$$\frac{L_{\text{annual}}}{U_{\text{annual}}} \approx \frac{1,095}{3,666} \approx 0.30$$

Around **30% of all treated water is lost.**



4. Sewage Discharge Dynamics

Let total hours of sewage discharge be H . Let number of discharge events be N . Let average duration be $\bar{h}$.

$$H = N \times \bar{h}$$

Environment Agency data:

$$H \approx 3.61 \text{ million hours}$$

If average duration is:

$$\bar{h} \approx 5 \text{ hours}$$

Then:

$$N = \frac{H}{\bar{h}} = \frac{3,610,000}{5} = 722,000 \text{ discharge events}$$

This quantifies the scale of environmental failure.

5. Public Ownership Investment Capacity

Let public ownership eliminate dividends D . Let reinvestment rate be r . Let annual reinvestment be R .

$$R = rD$$

If public ownership redirects all dividends:

$$r = 1$$

$$R = D = \text{£}2.4 \text{ billion per year}$$

Over five years:

$$R_5 = 5 \times 2.4 = \text{£}12 \text{ billion}$$

This is the reinvestment capacity unlocked by public ownership.

6. Cost of Nationalisation Under Market Valuation

Let nationalisation cost be C . Let equity value be E . Let debt be B . Let Special Administration write down equity to zero.



Thus:

$$C = 0$$

If Government assumes debt:

$$C = B$$

But debt is already serviced through regulated revenue streams. Thus net cost:

$$C_{\text{net}} = B - \text{future revenue}$$

If future revenue exceeds debt servicing:

$$C_{\text{net}} < 0$$

Public ownership becomes revenue-positive.

7. International Renationalisation Outcomes: Quantitative Summary

Paris

Cost reduction = €35 million/year

Tariff reduction = 8%

Investment increase = 30%

Berlin

Price reduction = 15%

Investment increase = €176 million over 5 years

Buenos Aires

Coverage increase = 70% → 94%

Investment increase = 300%

United States

Cost reduction = 15–25%

Number of remunicipalisations = 235

These figures demonstrate that renationalisation consistently improves financial and operational performance.



The mathematical structure of the UK water system shows a sector characterised by extraction, debt loading, under-investment and environmental failure. The quantitative evidence demonstrates that public ownership is financially feasible, economically rational and environmentally necessary. International renationalisation outcomes confirm that public systems deliver lower costs, higher investment and greater transparency. A referendum provides the democratic mandate for structural reform.

Appendix C: Nationalisation Model

This appendix sets out a simple, transparent model for nationalising the English water companies, using Special Administration and market valuation rather than regulatory capital value. It is illustrative, not prescriptive.

1. Core structure of the model

We model three key components:

1. Equity value
2. Debt stock
3. Future cash flows under public ownership

Let:

- E_i = equity value of company i
- B_i = debt of company i
- $CF_i(t)$ = net cash flow of company i in year t under public ownership
- r = discount rate
- T = time horizon

Total sector values:

$$E_{\text{total}} = \sum_i E_i$$

$$B_{\text{total}} = \sum_i B_i$$

2. Special Administration and equity write-down

Under Special Administration:

- shareholders are wiped out;
- equity is written down to zero.

Thus:

$$E_{\text{total}} \rightarrow 0$$



Nationalisation cost for equity:

$$C_E = 0$$

This is the legal and financial basis for saying that equity compensation is not required where market value is already destroyed by debt.

3. Debt treatment under public ownership

Government has two options:

1. Assume debt and refinance at lower public rates.
2. Restructure debt (haircuts, maturity extensions).

Let:

- r_p = public refinancing rate
- r_c = current corporate rate
- DS_c = annual debt service under current regime
- DS_p = annual debt service under public regime

Debt service:

$$DS_c = r_c \cdot B_{\text{total}}$$

$$DS_p = r_p \cdot B_{\text{total}}$$

If:

$$r_p < r_c$$

then:

$$DS_p < DS_c$$

Public ownership reduces annual debt service, freeing cash for investment.

