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Restructuring and Privatising Electric Utilities in Eastern Europe

David M. Newbery

Department of Applied Economics
University of Cambridge

and

Senior Research Fellow
Institute for Policy Reform

January, 1994

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Restructuring and Privatising Electric Utilities in Eastern Europe

Executive Summary

The arguments for privatising all state-owned enterprises producing competitively marketed goods and services do not immediately apply to network utilities such as gas, electricity, telecommunications, etc., where the networks are natural monopolies. There are sound economic arguments for regulating such natural monopolies and the main question is whether this requires public ownership or whether the public interest can be adequately represented by regulating a privately owned network. Until recently, these industries were in public ownership in most European countries, and even now, Britain is unusual in having privatised telecoms, gas, electricity, and water.

The importance (and ultimate political necessity) of regulating privatised natural monopolies is clearly not widely appreciated in Eastern European countries, where regulation is identified with the dead hand of bureaucratic socialism. Perhaps as a result these countries are actively attempting to sell such utilities. The arguments for privatising telecoms are simple. Huge investment is needed for efficient financial systems and the market economy, most readily supplied by telecoms companies in America and Western Europe. These companies can supply technical expertise, management skills and access to foreign capital, all of which are essential. In addition, the problems of privatising capital-intensive network utilities can be overcome without great difficulty. Privatising electricity is harder, and in Hungary the lack of a clear objective has resulted in confusion, delay, and inappropriate legislative design. The paper draws on the lessons from privatising the English electricity industry in 1990, and asks what steps are needed to privatise the Hungarian electricity industry.

Compare the relative attraction of selling airlines, telecoms and electricity to a foreign buyer who must balance risk and return in deciding how much to pay. The return depends on the level of prices allowed, while the risk depends on the period over which the investment is recouped and the confidence that he can charge cost-reflective prices over the life of the investment. This will depend on the system of regulation, the demand for the service, and the bargaining power of the investor *after* he has made the investment. In the case of airlines, the capital is not sunk and can be reallocated or resold if the regulator fails to allow satisfactory tariffs. Telecoms are very different, as the investment is highly durable and specific, so that the investor cannot recover his sunk cost and move elsewhere. The regulator may be tempted to hold tariffs down to transfer rents to consumers after the investment is sunk, but will be deterred from this if the penalties are sufficiently high. In the event of disagreement between the regulator and the utility, the utility can retaliate at high cost to the country by refusing to invest in further capacity. The retaliation costs will be even higher if foreign expertise is needed to operate the system on a daily basis, or if foreign

cooperation is needed to interconnect with foreign networks, for then the host country loses not only future expansion but risks the whole current system. In fact, the costs to the country of alienating a major foreign telecoms investor are probably so large relative to the benefits that all parties can be confident that it will not happen.

The electricity industry in contrast faces low demand growth and thus has little need for further investment, and can rely on indigenous technology and management, so the foreign owners have little power to retaliate if they are unhappy with regulation. It follows that regulation must be durable, credible and not prone to political manipulation if investors are to have the confidence to bid a reasonable price.

The Hungarian electricity industry was originally managed as a trust that had many similarities with the bureaucratic British Central Electricity Generating Board before privatisation. It systematically underpriced electricity to domestic consumers and skimped on investment in enhancing efficiency, concentrating instead on supply security and reduced import dependence. In 1992 it was reorganised into a corporate structure with a view to privatising up to half the state's holding, as a means of reducing public (and foreign) debt and financing future investment. This objective was compromised by an unwillingness to create a regulatory framework that could guarantee the independence of tariff-setting. If prices of electricity could be raised and maintained at economic levels, most of the industry's fiscal problems would disappear, and privatisation would not be required on that account.

The evidence from Britain is that privatisation is primarily required to upset the political economic equilibrium that leads to the underpricing in the first place. For this, the industry probably needs to be vertically de-integrated, which in turn strengthens the case for careful regulatory design, specifying the duties and rights of the licence holder and the regulator, and laying down dispute resolution procedures. The main benefits from privatisation are that it forces the government to provide a robust and credible regulatory framework, whose efficacy can be tested by attempting to sell the industry. This test has already been applied in Hungary and the system found wanting.

If the industry is restructured to de-integrate component parts, so that the potentially competitive elements are exposed to market competition, then considerable improvements in efficiency should result, while effective regulation of the natural monopoly elements may also improve efficiency, though this is more difficult. The main problem lies in adequately regulating the transmission and distribution system to retain the benefits of coordination and optimising the overall system while providing incentives for improvements. The British experience suggests that this process can be lengthy, and may result in large mistakes before the price signals are adjusted. It may therefore make sense to delay the deintegration of generation and transmission, even though many of the benefits of competitive pressure on generation will thereby be delayed.

Restructuring and Privatising Electric Utilities in Eastern Europe

David M Newbery*
Department of Applied Economics
Cambridge, UK
November 1993

Privatising electricity utilities seems an attractive way of reducing foreign public debt but requires raising tariffs and creating a credible system of price regulation, currently lacking in many East European countries. The ultimate benefits of proper regulation and eventual privatisation result from upsetting the present unsatisfactory equilibrium with underpricing and underinvestment, and should include improved efficiency in generation. There are difficult choices to make over the form of regulation, the design of dispute resolution procedures, and whether to separate generation from transmission, few of which are urgent.

1. Introduction

Privatisation is a key objective of the reform process in transitional economies of Central and Eastern Europe (CEE), though progress has been slower than anticipated.[1] There are powerful and familiar arguments for the eventual transfer of all state-owned enterprises producing competitively marketed goods and services to private ownership. Here the issues are largely practical, and have to do with sequencing legislation, re-structuring and privatisation, how and to whom to sell, and what degree of discount to provide to citizens. Public utilities, and particularly network utilities such as gas, electricity, telecommunications, rail, and the postal service do not fall into this category, and are frequently publicly owned in market economies.

The standard argument for privatisation has two sides - private ownership provides the incentive to maximise profits lacking in the public sector, while exposing the enterprise to competition encourages efficiency and limits the abuse of market power. The standard criticism of this argument is that privatising large enterprises normally involves diffuse ownership and problems of corporate governance, while selling public monopolies as private monopolies may be profitable to the state, but does nothing to encourage competitive

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[1] Frydman, Rapaczynski, Earle *et al* (1993a), (1993b) document the progress in the CEE countries until roughly June, 1992. Jarái (1993) and Mihályi (1993) give further details for Hungary.

pressures and may lead to greater abuse of market power. These arguments would seem most finely balanced in the case of network utilities where the network provides a natural monopoly. It would be foolish to duplicate the transmission and distribution grid of an electricity utility in order to encourage competition. The same is true of the wires connecting telephone subscribers to the exchange, and the gas pipe-lines to the gas fields.

There are sound economic arguments for regulating natural monopolies such as these network utilities, and the main question is whether this regulation requires public ownership or whether the public interest can be adequately represented by a regulator who imposes conditions upon the activities of privately owned operators of the network. Until recently, these industries were in public ownership in most European countries, and even now, Britain is unusual in having privatised telecoms, gas, electricity, and water. That being the case, there would seem to be no great urgency in privatising these network utilities, though there are considerable benefits in clarifying the form of regulation to be exercised while they remain in state ownership, and further benefits from restructuring and corporatising the utilities, both of which are sensible initial steps even if the ultimate objective is privatisation.

The importance (and ultimate political necessity) of regulating privatised natural monopolies is clearly not widely appreciated in the CEE countries, where regulation is perceived to be little different from the deadening hand of the former bureaucratic socialist form of ownership, to be replaced by the free and unregulated market as soon as practical. Given this perception, it is perhaps not surprising that most CEE countries are actively exploring the privatisation of some of their utilities, particularly as they are amongst the most valuable commercial assets in countries otherwise heavily indebted. Telecommunications companies are at the top of the list of utilities to be sold, but the energy utilities, particularly gas and electricity, follow shortly behind. Hungary has had the electricity industry under active scrutiny since 1991, with a succession of foreign advisors providing assistance in drafting legislation, suggesting regulatory frameworks, and proposing alternative structures for the industry.[2] The former CSFR produced a valuation of potential privatisation companies in 1990, and found that seven of the ten largest firms were energy companies. Most energy enterprises are scheduled for privatisation in the second wave once the appropriate legislation has been enacted. In Poland the government started an ambitious programme of privatising large state enterprises (SEs) in 1990 with the objective of privatising about half of the 9,000 SEs within three years. By mid-1992, 1,285 SEs had been privatised, mainly by liquidation, but no energy enterprises had yet been privatised, and 7,735 out of 8,199 remaining SEs were still not commercialised and continued to be self-

[2] Assistance was provided by the British 'Know-How' Fund, and involved participants from Rothschilds, the UK Department of Energy, the US Department of Energy and the Federal Energy Regulatory Commission, Coopers and Lybrands, and the World Bank. In 1993, the Hungarian State Holding Company appointed Schroders as their advisors for electricity privatisation.

managed by their workers' councils. Only three large power plants and a few district heating enterprises had been commercialised, though the World Bank was proposing the privatisation of a co-generation company. Despite this rather slow start, future privatisation of parts of the energy sector remain on the agenda, and the electricity generation companies are considered to be appropriate candidates once the macroeconomic and commercial environment improves.

