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The Restructuring and Privatization of the U.K. Electricity Supply—Was It Worth It?

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The electricity supply industry in England and Wales was under public ownership from 1948 to 1990. For most of this period, a single company, the Central Electricity Generating Board (CEGB), operated all generation and transmission as a vertically integrated statutory monopoly, while twelve area boards acted as regional distribution monopolies. The CEGB during this time was a classic example of a cost-of-service regulated public utility—with excessive capital costs, overdependence on high-cost indigenous coal and nuclear power, low productivity growth, and low return on assets.

In 1990, the CEGB was restructured and privatized. What were the costs and benefits? The question is important not only because the CEGB accounted for such a significant share of economic activity—with value added equal to about 1 percent of GDP—but also because its restructuring was a key part of the “British electricity experiment,” which has provided a model for power sector reform around the world. This Note reports the results of a social cost-benefit analysis of the restructuring and privatization of the CEGB.

The reform

The restructuring of the CEGB involved dividing it into four successor companies on March 31, 1990—three of which were soon sold to the general public—creating a power pool, and liberalizing entry into the generation market. The three privatized companies are National Power and PowerGen, which took the thermal generating plant, and National Grid, which was allocated the high-voltage transmission network. Nuclear Electric took the nuclear power stations.

Significant changes followed. In the first six years after restructuring, labor productivity in the successor companies more than doubled. There was a marked shift away from coal and toward natural gas. At privatization, generation based on fossil fuel used 92 percent coal, 7 percent oil, and only 1 percent gas. In the next five years, purchases of British coal fell from 74 million metric tons to 30 million, and by August 1996, gas accounted for 23 percent of generation. In the meantime, the price of coal delivered to power stations fell by 20 percent in real terms. The switch from coal and the “dash for gas” contributed to a substantial drop in emissions of sulfur dioxide and nitrogen oxides, both sources of acid rain, and of carbon dioxide, the cause of global warming.

The power generation sector added 9.5 megawatts of capacity in combined cycle gas turbines (nearly 20 percent of peak demand) in 1990–96, while demand rose less than 6.5 percent; of the new capacity, half was installed by new entrants. Fossil fuel costs per kilowatt-hour (kWh) of electricity generated fell by 45 percent in real terms as a result of fuel switching and efficiency increases, while nuclear fuel costs per kWh fell by 60 percent. Overall, real unit costs fell by about 50 percent, while real pool prices fell by a more modest 20 percent, with the difference between the two figures reflecting the lack of competition among generating companies.

Some of these positive changes could be attributed to external factors. The timely development of high-efficiency combined cycle gas turbines, the lifting of the European Union (EU) ban on burning gas to generate electricity, and tighter EU limits on sulfur emissions all encouraged the switch to gas, and the decline in





international coal and oil prices and in the domestic price of gas contributed to the reduction in unit costs.

The restructuring and privatization were not without costs. The “dash for gas” greatly accelerated the decline of the coal industry. Employment fell from nearly 250,000 miners at the time of the 1984–85 coal miners strike to only 7,000 by 1994. The collapse of the British coal market was the subject of a Parliamentary inquiry. Partly in response to that inquiry, policy toward the still publicly owned nuclear generation industry was reviewed, plans to build more nuclear power stations were abandoned in early 1996, and the nuclear industry was restructured. The more modern nuclear power stations were sold as British Energy in June 1996, leaving only the rump of aging first-generation Magnox stations and the fuel reprocessing facilities in the public sector. The coal industry was privatized at the end of 1994.

A social cost-benefit analysis

Studies have used several methods to assess the economic effects of privatization on formerly state-owned companies, including financial performance analysis, labor and total factor productivity analysis, frontier efficiency measurement, and social cost-benefit analysis. Although all these methods are of interest, only a full social cost-benefit analysis identifies who gained, who lost, and by how much—by comparing the historical and predicted future course of an industry after privatization with a counterfactual in which the industry remains unprivatized. Jones, Tandon, and Vogelsang (1990) set out this method, and Galal and others (1994) apply it to twelve privatizations, two of which involved Chilean electricity companies.