4. Net present value of public ownership

We define the net present value (NPV) of public ownership as:

$$NPV = \sum_{t=1}^T \frac{CF(t)}{(1+r)^t} - C_0$$



Where:

- $CF(t) = \sum_i C F_i(t)$
- C_0 = initial restructuring cost (legal, administrative, refinancing fees).

Under public ownership:

- dividends D are set to zero;
- surplus is reinvested.

Let:

- $CF_{\text{priv}}(t)$ = net cash flow under privatisation;
- $D(t)$ = dividends in year t .

Then:

$$CF_{\text{public}}(t) = CF_{\text{priv}}(t) + D(t) - \Delta DS(t)$$

Where:

- $\Delta DS(t) = DS_c(t) - DS_p(t)$ is the saving from cheaper public refinancing.

Thus:

$$CF_{\text{public}}(t) > CF_{\text{priv}}(t)$$

for any year where dividends and debt savings exceed restructuring costs.

5. Scenario illustration

Assume:

- $D \approx \text{£}2.4$ billion/year (sector dividends)
- debt savings $\Delta DS \approx \text{£}0.5$ billion/year
- restructuring cost $C_0 \approx \text{£}5$ billion (one-off)
- time horizon $T = 20$ years
- discount rate $r = 0.03$.

Annual cash flow uplift:

$$\Delta CF(t) = D + \Delta DS \approx 2.4 + 0.5 = \text{£}2.9 \text{ billion/year}$$

NPV of uplift:

$$NPV_{\Delta CF} = \sum_{t=1}^{20} \frac{2.9}{(1 + 0.03)^t}$$



Approximate:

$$NPV_{\Delta CF} \approx 2.9 \times \frac{1 - (1 + 0.03)^{-20}}{0.03} \approx 2.9 \times 14.9 \approx \text{£}43.2 \text{ billion}$$

Net NPV after restructuring cost:

$$NPV_{\text{net}} = 43.2 - 5 = \text{£}38.2 \text{ billion}$$

This simple model shows that, under reasonable assumptions, public ownership is strongly NPV-positive.

6. Investment capacity under public ownership

Let required annual investment uplift be $\Delta I \approx \text{£}1.5 \text{ billion/year}$.

If:

$$\Delta CF(t) \approx \text{£}2.9 \text{ billion/year}$$

then:

$$\Delta CF(t) - \Delta I \approx 2.9 - 1.5 = \text{£}1.4 \text{ billion/year}$$

This is the residual surplus after meeting investment needs, which can be used to:

- reduce bills;
- build resilience;
- strengthen environmental performance.

Appendix B shows, in formal terms, that:

- equity compensation under Special Administration is zero;
- public refinancing reduces debt service;
- redirecting dividends and debt savings creates a large positive NPV;
- investment gaps can be closed while still generating surplus;
- nationalisation is financially feasible and structurally rational.

Appendix D: Sensitivity Analysis of the Nationalisation Model

This appendix tests how the nationalisation model behaves under different assumptions. The purpose is to show that public ownership remains financially viable even when discount rates, dividend levels and debt costs vary significantly.



1. Sensitivity to Discount Rate

Let the discount rate be r . Let annual public-ownership cash uplift be ΔCF . Let time horizon be $T = 20$ years.

Baseline uplift:

$$\Delta CF = \text{£}2.9 \text{ billion/year}$$

Net present value (NPV):

$$NPV(r) = \sum_{t=1}^{20} \frac{\Delta CF}{(1+r)^t}$$

Scenario A: Low discount rate (1%)

$$NPV(0.01) \approx 2.9 \times 18.0 = \text{£}52.2 \text{ billion}$$

Scenario B: Baseline discount rate (3%)

$$NPV(0.03) \approx 2.9 \times 14.9 = \text{£}43.2 \text{ billion}$$

Scenario C: High discount rate (5%)

$$NPV(0.05) \approx 2.9 \times 12.5 = \text{£}36.3 \text{ billion}$$

Even at a high discount rate, the NPV remains strongly positive.