In the case of telecoms, the arguments for privatisation are simple. Huge investment in new technology is required to provide the infrastructure needed for a market economy and an efficient financial system, and this can most readily be supplied by western companies, particularly the privatised telecoms companies in America and Western Europe. These companies will not only supply the technical expertise but management skills and access to foreign capital, all of which are essential for rapid progress. Most of the difficulties encountered by privatising capital-intensive network utilities can be reasonably easily overcome in the case of telecoms, as will be argued below when considering the special difficulties faced by privatising public utilities.

The case for privatising electricity is much less clear cut, and at least in Hungary the lack of a clear objective guiding the programme has led to confusion, delay, and inappropriate legislative design. This paper draws on the lessons learned from privatising the English electricity supply industry in 1990, and considers the case for privatising the Hungarian electricity industry, and the steps that will be required for this to become feasible.

2. The problem of regulatory commitment

It does not seem to be sufficiently appreciated in CEE countries that privatising electricity satisfactorily is far harder than privatising airlines or telecoms. All are network industries that are frequently in public ownership in market economies, they typically have their tariffs regulated where they are in private ownership, and would thus appear to have much in common. Consider their attraction to a potential foreign buyer, who must balance risk and return in deciding how much he is willing to pay for the utility. The return depends on the level of prices he is allowed to charge relative to both operating and purchase cost, while the risk depends on the period over which the investment is recouped and the confidence he has in his ability to charge cost-reflective prices over the life of the investment. This last will depend on the system of regulation, the demand for the service, and factors affecting costs, and the bargaining power of the investor *after* he has made the investment.

The form of regulation has a number of dimensions, but for the moment I wish to concentrate on the confidence the potential investor has that future tariffs will be regulated according to clearly specified and acceptable criteria. Different regulatory regimes can be ranked according to this confidence. At one extreme there may be no current regulation at all, with apparent freedom to set tariffs at any level thought profitable. In practice, for most durable network utilities this would not be a credible claim, and potential investors would

treat it as a statement that the system of regulation had not yet been decided. At the other extreme, the form of regulation would be constitutionally enshrined, tightly circumscribed by legal precedent, and resistant to statutory change, much as we find in the US. Along the spectrum from one extreme to the other, we can imagine regimes of differing durability. If the government is required to approve rate increases in an inflationary climate while seeking or attempting to maintain democratic support, then it may find it politically unattractive to increase regulated tariffs in line with costs and investors will have little confidence that current tariff levels will remain cost-reflective in the future. If the regulatory body is independent, reasonably insulated from day-to-day political pressures, has a clear set of objectives and procedures for dispute resolution, and issues licences with legally enshrined rights and obligations to the utilities, as in Britain, then the form of regulation will be perceived to be more durable. How much the durability of the regulatory regime matters will depend on the characteristics of the industry, and the bargaining power of the investor.

The bargaining power of the investor after he has made his investment can be measured by the damage that he would inflict on the government or the country in the event of regulatory breakdown. What would it then be in the interest of the investor to do if the initial regulatory contract or understanding has been broken, and how costly would it be for the host country? Would this implicit threat of the consequences of regulatory breakdown be sufficient to dissuade the regulator and/or the government from breaking its original undertaking?

Consider now the three potential candidates for privatisation - the national airline, telecoms, and electricity. The airline raises the fewest problems as the network is the least durable. If the regulator or government were to take arbitrary action to undermine the profitability of the routes (relative to the rest of the world), then the airline owner could overnight reallocate his capital (the airplanes) to other more profitable routes. Given this, the investments are very secure as they can be reallocated or resold for a high fraction of their value in the original use - and as a result, carriers can operate with a negligible capital base, leasing or renting the airplanes. As capital is not sunk, it is not necessary to have a very durable form of regulation, and negotiations over the form of regulation or fare-setting can take place repeatedly on essentially the same terms as before the investor originally entered the industry or bought the airline.

Telecoms are very different, as the investment is highly durable and specific, so that the investor cannot recover his sunk cost and move elsewhere. The investment is very capital-intensive, at about $2000 per new line, and the operating costs are low relative to the capital cost. The worry that the investor has is that once the investment has been made, the regulator or government may wish to lower prices and transfer rents from the foreign owner to domestic subscribers. As operating costs are so low relative to total costs, this would seem to be attractive to the host country. What might deter the regulator or government from expropriatory tariffs or over-tight price regulation?

Gilbert and Newbery (1988, 1993) have argued that the efficacy of regulatory regimes can be studied as a repeated game between the utility and the regulator. The constitution together with the laws under which the industry is to be regulated and privatised lay down the rules of the game and the expectations of the players. If the regulator deviates from these rules or expectations, then the utility may retaliate, at the least by not investing further, but possibly by more costly and immediate actions. The regulator will then weigh the costs of this retaliation against the benefit of lower prices, and be dissuaded from deviating if the costs are too high relative to the gains.

These costs will be high if the country needs to sustain a high rate of investment in telecoms, and if foreign expertise is required for further investment. For if the foreign investor pulls out because of justified dissatisfaction with regulation, then other companies will be reluctant to risk a similar fate, and the country will be forced to stop telecoms investment, or will have to spend large sums acquiring the indigenous expertise for autarkic expansion. The retaliation costs will be even higher if foreign expertise is needed to operate the system on a daily basis, or if foreign cooperation is needed to interconnect with foreign networks, for then the host country loses not only future expansion but risks the whole current system. Modern telecoms systems rely heavily on software programmes to manage the switches and route the calls, and the threat of erasing this software would be an even more costly form of retaliation. In fact, the costs to the country of alienating a major foreign telecoms investor are probably so large relative to the benefits that all parties can be absolutely confident that it will not happen, and therefore there is little to worry about. The main concerns of the parties will probably be spelled out carefully in the initial bids or contracts, specifying how tariffs are to be set and adjusted, and how cross-subsidies are to be protected against competitive entry ('cherry picking' or 'cream-skimming'), and how fast investment is to be undertaken.[3]

Now consider the electricity industry. In most CEE countries, electricity demand fell with the fall in industrial output during the transition, and forecast demands are unlikely to put pressure on current capacity until the end of the century. Most CEE countries are so energy-intensive and electric-intensive per $ GDP,[4] that improvements in efficiency caused

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[3] Cross-subsidies arise if some services (eg rural services, directory inquiries, local call boxes, etc) cannot cover their costs from allowed charges, and are to be financed by higher than normal charges elsewhere (eg for line rental, long distance or foreign calls, etc). If competitors are allowed to offer lower charges for these other services, the original company may no longer cover its total costs. Whether its income is protected by statutory monopoly or access deficit charges to new entrants or other forms of rebalancing is less important than the recognition that some such response will be required.

[4] Hungary had a TPES/GDP ratio of 3.91 TOE/$'000 GDP compared with 1.00 for OECD Europe and 0.86 for the similar income and sized country Portugal (OECD, 1992a; Table 39). (TPES is total primary energy supply, TOE is tonnes oil equivalent, and the calculations use commercial exchange rates for Hungary, 1989 prices and purchasing power parities for OECD countries.) The former CSFR also had a TPES/GDP

by sensible pricing and market responses will weaken demand growth for at least a decade.

In Hungary, electricity generation stagnated at about 30 TWhr between 1987-91, with a slight increase in 1992 (NBH, 1992, p132). Forecasts made by the Hungarian Electricity Trust MVMT in 1991 for the 'realistic' scenario forecast falls in demand (and imports) from the 1990 peak which will not be recovered until the end of the century (OECD, 1992, pp 70-6). Fig. 1 shows recent history and forecasts from 1992 made by the World Bank at the end of 1992. The bars (read on the left hand scale) show gross generation plus imports peaking at 38000 GWhr (38 TWh) in 1989 and not recovering to this level before 2000, though domestic generation is projected to continue to grow, with the fall in demand reflected in a substantial drop in imports. The growth in domestic generation from 1980-89 was 2.4 per cent per year, while the forecast growth from 1989-2000 is 1.9 per cent per year, though there would be no need for any growth in domestic generation if past levels of imports were to continue. Domestic available capacity and maximum demand are shown in MW on the right hand scale. The reserve margin was a high 37 per cent in 1988 counting the import capacity just as the average December working day flows (1850 MW, rather than the capacity of the link of 4000 MW).