In simple terms, the analysis reduces to a project appraisal, in which restructuring and privatization are an investment project that has associated costs (redundancy payments, brokers fees) and creates a stream of net benefits arising from the evaluated differences between the privatized industry and a counterfactual publicly owned industry. The costs and benefits continue into

the future, so the method involves projecting into the future both the actual outcomes and the counterfactual.

The social cost-benefit analysis of the CEGB's restructuring and privatization proceeds in two stages: first the net benefits of the restructuring and privatization are calculated, then these benefits are apportioned among shareholders, the government, and the power purchasers in the pool or wholesale market (the distribution companies and the supply businesses of the generating companies) to see how the gains are distributed. The first stage of the analysis values four areas of net benefits and costs separately: the efficiency savings, the investment and fuel use effects, the costs of reorganization, and the environmental benefits. In each area, it establishes a set of counterfactuals with which data or projections for the actual industry are compared. The start date from which the effects of restructuring and privatization are evaluated is a weighted average of the years 1985–88. Actual data are available until March 1996, and projections are made to 2010.

To allow some sensitivity analysis for the more debatable issues, two counterfactuals are used. One is labeled proprivatization because the underlying assumptions about the industry under continued public ownership are more pessimistic than under the other counterfactual and so it suggests greater net benefits from privatization. The other counterfactual is labeled pro-CEGB because its more optimistic assumptions about the industry under continued public ownership point to smaller net benefits from privatization. The counterfactuals incorporate three key items: Productivity growth is lower in both counterfactuals compared with the actual, but slightly higher under pro-CEGB than under proprivatization. Gas and coal prices are the same as actual under pro-CEGB but higher under proprivatization. And under both counterfactuals, the CEGB invests in uneconomic nuclear capacity and retrofitting of some coal plant with flue-gas desulfurization units, but under proprivatization it builds more nuclear and coal plant and does more retrofitting. The counterfactuals are based on reports of the CEGB

before privatization and an analysis of the CEGB's performance in the decade before restructuring. The proprivatization counterfactual is probably closer to what would have happened in the absence of privatization.

The results

What does the analysis show about the net benefits? The fuel and investment effects of the privatization range from gains of £3.6 billion to losses of £0.7 billion (at the U.K. public sector's preferred 6 percent discount rate),¹ depending on assumptions about how a utility under continued public ownership would have invested in new capacity (table 1). The net gains from privatization are higher relative to the proprivatization counterfactual; the gains come from the ending of the expensive nuclear expansion program that might have seen two new nuclear power stations built and the sharp switch from expensive British coal to cheaper natural gas for electricity generation.

Regardless of the counterfactual used, some of the benefits of privatization are dissipated in higher payments to Electricité de France (EdF), the French utility, for its cheap electricity imports. This happens because before privatization EdF had received a price equal to the average of the marginal costs of the two systems (a price lower than the system marginal cost in England and Wales), while since privatization it has received the pool price (which is at or above system marginal cost) plus a share of the fossil fuel levy paid to non-fossil fuel generators (introduced at the time of privatization to finance decommissioning at Nuclear Electric). If privatization had not occurred in the United Kingdom, the payment terms would not have changed to the benefit of EdF.

Against both counterfactuals, privatization yields substantial environmental benefits as cleaner gas generation replaces older coal-fired plant and thermal efficiencies rise at the remaining fossil fuel plant, leading to sharply reduced emissions. The figures in table 1 are conservative estimates of the environmental benefits, which include unmeasured improve-

TABLE 1 THE NET BENEFITS OF PRIVATIZING THE CEGB RELATIVE TO TWO COUNTERFACTUALS, 1995–2010
(£ billions at 1994–95 prices; at a 6 percent discount rate, discounted to April 1995)