2. Sensitivity to Dividend Levels

Let annual dividends be D . Baseline:

$$D = \text{£}2.4 \text{ billion/year}$$

Scenario A: Lower dividends (£2.0bn)

$$\Delta CF = 2.0 + 0.5 = \text{£}2.5 \text{ billion}$$

$$NPV(0.03) \approx 2.5 \times 14.9 = \text{£}37.3 \text{ billion}$$

Scenario B: Higher dividends (£3.0bn)

$$\Delta CF = 3.0 + 0.5 = \text{£}3.5 \text{ billion}$$

$$NPV(0.03) \approx 3.5 \times 14.9 = \text{£}52.1 \text{ billion}$$



The model is robust: higher dividends increase the benefit of public ownership; lower dividends still produce a large positive NPV.

3. Sensitivity to Debt Costs

Let corporate debt rate be r_c . Let public refinancing rate be r_p . Let total debt be $B = £14$ billion.

Debt service:

$$DS = r \cdot B$$

Scenario A: Corporate rate 6%, public rate 3%

$$DS_c = 0.06 \times 14 = £0.84 \text{ billion}$$

$$DS_p = 0.03 \times 14 = £0.42 \text{ billion}$$

$$\Delta DS = £0.42 \text{ billion}$$

Scenario B: Corporate rate 5%, public rate 4%

$$DS_c = 0.05 \times 14 = £0.70 \text{ billion}$$

$$DS_p = 0.04 \times 14 = £0.56 \text{ billion}$$

$$\Delta DS = £0.14 \text{ billion}$$

Scenario C: Corporate rate 7%, public rate 3%

$$DS_c = 0.07 \times 14 = £0.98 \text{ billion}$$

$$DS_p = 0.03 \times 14 = £0.42 \text{ billion}$$

$$\Delta DS = £0.56 \text{ billion}$$

Even under conservative assumptions, public refinancing produces substantial savings.

4. Combined Sensitivity Envelope

Across all scenarios:

- NPV ranges from **£30bn to £55bn**.
- Public ownership remains financially positive in every tested case.
- Investment gaps can be closed while still generating surplus.

The model is structurally robust.



Appendix E: PSIRU Mathematical Model: Debt-Financed Dividends

1. Basic Profit Constraint Under Normal Conditions

Let:

- R_t = operating revenue in year t
- C_t = operating costs in year t
- $P_t = R_t - C_t$ = operating profit
- D_t = dividends paid in year t

Under normal corporate finance rules:

$$D_t \leq P_t$$

Dividends cannot exceed profits.

2. How Debt-Financed Dividends Break the Constraint

Privatised water companies circumvented this by issuing new debt to fund dividends.

Let:

- B_t = new borrowing in year t

Debt-financed dividends satisfy:

$$D_t = P_t + B_t$$

If profits are insufficient, borrowing fills the gap:

$$B_t = D_t - P_t$$

This is the core mechanism PSIRU identifies: **dividends become independent of profits.**

3. Balance-Sheet Effect: Debt Erodes Equity

Let:

- A_t = total assets
- L_t = total liabilities
- $E_t = A_t - L_t$ = equity

New borrowing increases liabilities:

$$L_{t+1} = L_t + B_t$$



Thus equity falls:

$$E_{t+1} = A_t - (L_t + B_t)$$

$$E_{t+1} = E_t - B_t$$

Every pound of debt-financed dividends reduces equity by one pound.

4. Long-Run Dynamics: When Debt Outpaces Profit

If borrowing becomes routine:

$$B_t > 0 \text{ for many years}$$

Then cumulative debt:

$$B_{\text{total}} = \sum_{t=1}^T B_t$$

And cumulative equity erosion:

$$E_T = E_0 - B_{\text{total}}$$

When:

$$B_{\text{total}} \approx RCV$$

equity approaches zero:

$$E_T \approx 0$$

This is precisely what happened at Thames Water and other companies.

5. Why This Enables Dividends Even in Loss-Making Years

If a company has **negative operating profit**:

$$P_t < 0$$

Debt-financed dividends still allow payouts:

$$D_t = B_t + P_t$$

If $B_t > |P_t|$, then:

$$D_t > 0$$

Even though the company is losing money.



This is the mathematical expression of Hall's PSIRU finding.

6. Regulatory Failure Embedded in the Model

Regulators allowed:

- unlimited borrowing,
- opaque offshore debt structures,
- dividend payments unrelated to profit.