Hungary past and forecast electricity supply and capacity

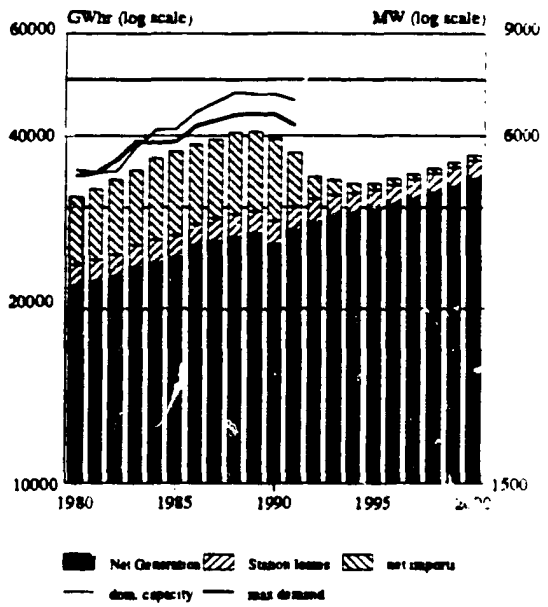

Fig 1

In Poland, electricity demand peaked in 1988 at 149 TWh but fell to 132 TWh in 1991 and is expected to remain flat until 1997 (World Bank estimate, 1993). After growing at 3 per cent per year between 1979-89 in the former CSFR, projected sales were are expected to fall sharply, and not to recover until the end of the century (World Bank, 1992, p55).

Foreign buyers could not therefore inflict much damage on these countries by declining to invest in additional capacity if they became dissatisfied with the way prices were being regulated. In addition, these countries have a history of building and operating power

ratio about four times as high as the OECD (OECD, 1992b; p16). Energy consumption over GDP was almost twice the OECD average in Poland in 1989 (ESMAP, 1993; p6). The ratio of electricity consumption per unit value added is about 2.4 kWh/$ in Hungary and Poland, just under 2 kWh/$ in the CSFR, compared to about 1 kWh/$ in Italy and Denmark (OECD, 1992a, p134).

stations to reasonably high standards, and so are not dependent on foreign suppliers for access to appropriate technology. Thus until the mid 1970s, the overwhelming share of generators, transformers and turbines in Hungary were domestically produced, some under licence, but some to its own design by the Ganz Electrical Works. Most of the turbines installed in Hungarian power stations are manufactured under licence from Brown Boveri or were imported from the Soviet Union (Valentiny, 1979, and personal comunication). The one arguable exception might be for control equipment for nuclear power stations, but the West has a clear interest in ensuring nuclear safety in the East and would certainly not withhold such technology in response to a regulatory breakdown. The nuclear power station at Paks in Hungary is a good example of combining state-of-the-art western control technology with a Russian pressure water reactor design, and has achieved impressively high standards of safety and availability without direct assistance from the West. Nor are these countries dependent on access to Western markets for either import or export of electricity, though there are plans to upgrade the high tension system to Western standards to allow electricity exchanges. At the moment such exchanges between Hungary and Austria are made via a 600 MW DC link, in contrast to the 4000 MW combined capacity of the 220, 400 and 750 kV AC links to the Ukraine. In short, these countries have been independent of Western technology in the past, and could continue to be so in the future at very low cost, greatly reducing the bargaining power of any foreign buyer. It follows that the regulatory system will have to be carefully designed as it will not be self-enforcing.

3. Preparations for electricity privatisation in Hungary

Under the 1962 Electricity Act the state had a monopoly to produce and distribute electricity. Until January 1992, the electricity supply industry was controlled by a trust, Magya Villamos Muvek Troszt, MVMT, which acted as the accounting organ for the 22 legally independent enterprises: 11 power and heat generating companies, a transmission company, 6 regional distribution companies (RDCs), and 4 service companies dealing with construction, maintenance and installation. In the 1960s, MVMT operated under tight control from the Ministry of Industry and Trades (MIT) and in turn regulated the enterprises with tight control over the allocation of funds and transfers of revenues. In the 1970s, under the New Economic Mechanism, authority was increasingly decentralised, together with authority to invest up to prescribed limits. MVMT negotiated with the enterprises within the framework of the five year and one year plans, with the government determining the rate of profit by controlling tariffs through the state pricing authority and later through MIT. Tariffs to consumers were held below cost, and MVMT financed investments partly out of the profits on the resale of cheap imported electricity. As with other SEs, taxes were set to transfer the surplus to the centre, and large investments like the nuclear power station at Paks were initially financed by the state, with the debt subsequently transferred to MVMT to be serviced and repaid.

MVMT appears to have been starved of investment resources except for those projects for which it could make a strong case on grounds of reduced energy dependence or increased demand. Investments to reduce operating costs and increase efficiency appear to have carried less priority, and the distribution network in particular appears to have suffered from underinvestment compared to generation. Relations between MVMT and the member enterprises appear to have reflected those between SEs and the state, in that contract prices for delivery of electricity were held close to costs in order to transfer surpluses to the Trust, and as a result different generating companies were paid different prices per unit of electricity generated. Over time there was a move to devise an internal tariff structure rewarding efficiency (heat rate), availability, etc. in the spirit of providing more decentralised incentives, while the Trust attracted competent and loyal engineers who maintained high technical standards. The Trust thus had considerable similarities with the state-owned Central Electricity Generating Board (CEGB) in Britain, and had other similarities in its heavy dependence upon indigenous and rather high cost coal, coupled with a desire to reduce its dependence on imported fuels by its nuclear construction programme.

In January 1992, MVMT was reorganised in response to the requirement to corporatise under the Company Law. MVM Rt[5] was established as the holding company with 15 subsidiaries: 8 for power generation, 6 for distribution and 1 as the National Transmission Company, and the 1962 Electricity Act was modified by cancelling the requirement that the state had a monopoly to produce and distribute electricity. In November 1992, the Hungarian State Holding Company (HSHC, or AV Rt), was created by Law LIII of 1992 as wholly state-owned joint-stock company to manage all companies deemed to have a long term future in public ownership. About half are companies in the energy sector, others include telephones, water, industrial companies with poor prospects which need restructuring such as steel and aluminium, the bus company Ikarus, pharmacological companies and then non-commercial activities such as the mint, plant breeding, forestry, culture, films, research and development. The HSHC was allocated 99.8% of the share capital of MVM Rt, with the balance of 0.2% allocated to the Municipal Governments. MVM Rt in turn owned 50% of the subsidiary companies,[6] the State Property Agency (SPA) owned 48% of these companies, and the balance of about 2% were held by the Municipal Governments. Of the 48% of the companies held by SPA, 10% were set aside for those with restitution vouchers (compensation warrants) who may use these to buy shares, 15-20% were notionally set aside

[5] Rt denotes a joint-stock company and is one of the six types of business organisation provided under the Company Law (the 1988 Act on Business Societies, Associations, Companies and Ventures, also known as the Act on Economic Associations).

[6] except for three generating companies which have taken over associated coal mines which filed for bankruptcy in 1993. The state-owned Coal Mining Restructuring Centre (SZESZEK) became a temporary co-owner of the emerging new companies, and the share held by MVM Rt and SPA was reduced.

for social security funding, and the balance was available for sale by SPA. Shares in two distribution companies were offered to those holding compensation warrants (which can also be used to purchase land) in January 1993 to test market demand but at the quoted price only 2 million forints' worth (US$20,000) were sold.

The objective of SPA is to privatise its assets quickly, but at a commercial price, in contrast to HSHC, which is concerned to manage and if necessary restructure assets that remain in the state sector. A majority of certain strategic industries like energy must remain in public ownership, though this might permit 100% of some of the electricity companies to be sold if others remained in dominant state ownership. This rather complex ownership structure of the electricity industry meant that different owners, with their different objectives, might find it difficult to agree of strategy. SPA has the simple objective of selling its assets quickly and at as high a price as possible in order to reduce pressure on the budget. To this end it appointed five advisors for the six RDCs to manage any sales, and organised a trade sale for 15% of these RDCs.[7] The Government decided that the tender offers were too low, and to resolve the unsatisfactory ownership structure of the industry, it transferred all the shares from SPA to HSHC by a decree on 12 November, 1993, and re-opened the question of the proportion of shares to set aside for compensation vouchers and social security funding.[8]

Current assets are valued at US$6 billion, with negligible debts, divided between the RDCs ($2.5 billion) generation ($2.5 billion), and the grid ($1 billion).[9] Forecast investment and refurbishment expenses might be $2.5 billion up to the year 2000, so that if half the industry were sold for $3 billion (and was then responsible for its share of investment), HSHC would only need to finance $1.25 billion in future investment to 2000, much of which would be financed out of revenue and borrowing. The larger part of the sale proceeds of $3 billion would thus be available to reduce Hungarian public debt. The expectation is that the sale would be 70:30 debt to equity, so the net effect would be an increase in private debt and foreign equity equal to the reduction in public debt.