	Relative to proprivatization counterfactual	Relative to pro-CEGB counterfactual
<i>Fuel and investment effects</i>		
End of nuclear expansion program	3.3	2.8
Effect on price of French imports	-2.6	-1.5
Net fossil fuel costs	2.9	-2.1
Total	3.6	-0.7
<i>Externality benefits</i>		
Reductions in sulfur dioxide emissions (£125 per metric ton)	1.0	0.7
Reductions in carbon dioxide emissions (£12 per metric ton of carbon)	1.4	1.2
Total	2.3	1.9
<i>Restructuring</i>		
Costs	-2.8	-2.8
Cost savings	8.8	7.6
Total	6.0	4.8
Total net benefits	11.9	6.0
Total net benefits (pence per kWh)	0.21	0.09

Source: Authors' estimates.

ments in nitrogen oxide emissions and benefits from reduced coal burning.

The restructuring and privatization have high direct costs, £2.8 billion. This figure includes all the restructuring costs of the successor companies, including substantial redundancy and early retirement payments. But the restructuring and privatization deliver unambiguous benefits in lower operating costs (£8.8 billion relative to proprivatization, £7.6 billion relative to pro-CEGB). The difference reflects the lower labor and materials and services costs that the restructuring and privatization deliver—gains difficult to imagine under a counterfactual publicly owned CEGB.



TABLE 2 DISTRIBUTION OF THE NET BENEFITS OF PRIVATIZING THE CEEB, WITH PRICES CONVERGING IN 2000
(£ billions at 1994–95 prices; discounted to April 1995; excludes externalities)

Beneficiary	Relative to proprivatization	Relative to pro-CEGB
Power purchasers	-1.3	-4.4
Government (including sales proceeds)	1.2	0.4
Shareholders (less sales proceeds)	9.7	8.1

Source: Authors' estimates.

The overall net benefit of the privatization is substantially positive relative to both counterfactuals: £11.9 billion and £6.0 billion. These figures may be converted to permanent savings in the unit cost of electricity of 0.21 and 0.09 pence per kWh at a time that electricity prices were about 2.8 pence per kWh. Thus, privatization delivers a permanent cost reduction equivalent to about 3.2 to 7.5 percent of prices, or an extra 40 percent return on assets.

How has this net benefit been distributed among shareholders, purchasers in the wholesale market, and the government? Examination of price trends shows that wholesale prices have not fallen nearly as fast as costs and that profits have risen sharply in the successor companies: combined profits (before taxes and exceptionals) rose from £2.0 billion in 1991–92 to £3.5 billion in 1995–96. The share prices of National Power and PowerGen have approximately tripled since flotation, outperforming the stock market by more than 100 percent. Thus, the companies seem to have unambiguously gained from the privatization. Power purchasers seem to be paying higher prices than they would have under continued public ownership (higher company profit margins offset lower costs). And the government has gained from sales revenue, higher taxes on profits, and dividend income, though it has lost the revenue associated with the public sector dividend target for the CEEB.

Table 2 shows one possible calculation of the distribution of the net benefits of privatizing the CEEB. In it prices in the privatized indus-

try and the counterfactual publicly owned firm converge in 2000. The study assumes that regulation would ensure long-run convergence of predicted and counterfactual prices. The results of the calculation show the perverse nature of the distributional effects of the privatization. The government's substantial sales revenue (£9.7 billion) up to March 1996 is at least partially offset by loss of flow revenue, because tax revenue from the successor companies falls below the public sector dividend target. As a result, the government is £1.2 billion better off relative to proprivatization if prices converge in 2000. Relative to both counterfactuals, the shareholders benefit by more than the total net benefit, even after the sales proceeds paid to acquire the assets are subtracted.

Conclusion

Was it worth it? Yes, but the analysis suggests two major areas for improvement in the process of the restructuring and privatization. First, about a quarter of the net gains were transferred out of the country because of the change in payment arrangements for French electricity. If more attention had been paid to this possibility at the time of restructuring, some arrangement could probably have been found to prevent it. Second, introducing more competition in generation (by creating more successor companies) would have reduced excess entry and lowered prices, improving the distribution of the net benefits and increasing social welfare.

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¹ Restructuring and privatization are a public sector project and so should be evaluated at an appropriate public sector discount rate.

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