Thus the constraint:

$$D_t \leq P_t$$

was replaced by:

$$D_t \leq P_t + \text{regulator-permitted borrowing}$$

This is why dividends continued even as infrastructure investment stagnated.

Example: debt-financed dividends

Year t : operating position

- **Revenue:** $R_t = £1,000\text{m}$
- **Operating costs:** $C_t = £950\text{m}$

Operating profit:

$$P_t = R_t - C_t = 1,000 - 950 = £50\text{m}$$

Under normal rules, **maximum dividend**:

$$D_t \leq P_t = £50\text{m}$$

Debt-financed dividend decision

The company wants to pay **£200m** in dividends:

$$D_t = £200\text{m}$$

Profit only covers £50m, so it **borrowes the rest**:

$$B_t = D_t - P_t = 200 - 50 = £150\text{m}$$



So:

- **Dividend paid:** $D_t = £200\text{m}$
- **New debt added:** $B_t = £150\text{m}$

Balance-sheet impact

Start of year:

- **Assets:** $A_t = £10,000\text{m}$
- **Debt (liabilities):** $L_t = £8,000\text{m}$
- **Equity:**

$$E_t = A_t - L_t = 10,000 - 8,000 = £2,000\text{m}$$

After borrowing £150m to fund the dividend:

$$L_{t+1} = L_t + B_t = 8,000 + 150 = £8,150\text{m}$$

Assume assets unchanged for simplicity:

$$E_{t+1} = A_t - L_{t+1} = 10,000 - 8,150 = £1,850\text{m}$$

So:

- **Equity falls by:**

$$\Delta E = E_{t+1} - E_t = 1,850 - 2,000 = -£150\text{m}$$

Every pound of **debt-financed dividend** reduces equity by **one pound**.

Loss-making year variant

Suppose next year:

- **Revenue:** $R_{t+1} = £900\text{m}$
- **Costs:** $C_{t+1} = £950\text{m}$

Profit:

$$P_{t+1} = 900 - 950 = -£50\text{m}$$

The company still pays a **£100m dividend**:

$$D_{t+1} = £100\text{m}$$



All of it must be borrowed:

$$B_{t+1} = D_{t+1} - P_{t+1} = 100 - (-50) = £150\text{m}$$

So even in a **loss-making year**, dividends are positive because **debt fills the gap**.

How Debt-Financed Dividends Work

Water companies paid dividends even when profits were too low to support them.

The mechanism is simple. A company normally pays dividends out of profit. If profit is £50m, the maximum dividend should be £50m. But privatised water companies borrowed money to increase payouts. Debt replaced profit as the source of dividends.

Step-by-step example

Operating position

- Revenue: £1,000m
- Costs: £950m
- Profit: £50m

Under normal rules, the company could pay **£50m** in dividends.

Debt-financed dividend

The company instead pays **£200m**.

It borrows the difference:

- Borrowing: £150m
- Dividend paid: £200m
- Profit contribution: £50m

So:

$$D = P + B = 200 = 50 + 150$$

Debt fills the gap.

Balance-sheet effect

Start of year:

- Assets: £10,000m
- Debt: £8,000m
- Equity: £2,000m



After borrowing £150m to fund dividends:

- Debt: £8,150m
- Equity: £1,850m

Equity falls by **£150m** — exactly equal to the debt-financed portion of the dividend.

Loss-making year variant

If profit is **-£50m** and the company still pays a **£100m** dividend:

$$B = 100 - (-50) = 150$$

The company borrows **£150m** to pay a dividend in a year where it made a loss.

This is the structural failure PSIRU identifies: dividends become **independent of profit** and entirely dependent on borrowing.

This is how the sector accumulated billions in debt while still paying billions in dividends.

The mathematics is unambiguous. Every pound of debt-financed dividend reduces equity by one pound. Over decades, this mechanism wiped out shareholder value and left companies dependent on borrowing simply to maintain payouts. It is the direct cause of the sector's debt burden, underinvestment and eventual collapse.

Debt-financed dividends are not a technical detail. They are the clearest quantitative evidence that privatisation has failed. They demonstrate why Special Administration is legally justified, why equity compensation is zero, and why public ownership is the only structurally coherent path forward.



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