On the face of it, this would appear to substitute government guaranteed debt for private debt at a probably higher interest rate, and equity capital which would certainly require a higher real return. The net indebtedness of Hungary would not decrease, and

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[7] The advisors are Price Waterhouse, Argenta Top Broker with ABN AMRO Bank, Knight Wendling Consultancy, CIB with Societé Generale, and Gauff.

[8] I am indebted to Pál Valentiny for this recent information.

[9] The assets were revalued to roughly three times book value in 1991, and may greatly overstate the value of generation assets, given the availability of cost-reducing CCGT alternatives. The market value of the British CEGB on privatisation was a small fraction of its book value (measured at written down replacement cost), so any claimed asset value should be treated with considerable caution.

therefore presumably its credit rating on international markets would not change. Given that Hungary could borrow to finance investment in electricity from the World Bank with little difficulty, it is therefore difficult to see the attraction of this financial manoeuvre if judged purely as a means of raising international capital.

The original argument for privatisation was the belief that private ownership would constrain the power of the state to intervene to achieve political objectives that might be incompatible either with economic efficiency or, more generally, with the satisfactory operation of a decentralised market economy. With that objective, Dr Arpád Bakay, Undersecretary of State responsible for energy issues (now at the HSHC), approached the British at the end of 1990 to seek assistance in preparing the electricity industry for privatisation. The British Government provided assistance under the 'Know-How' Fund in the form of experts from the Department of Energy and Coopers and Lybrands who were familiar with the British electricity privatisation of 1990. Together with other experts from the US Department of Energy, the US Federal Energy Regulatory Agency (FERC) and the World Bank, they set up a team with Hungarian counterparts from MIT and the electricity industry to prepare for possible privatisation.

This required preparing a draft law which would also set out the form of regulation, and the associated decrees and licences, as well as designing a system of regulation. In addition, the structure of the industry had to be decided, which in turn required financial models to test for the commercial viability of alternative forms, and to propose a financial structure (debt:equity) appropriate for their investment needs, revenue streams and risk profiles. The last stage would be to draw up contracts between the component parts of the restructured industry, to provide sufficient revenue predictability to enable each company to be financially viable and thus ready for sale if necessary. This work plan followed the earlier British experience, forming a logically inter-related sequence of steps required, starting from the framework law and the form of regulation, and then proceeding to the industrial and financial restructuring.

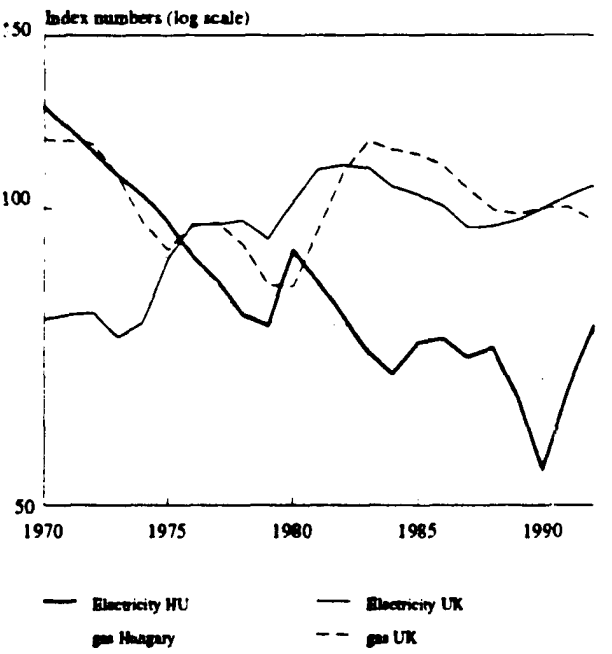
The centrepiece of the draft law was a strong regulatory framework neutral as to ownership, designed to ensure that tariffs were set to earn a reasonable rate of return on the underlying assets. The foreign advisors went to considerable lengths in presentations and seminars to stress the importance of sound regulation as the cornerstone to successful privatisation.

This emphasis on regulation was opposed by the senior management of the utilities, who withdrew much of their support from the team, and hence were not present at the lengthy discussions about the philosophy and necessity of regulation. Management believed that the main purpose of privatisation was to gain the freedom of the market, not to substitute one form of state or ministry regulation for another, possibly more tightly specified from of public utility regulation. The tension between the industry arguing for light regulation and the ministry wishing to specify the form of regulation in considerable detail was resolved at

the end of 1992 by a change of the Minister and Secretary. The draft plan was scrapped, and a new Commission more favourably inclined to the industry set up. The new Commission had little overlap with the old, but worked fast and produced a draft by 1993 which differed sharply from the first draft. The detailed specification of the powers and method of appointment of the regulatory body was deleted, and replaced by a brief description of the Hungarian Energy Office, to be established under an Act on Gas Services. The Hungarian Energy Office can issue licences where there is a natural monopoly and 'exercise such other powers as provided in separate legal regulations relating to energy production' (§5, Draft Electrical Energy Act). The Minister of Industry and Trades shall 'establish the fixed price (charge) of electrical energy' [§4 (3)] though the 'calculation of the highest fixed price of (charge for) the electrical energy and the application of the price (charge) is regulated in a separate Act (currently the Price Act, Act No. LXXXVII of 1990)' [§55 (1)].

The draft Act therefore continues the previous and unsatisfactory method for regulating price, under which the Minister of Industry and Trades was subject to strong political pressure to hold down the price to domestic consumers. Fig. 2 shows the evolution of the real relative price of electricity and gas in Hungary and the UK, where the real relative price is measured as the ratio of the price index for the fuel divided by the retail price index. In August, 1992 the World Bank estimated that the price of electricity to domestic consumers was 72 per cent of the economic cost, and the price of gas for domestic consumers was 81 per cent of the economic cost. The figure has therefore been calibrated so that in 1992, the electricity price in Hungary is taken as 72 per cent of the UK price, and the gas price is taken as 81 per cent of the UK gas price, on the assumption that the UK prices were correctly set at their economically justified level.[10] The

Real Relative Prices
Hungary and UK 1970-92



Price index deflated by CPI
UK 1990=100, HU rel to ec. cost 1992

Fig. 2

[10] UK domestic gas prices may have been somewhat below economic costs in 1992, in that an investigation into breaking up the monopoly British Gas would result in rebalanced tariffs that might increase average charges for two-thirds of domestic customers. UK electricity prices still reflected the above-world

scale is logarithmic, so that each time series can be rebased by moving it vertically without changing its shape - equal vertical steps correspond to equal proportional changes. The figure clearly shows the steady fall in the real price of domestic electricity in Hungary (while that in the UK rose), only partially reversed in 1991-2. It reflects the political difficulty of raising domestic tariffs in line with inflation.

The present agreement with the IMF requires that the price of electricity be raised to the cost of fuel plus overheads/1.2 plus profits on revalued assets sufficient to earn a return of 6%, by the end of 1995. The draft Act contains clauses §55 (2) and §57 (1) requiring that by January 1 1996 'the price (charge) shall cover the costs of the fulfilment of environmental responsibilities of the power station upon its closure and demolition.' This suggests that nuclear decommissioning costs are also to be included in the economic costs with the same timescale for implementation. However, the government has already once resisted pressure from the IMF to adjust electricity tariffs to economic levels, which casts some doubt on the credibility and durability of this undertaking. It is also worth noting that a 1992 attempt to sell part of a gas utility failed because foreign investors lacked confidence in the regulatory framework for setting tariffs, and confidence is therefore not increased by noting that the Hungarian Energy Office is to be established under an Act on Gas Services.

There is an obvious political tension over price setting for electricity that has not yet been resolved within government. It will be impossible to sell electricity companies unless tariffs are raised to economic levels and the form of regulation made sufficiently clear and resilient to ensure that future tariffs will also be maintained at economic levels. If this were done, the industry would then generate considerable profits to its owners, currently the state. These revenues would amount to over $2 billion between 1994 and 2000, while future investment and refurbishment could be financed by borrowing from the World Bank. The net cash flow to the state from raising the price to economic levels and borrowing on the strength of the assets of the industry would be similar to those obtained from the sale of half the industry. In short, for the industry to be successfully privatised, tariffs must be raised to the point at which they would generate similar cash flows to those that would accrue to the state without privatisation. On the one hand, if the industry is not privatised, it may be impossible to introduce sensible tariff regulation, but on the other hand it may be impossible to agree to delegate tariff-setting powers, in which case the industry will fail to be privatised.

The telecoms example is again instructive, as Hungary wishes to privatise MATAV, the telecommunications company. The Minister concerned announced the 1994 prices in November 1993, and stated that these would be capped by the increase in average industrial wholesale prices from the beginning of 1996. This has some similarities with the British form of RPI-*X* regulation, where the critical issue is who determines *X*, how often, and with

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market price of UK coal, and were thus arguably slightly above economic cost.

what objectives. Such issues will need to be carefully spelled out in the legislation.

The electricity industry in Hungary, like the former CEGB in Britain, continues to exhibit a political equilibrium in which the different interest groups have managed to secure an accommodation with each other. The main interest groups in Hungary are the coal mines, the electricity companies themselves, domestic consumers, and large industrial electricity users. Each group attempts to protect the interests of its constituency, and as with most distributional conflicts, there are bound to be inefficiencies created by the various cross-subsidies and transfers. One of the major benefits of privatisation of utilities in Britain has been to upset what is otherwise a very stable and robust politico-economic equilibrium, by replacing the potentially conflicting objectives of satisfying all constituencies with the single objective of maximising profits or behaving commercially.

Privatisation will only succeed if commercial objectives are both clear and protected against other political objectives, and the evidence in Hungary is that there is not yet sufficient political will or agreement to replace the old politico-economic equilibrium with a new commercial equilibrium. This is most visibly demonstrated by the unwillingness of the government to depoliticise tariff regulation. It is difficult to say whether resistance to autonomous and independent price regulation comes from the utility management because they seriously believe that they could be given the freedom to make monopoly profits or whether they wish to resist restructuring into competitive privately owned companies and realise that they can undermine this by making regulation non-credible to potential buyers, thus ruining the prospects for successful privatisation.

The next section briefly reviews the history of the British electricity supply industry, illustrating the advantages and drawbacks of public and private ownership, and the way in which privatisation disturbed the previous politico-economic equilibrium.

4. Lessons from the British experience of public and private ownership

The history of the British electricity industry can be divided into four phases.[11] The industry until 1926 was decentralised, uncoordinated, with generation under both private and municipal ownership subject to loose regulation laid down by statute. There were examples of notable private sector success, but overall the industry fell behind best practice abroad, and seemed locked in an unsatisfactory equilibrium. The creation of the Central Electricity Board as a public corporation in 1926, set up to build the high tension grid, marked the start of the second phase, which reaped some of the benefits of coordination by public ownership of part of the natural monopoly element, with mixed ownership in generation and distribution.

The failure in this period lay in extending the benefits of coordination to distribution,

[11] This section draws on Newbery and Green (1993)

where it became increasingly evident that voluntary negotiation would continue to be blocked by vested interests. Nationalisation in 1947 was the only way to resolve this deadlock, for central public ownership seemed to be the only way of coordinating the fragmented and largely municipally owned local distribution undertakings. Although the period from 1947 to 1990 had its technical successes, the regulatory system reflected an inefficient equilibrium that only privatisation appeared capable of upsetting. Privatisation in 1990 resulted in substantial changes in the structure and operation of the industry, but raised again the critical question whether the benefits of increased competition outweighed the difficulties of achieving the benefits of co-ordination.

4.1 Early history

These coordination benefits are very clear from the earlier history of the industry. Before 1914, the large number of locally restricted producers faced a fundamental problem. Cheap electricity at a price low enough to create adequate demand required integrated distribution and large generating stations under single ownership as natural monopolies. Existing municipal undertakings could not expand into neighbouring jurisdictions, and would not permit private generators to take them over. Relations between the public and private sector were perhaps more strained than in other countries, and the debate over public ownership more vigorous and polarised. These shortcomings became apparent during the First World War, and in 1917 a Reconstruction Committee recommended that the 600 undertakings be replaced by large powerplants in 16 districts, in order to halve the cost of power. This recommendation failed because rationalisation would require either powers of compulsory purchase, or public ownership, neither of which were politically acceptable.

A subsequent enquiry in 1925 produced a damning indictment of the power of local interests to block technical improvements. The committee argued for a national grid and suggested an ingenious compromise to the conflict between public and private interests. The Central Electricity Board (CEB) should build and operate the grid, while existing companies built and operated stations and distributed power locally. New investment would be coordinated by the CEB, as would despatch. Such a proposal was presented to Parliament and bitterly opposed in 1926, although no private assets were to be transferred to public ownership. It finally passed in December with Labour support after the General Strike. After the 1926 Act, supply expanded rapidly - between 1929 and 1935 output of public supply undertakings increased by 70%, despite the Depression. Given the capital-intensive nature of electricity supply, this could not be financed entirely out of profits, and only an estimated 48% was so financed. There appeared to be no difficulty in raising capital for what was a prosperous and rapidly expanding regulated monopoly.

If the CEB was a notable success, the hopes that the numerous distribution companies would voluntarily agree to merge and coordinate their activities was a disappointing failure. The political debate between the Conservatives who argued for voluntary mergers and those

who argued for enforced reorganisation under public ownership was suspended during the second world war. Originally private generators had been granted 42 year franchises, which were now maturing and could be acquired by municipalities. During the war, these franchises were put on ice, but after the war the incoming government was faced with the choice of either nationalisation to impose a sensible coordinated distribution system, or increased fragmentation among municipalities, who seemed incapable of rational coordination. Public ownership at the national level was thus a superior alternative to public ownership at the municipal level. One might conclude that nationalisation was forced upon the industry by the initial franchising provisions, and that the Conservative party were happy to acquiesce in the forced reorganisation, although they might have been individually unwilling to underwrite nationalisation. The industry was nationalised by the Labour Government in 1947, and for most of the post-war period, the Central Electricity Generating Board (CEGB) operated all generation and transmission in England and Wales as a vertically integrated statutory monopoly.

4.2 Public ownership 1947-1990

The main weakness of nationalisation was that it had no clear objective to guide its policy once it had achieved the initial task of rationalising the industry, which happened rapidly in the post-war reconstruction period. This failure to specify clear objectives is symptomatic of a deeper problem. Public ownership inevitably allowed the various interest groups a stage on which to influence outcomes and thus ruled out the pursuit of any simple single objective. These interest groups not only included the management and unions within the industry, but also those of the coal industry, whose fate was inextricably linked with that of electricity. Coal supplied 80 per cent of the fuel for generation in 1960, and although this share fell slightly over time, in 1990, over two-thirds of electricity was still generated from coal, and power generation took 80 per cent of the output of British Coal. The nationalised industries dominated the Trades Unions Congress, which in turn had close links with the Labour Party that had nationalised these industries. Domestic coal has thus been protected against imported coal and heavily subsidised, particularly in the period 1974-1992, when the subsidies averaged 19 per cent of the sales revenue of the CEGB. Major energy users take one-third of power, and have successfully argued for lower electricity prices to match foreign competition. Finally, electricity is essential for every household and voter in the country. Electricity prices and investment demands both have macroeconomic significance and have at various times been constrained by the Government's fiscal position. Prices have been held down to slow inflation and investment curtailed to protect the budget, with adverse effects on the industry. Given all these pressures to hold down electricity prices while paying high prices for inputs, it is not surprising that the average real rate of return in the whole period of public ownership was only 2.5 per cent, well below the average in UK manufacturing.

Energy policy was not only shaped by the demands of the employees, suppliers and

consumers, but also by the technical characteristics of electricity. Fuel costs are roughly half total generation costs, and as electricity is non-storable, security of fuel supply is critical. Britain has thus chosen to favour indigenous coal rather than imported and often cheaper oil. The 1956 Suez Crisis revealed the insecurity of oil supplies and was responsible for accelerating the ambitious and ill-fated nuclear construction programme to diversify fuel supply while reducing import dependence. The oil shocks of the 1970s created further concerns about security, and further entangled energy policy with foreign policy. Yergin (1992) argues convincingly that the geo-politics of oil made this entanglement inevitable for any major oil-importing power such as Britain.

The General Strike of 1926, and the miners' strikes of 1974 and 1984 demonstrated that indigenous fuel supply did not automatically ensure security of supply, and prompted repeated attempts to diversify away from coal. At the political level, defeating the miners' strike in 1984 was a key part of weakening the Trades Unions, thereby altering the balance of political power in favour of the incumbent Conservative Party. On one view, privatising the CEGB had the effect of entrenching the new politico-economic equilibrium and undermining the monopoly power of the coal miners and other nationalised unions.

Over the period from 1947 to 1990, the balance of power shifted between the different interest groups, depending on external circumstances such as the oil shocks, Suez, as well as domestic priorities such as inflation or strikes. Given the varying political importance of these objectives at different times, it is hard to see how specifying the pursuit of a simple objective such as 'minimise the (social) costs of meeting demand' would have been feasible. Given that, it is hardly surprising that the regulatory framework implicit in public ownership failed the test of economic efficiency.

The Conservative Government under Margaret Thatcher had a variety of motives for privatisation, and one extremely telling argument for considering the privatisation of the electricity industry - such industries operated under private ownership with apparent success in a number of European countries, and certainly in the United States. There was a growing belief that the large nationalised industries, of which the CEGB was an excellent example, were inflexible, bureaucratic, secretive, and largely out of political control. The Government could audit them, commission studies, and subject them to the searching enquiries of the Parliamentary Select Committees, but it had few sanctions short of denying them access to investment funds and/or resisting requests to raise tariffs. Such negative sanctions merely increased the inflexibility of the organisation, and did little to promote an aggressive and competitive industry. Privatisation therefore held the considerable attraction of upsetting this very unsatisfactory politico-economic equilibrium.

The Government had already successfully privatised British Telecom and British Gas, the latter as a monopoly, the former as virtually a monopoly (the tiny competitor, Mercury, was protected from further entry for five years). In both cases it required aggressive and tight regulation to change the corporate culture, and this only happened slowly. There was

growing dissatisfaction with a concept of privatisation that transferred public monopolies intact to private ownership, and mounting evidence that competition rather than ownership was the decisive factor in improving economic performance. It was therefore argued that to disturb the unsatisfactory politico-economic equilibrium in an industry as prone to such a variety of pressures as electricity, it was essential to dismember or de-integrate the industry. The separate stages of the previously vertically integrated industry should be forced to operate in full public view in the market-place rather than in the obscurity of committee rooms. As such, it was to be one of the most ambitious attempts anywhere to introduce competition into an industry normally considered to be a natural vertically integrated monopoly.

4.3 Privatisation

The British Government legislated the resulting privatisation of the CEGB and the distribution companies of England and Wales (Scotland and Northern Ireland came later) in the Electricity Act in July 1989. The CEGB was divided into four parts: high-tension transmission in the National Grid Company (NGC), the fossil-fuelled generators were split between PowerGen and National Power, while nuclear power stations were retained in public ownership in Nuclear Electric, all of which were vested as public limited companies on March 31st 1990. At the same time the twelve local distribution companies, now to be known as the Regional Electricity Companies (RECs), were vested, NGC was transferred to the joint ownership of the RECs, and the RECs were sold to the public in December 1990. Sixty per cent of National Power and PowerGen were subsequently sold to the public in March 1991.

The new structure introduced in March 1990 thus divided the process of electricity supply into four activities; generation, transmission, distribution, and supply.[12] Generation accounts for around two-thirds of the industry's costs, transmission for 10%, distribution for 20%, and supply for the remaining 5%. Supply is further sub-divided into sales to a franchise market of smaller customers, restricted to the local REC, and a non-franchise market of large customers, which can be served by any company acting as a private, or second-tier, supplier. Transmission and distribution as natural monopolies were to be regulated by the Office of Electricity Regulation, OFFER, but the government argued that there was no natural monopoly in generation providing there was freedom of entry. This was guaranteed, and the generators were therefore not subject to detailed regulation, but to the threat of competition from new entrants, as well as actual competition from each other and with imports from France and Scotland (about 9 per cent of the total).

The market setting for this competition was to be the bulk electricity supply market,

[12] Supply involves contracting for the delivery of electricity to the customer, metering and billing.

which was set up as a spot market (more accurately, a 'day ahead' market) for the despatch and pricing of electricity. This spot market, or 'pool', is the most radical part of the 1990 reforms. Every morning, generators must declare which of their generating sets will be available the next day, and announce prices for each set. The grid despatcher then computes the least financial cost of meeting the predicted demand, and pays all the generating sets actually despatched the same system marginal price (the bid price of the most expensive set required to operate).[13] As the pool price varies widely over the day and year, the resulting price risks need to be hedged by contracts. At vesting, the generators and suppliers were provided with contracts of up to three years duration. Most were Contracts for Differences, under which a generator receives, in addition to the normal pool price for any sales, a sum equal to the difference between the specified strike price and the pool price, multiplied by the specified number of units contracted. In addition there is a market for Electricity Forward Agreements (EFAs) which allow the main components of electricity price uncertainty (such as the pool price between certain weekday hours, or the capacity charge) to be hedged up to a year ahead, rather like a futures market.

4.4 Consequences of privatisation

The system of pool settlement appears to operate reasonably well, and the experience to date is an impressive technical success. Substantial entry has been induced, with contracts in place for an extra 9 GW of high efficiency combined cycle gas turbine (CCGT) plant by 1996 (compared to total capacity of about 57 GW). This entry was facilitated by long-term contracts at prices that compared favourably with the vesting contract prices, though these were substantially higher than pool prices. Pool prices were below medium run avoidable costs and long run average costs up to 1992, but increased sharply in 1993 when the vesting contracts expired. The two major generators have demonstrated that they have considerable power to raise the pool price, though they are constrained by the threat of entry - if the RECs believe that future pool prices will remain above the prices from new CCGT plant, they can sign long-term contracts with independent power producers, who will then enter the industry.

What effect has privatisation had on efficiency? Efficiency has a number of different dimensions, all of which have been affected by privatisation. In the short run, the main question is whether power is transmitted to its final destination at least cost, that is, whether stations are run in correct merit order and operated efficiently. In the medium run, is the industry using the right inputs (of fuel and labour) in the right amounts? In the long run, are the right amount of investments undertaken at least cost, using the best technology, and in the correct place?

In a competitive market during a period of recession and excess demand, one would

[13] There are further payments if sets are required to operate out of merit order to meet transmission constraints, and if declared capacity is tight relative to demand (capacity payments).

expect bids to be held down to avoidable cost, and this is required for efficient despatch. There is growing evidence that the duopolists bid above this in order to recoup average costs, with consequent damage to energy-intensive industry. On the other hand the generators have almost doubled their labour productivity since vesting, and even the publicly owned Nuclear Electric has dramatically increased productivity and cut costs, now that it has to compete in the pool market. The short-run operating efficiency of the generators has therefore increased, but as prices have not fallen as fast as they might, profits have risen substantially. The present system of charging for Grid services does not properly relate energy charges to energy losses, and therefore does not ensure that the system as a whole operates at least cost. At the moment, all generators are paid the same pool input price, no matter where they are located, even though the difference in transmission losses between stations could amount to as much as 11 percent of the bid price.

It has also proved difficult for the grid to devise a satisfactory set of price signals to influence location decisions, and as a result the 9GW of CCGT stations are not necessarily optimally located. The high prices of the original contracts and the failure of the duopolists to offer more competitive new contracts resulted in excessive entry, though the sulphur emissions limits would have required gas generation towards the end of the period. The extra cost is that of building ahead of need, perhaps $3 billion five years early (though with considerable savings in operating cost). Newbery and Green (1991) predicted that a more competitive generation sector, with perhaps five competing private companies instead of two, might have reduced deadweight losses by some $300 million per year, or 5 per cent of sales revenue.

If investment was too soon, and possibly in the wrong places, it appears to have been undertaken at low cost and to time compared to the experience of the CEGB, though it may be unfair to compare turn-key CCGT projects with large and often idiosyncratic steam plants typical of the earlier period. The consensus is that under the CEGB, power stations cost between 50-100 per cent more than in other developed countries, took as much as twice as long to commission, and rarely achieved the economies of replication that a large buyer might reasonably have expected, instead being pressured by an industrial policy that aimed to keep alive an unreasonable number of internationally uncompetitive British firms.[14] The management of the nuclear power station currently under construction in the public sector appears to be far better than earlier nuclear construction, as it is on time and within budget. This is consistent with the view that market pressures rather than ownership are decisive for

[14] eg see the evidence of Sir Alastair Frame and Michael Prior to the Sizewell Inquiry (Layfield, 1987). Thus the CEGB estimated that the cost of a coal alternative to Sizewell would be £664/kw (£1982) compared with an average for US and European plants of £490/kw, or 136 per cent of this average. But the CEGB's average cost overrun on coal-fired plant was 18 per cent in real terms at this date, bringing the costs to more than 50 per cent that of the average elsewhere.

efficiency, for the performance of the station can be measured by market criteria - can the new plant cover its costs measured against the very visible pool prices? Investors and banks must be willing to finance new investment, and to date this has not proved a problem - perhaps again because of the fortuitous arrival of CCGT technology, though the major generators appear ready to place contracts for more complex construction where needed (such as Flue Gas Desulphurisation or FGD plant).

Finally, privatising electricity put huge pressure on British Coal to cut costs, as it now had to compete with imported coal and oil, as well as gas. Although it managed to cut deep mine operating costs by 40 per cent in real terms between 1985 and 1992, and raise labour productivity in existing pits by 45 per cent (House of Commons, 1993, p22), it failed to meet the challenge of matching or undercutting imported coal, and has consequently lost half of its market. Had coal prices been at import parity in the 1990 contracts, the 'dash for gas' might have been delayed, and with it the inevitable decline in coal production. The remaining pits will have to continue to cut costs if they are to survive. By 1993 an industry that employed 741,000 workers as recently as 1955 had declined to one employing just 16,500 workers in an inevitable if painful restructuring that electricity privatisation undoubtably accelerated.

5. Lessons from the British experience of regulating electricity

Regulation of the electricity supply industry is similar to that of other regulated utilities in Britain, with the Electricity Act giving statutory powers to the person of the Director General of Electricity Supply (DGES) who issues licences for generation, transmission, distribution and supply. The DGES enforces the licence by issuing orders requiring compliance when a breach is detected, from which time the order creates a liability for action. The DGES has a degree of discretion in cases where he has to set various charges (e.g. for use of the transmission system) and interpreting such requirements as to 'promote competition' or ensure that the RECs have followed their duty to purchase electricity economically. The license between the license holder and the regulator can be modified by agreement, subject to approval by the Minister who can, if he disagrees, refer the case to the Monopolies and Mergers Commission (MMC). Typically, the license specifies a period after which the terms are to be reviewed, and under the system of price cap regulation in which the average price charged may not increase by more than RPI-*X*, the value for *X* is periodically examined and may be changed.

Regulation differs between utilities because of differences in the Acts, the nature of the industry, and the style of the regulator (and those he or she regulates). BT has complained that the telecoms regulator is not required to make public his reasons for reaching a decision (and has been legally advised not to do so), leading to the obvious charge of arbitrariness. The normal procedure in electricity is for the DGES to issue a consultation paper when he consider that some aspect of regulation should be reviewed, or some features

of competition are unsatisfactory. Electricity is unusual in the large number of sizeable companies whose interests are affected, (the generators, NGC, the RECs, British Coal, the oil and gas companies, British Gas, large industrial users) each of which is well placed to present a carefully argued case, and to commission consultants to collect additional information. In some cases the regulator holds a public discussion meeting at which these results are presented, and submissions are available for external scrutiny in any case. There is no doubt that this process of open debate and scrutiny within a commercial rather than political forum increases confidence that changes will be guided by economic logic rather than political expediency, though at present there is no statutory requirement that the regulator should conduct his discussions in such a public manner.

5.1 Dispute resolution

The most difficult part of the design of any system of regulation is deciding how to deal with changes, new circumstances or unanticipated events. It would be impossible to specify what the regulator should do in all possible contingencies in the initial Act, and there must therefore be a mechanism for dealing with unforseen events as they arise. In the British system, the regulator can either use his discretion where the Act provides flexibility, or it may be necessary to negotiate a change in the license. But what constrains the regulator to ensure that he does not behave unreasonably? Who regulates the regulator?

The regulated company has two options open in the event of a disagreement with the regulator. If the regulator used his discretion or provided what was felt to be an unreasonable interpretation, the company can request a judicial review. This is widely agreed to be very unsatisfactory, as a review can only adjudicate on a very narrow interpretation of whether the regulator acted reasonably, and cannot comment on the actual decision nor replace it by an alternative. The second option is that if the regulator and the company fail to agree, the company can request that the case be referred to the MMC. The regulator will then draft the terms of the reference, and might widen the scope of the enquiry beyond that of the original dispute to ask more searching questions of the structure and conduct of the industry. The MMC reports to the regulator who may or may not take regard of their recommendations, or it may report to the minister, who could in extreme circumstances make a legislative change, though this is even more costly and less predictable. Recourse to the MMC can be enormously costly for the company as it ties up scarce managerial time for an extended period, prejudices any negotiations between the company and other companies, while the outcome of the team of economists and lawyers recruited to adjudicate is unpredictable.

Is this a satisfactory way to handle disputes? Clearly, there must be some cost and disincentive to the regulated industry in appealing against decisions of the regulator, otherwise the appeal body itself acts as the regulatory agency. The present British system has this property. It is not clear that all disagreements should require an equally costly appeal procedure, and there is a danger that the regulator can use the threat of a breakdown

in negotiations and a reference to the MMC to enforce agreement with the industry which would not be accepted if appeals were less costly. It may be that disagreements of interpretation should be referred through a panel of the MMC constrained to deal the disagreement, and to produce a speedy response. Disagreements about more fundamental features of regulation suggest that the structure of regulation is unsatisfactory in some sense and might reasonably require the full MMC reference.

The alternative in which appeals are made to the minister or parliament has the drawback of politicising decisions, so that appeals will be judged on the basis of popular support rather than economic logic. The most severe test to which electricity regulation has been exposed to date was the 1992 House of Commons enquiry into the market for coal. At vesting, British Coal had three year take-or-pay contracts with the generators for 65 million tonnes of coal at prices substantially above import parity. At these prices for coal, and the 1991 price for gas, it was cheaper to build and operate CCGT plant than to incur the avoidable costs of existing coal-fired stations. In addition, the EC-mandated sulphur limits would require the generators to either install FGD equipment at considerable expense to clean up emissions from existing coal-fired stations, or switch to less polluting fuels such as gas. Within a remarkably short space of time, some 9GW of CCGT plant was contracted, together with back-to-back 15-year contracts for gas and the sale of electricity. This would displace nearly 30 million tonnes of coal, and on October 13 1992 British Coal announced that it had been unable to renegotiate the 65 million tonne coal contract and that within two years its sales to the generators would fall to 30 million tonnes. It therefore proposed to close 31 of its 50 remaining pits, the first 10 with immediate effect.

The public outcry reflected in the House of Commons led to the setting up of a Select Committee of the House of Commons, while the Department of Trade and Industry (DTI, responsible for the electricity industry) also prepared a report for parliament (DTI, 1993). The Select Committee called witnesses and received submissions many of which argued that the DGES had failed in his duty to ensure efficient electricity supply. He in turn argued that he had a duty to promote competition as well as ensuring the RECs met their obligation to purchase economically. By comparing the terms accepted by the RECs from the independent power producers with those offered by the major generators he judged that this obligation had been met, though it was pointed out that this comparison involved prices not costs. The Secretary of State of the DTI explained that he had no powers to intervene or over-ride the contracts drawn up between privately owned companies in the industry, in contrast to the days of public ownership.

The final outcome of an intense period of public and political scrutiny was that the industry was allowed to continue as before, as was the regulator, though the government offered subsidies to British Coal to enable it to meet competition from imported fuels (House of Commons, 1993). The largest outstanding issue is whether the regulator should refer the major generators to the MMC for abuse of market power in keeping up the pool and contract

prices to an unreasonable extent and whether they should be further dismantled into smaller and more competitive companies. The DGES had not decided by the end of 1993 whether to make a reference, and although it is now clear that the initial structure of the industry was unsatisfactory and would probably have been improved by dividing the fossil generators into five equal sized companies rather than two unequally sized companies, the subsequent demonstration of the ease of entry into the industry by small independent power producers may have made the industry sufficiently contestable to make further restructuring unnecessary, at least for the moment.

The British experience shows that at moments of crisis which occur periodically the energy industries will be inevitably subject to political scrutiny. Any regulatory system that is to command credibility from investors must have some resilience against these pressures, and here the British structure operating though licenses which can only be altered by a complex, costly and lengthy procedure provides considerable political insulation. The autonomy of the regulator has been demonstrated, provided he in turn acts within his mandate, and the legislative power of the House of Commons which may be able to remedy sufficiently unsatisfactory outcomes, clearly cannot be used for minor reforms or arbitrary interference.

The contrast with regulating telecoms is instructive. Here technology is changing so rapidly, and the global ramifications of these changes are so extensive that it is necessary to make critical regulatory decisions with alarming frequency. It is therefore difficult for the participants to predict the future regulatory regime, though this is a problem common to every single country and not peculiar to those with a particular form of regulation. In contrast, technical change in electricity is much slower, though the rapid development of CCGTs provides a single and rather important instance of a major technical breakthrough. The main source of uncertainty to participants is politically-motivated regulatory change rather than a technology-driven response. The British experience shows that political pressures can emerge with remarkable speed and force, and that the regulatory framework must be capable of handling these pressures if it is to command respect.

The experience also shows the difficult trade-offs involved. On the one hand, commercialising the industry and replacing administrative decisions by contracts and licences makes the system more resilient against political shocks, but on the other hand these contracts may reflect monopoly power rather than economic efficiency, leading to unsatisfactory results. Newbery (1993) argued that the 'dash for gas' might have been beneficially delayed had generation been more competitive, so there were real costs involved in allowing market power rather than cost-benefit analysis to determine the outcome.

5.2 Regulatory design and industrial restructuring

If the design of the regulatory framework and the dispute procedure is the most important issue to settle, the next most important concerns the content of regulation and the structure

of the industry after privatisation. The main choice here is between the US style of 'rate-of-return' regulation or the British alternative of 'RPI-*X*' or price-cap regulation. The standard defence of the British solution is that the American approach rewards gold-plating, and encourages excessive capitalization because this will lead to higher total profits. The standard objection to the British approach is that the only practical way to choose *X* is to look at the achieved rate of return, and make periodic adjustments to ensure that the earned rate of return is reasonable. If so, the British system collapses into the American system with a regulatory lag. Both observations are incomplete.

The American system has been much modified by the 'used and useful' doctrine, under which the Regulatory Commission can instigate a prudential review of investments to see if they were justified, and may disallow some fraction of the investment cost in cases where it finds the investment unwarranted or uneconomic. Newbery and Gilbert (1988, 1993) show that this can offset the tendency to excessive capital expenditure, while the problem with price-cap regulation is that it may encourage under-investment. The problem is one of regulatory commitment, and the reason why price-cap regulation may be less reliable than rate-of-return regulation is that profits will be more variable under price-cap regulation. This provides greater temptations to the regulator to respond to periods of high profits by tighter price controls, which will not necessarily be offset by more generous price controls in periods of deficient demand and lower profits. Knowing this, the utility may under-invest to reduce its exposure to partial profit expropriation. Rate-of-return regulation may be seen as a regulatory contract in which the utility is protected from public hostility against high profits in return for a stable profit stream, and a lower cost of capital.

The choice of the post-privatisation structure for the industry interacts with the regulatory regime. The CEGB was de-integrated so that the potentially competitive parts should be exempt from regulation, which would be confined to the network components of transmission and distribution. The prices to final consumers are the sum of the unregulated generation and supply costs and the regulated transmission and distribution costs. The former can vary with market conditions, while the latter are controlled. The alternative model, adopted for BT, is that the whole industry remain vertically integrated, and only the prices to final consumers are regulated.

It is more difficult to regulate a de-integrated industry, as it is difficult to devise an efficient structure of prices for using the variety of services supplied by NGC - transmission, security, phase control, stability, optimal location and expansion, etc.[15] Within an

[15] To some extent this distinction is overdrawn, for other telecoms companies need access to the local BT network, and the regulator has had to specify access charges, which raise similar problems to setting the grid charges. Indeed, it may be more difficult to reach agreement on access charges when the network is owned by a dominant utility than when it is separately managed and/or jointly owned (as in the case of NGC, owned by all the RECs). Disputes over access pricing to British Gas's high-pressure national transmission system

integrated industry, transfer prices between different stages (from generation to transmission and final distribution) will be set to minimise overall costs, and internal decisions will be guided by marginal costs. In a de-integrated and regulated industry, it is most unlikely that the regulated intermediate prices will be equal to short-run marginal costs, if only because these may not recover sufficient revenue to cover operating costs. The choice of industry structure thus consists in balancing the advantages of greater competitive pressure applied to the potentially competitive elements of the industry (generation and supply) against the possible inefficiencies in transactions arising in these and the regulated components.

The evidence from Britain is that it is difficult to achieve efficient access and use-of-system pricing for transmission, but the regulator and other participants in the industry have an interest in improving such regulation, and have instituted a series of enquiries to recommend changes. The latest of these (on Transmission Services) proposes to reassign responsibility for various services from the pool to NGC, so that NGC has an incentive to minimise the total costs of operating transmission, rather than at present just minimising the costs of meeting peak demand for a given level of security. Requiring the regulator to take steps to ensure the efficiency of the industry as a whole gives him a mandate to identify inefficiencies and propose solutions, which are subject to public scrutiny. This is management at a distance, rather than the potentially more responsive management that is possible within a vertically integrated industry, but it requires response, whereas a vertically integrated monopoly which is not tightly regulated may have little incentive to reduce costs, particularly as these may then be clawed back when X is adjusted at the next review. Thus although the ability to manage costs is better within a vertically integrated industry, the incentive to do so may be less.

The lessons for other countries are thus mixed. The advantages of de-integration increase with the size of the industry, as the benefits of flexibility and competition grow to exceed the costs of inflexibility when compared with the benefits of central coordination. In the United States there are over 150 electricity utilities, while France represents the other extreme. If the European or East European transmission system were so structured that there was open and vigourous competition between neighbouring countries, it would be less important to create competition within countries, but that ideal is far from a reality, so that the most reliable form of competition is still domestic. The development of CCGT sets of 300-500 MW means that even small countries can now contemplate a variety of competing generating countries, and may have tilted the advantage towards the more competitive de-integrated structure.

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led the regulator to make a reference to the MMC who suggested that the system be divested to avoid such conflicts of interest.

6. The Case for Privatising Hungarian Electricity

The parallels between MVMT and the CEGB are sufficiently close in many respects to suggest that privatisation and restructuring might improve the efficiency of the Hungarian Electricity Industry provided the regulatory regime can be satisfactory designed. The main sources of inefficiency in Hungary are first, that domestic tariffs are too low, and as a result investment in distribution and possibly also in generation have been starved of finance. Second, the coal and lignite mining sector needs restructuring, and the evidence from Britain is that this is likely to happen more quickly, if more brutally, if generation is under private ownership. Third, for both environmental and economic reasons new gas-fired capacity will soon be economically justifiable, and is likely to take place more swiftly when driven by commercial imperatives. Fourth, profitable international trade in electricity is more likely if the participants are privately owned than publicly owned, for public international negotiations have diplomatic and strategic dimensions that hinder the pursuit of economic gain. As access to Russian gas and connection with other power systems are both likely to assume increasing economic importance in the future, decoupling these transactions from the diplomatic sphere is likely to be desirable.

The main argument against giving the industry narrow commercial objectives have to do with energy security and the social costs of closing down coal and lignite mines. The latter problem can be dealt with by medium term contracts and subsidies, and is in any case already underway. The former problem is fundamental, and explains why the government views the industry as strategic, with a majority holding to be left with the state. In the past, Hungary has been heavily dependent on the USSR for a large fraction of its energy, particularly oil and gas and imported electricity. This dependence was kept lower than it might have been by the Paks nuclear power station and by the over-exploitation of domestic lignite and coal. The uneconomic nature of many of these pits meant that the coal mining interest group restricted stockpiling of coal at power stations, thereby increasing the dependence of MVMT on the continued production of domestic coal.

The rational solution to the problem of import dependence is to further diversify fuel supplies to include the use of imported gas in generation, to stockpile coal to cover possible periods of disruption to supplies of gas or oil, and possibly also to store oil. Improved interconnection facilities with neighbouring countries for electricity transfer will further improve security not only in Hungary but in these other countries.

Under the draft Electrical Energy Act, the Ministry of Industry and Trades is required to approve the fuel choice of power plants up to 600 MW, with Parliament deciding those of larger size, and also the location of power plants with a capacity greater than 50 MW (Electrical Energy Act, §4). The government thus retains considerable power to ensure that the fuel mix in generation takes due account of supply security, while presumably forcing the Minister to justify any deviation from the least-cost or commercially preferred option, making energy policy more transparent.

6.1 Restructuring options

The original plans for restructuring the industry drawn up by the team of experts envisaged as a first stage keeping the current integrated form of MVM Rt but allowing independent power producers (IPPs) to build, own and operate new generating sets with the sale of electricity under long term contracts to MVM Rt. These contracts would presumably look like those between IPPs and the RECs in Britain, and would have the obvious attraction of relaxing the financial constraints on MVM Rt for new investment, while allowing a straight comparison between the costs of new plant and the costs of continuing to operate less efficient old plant.

The next stage of restructuring would involve splitting off the regional distribution companies who could be privatised first. MVM Rt would then look structurally like the British CEGB, with high tension transmission remaining together with generation. The final stage would involve a choice between either selling the generation/transmission company intact as a regulated monopoly, or splitting off the generators as separate companies while leaving the transmission system as a separate company, possibly in public ownership. The three alternatives here are that either the transmission company acts as a monopsony buyer of electricity from the generators and a monopoly seller to the distribution companies with no possibility of bypass from generation to final customers (the strong grid option), or allowing generators to contract directly with distributors and final customers (the weak grid option), or possibly the British model in which transmission is jointly owned by the distribution companies. At present, the draft Electricity Act (in §21) gives the transmission company exclusive rights for the transmission of electrical energy and the supply of electrical energy in a specified area, as envisaged in the strong grid model and as preferred by the electricity industry.

The alternative, weak grid option, has advantages and limitations. The main advantage is that it puts competitive pressure on the grid to minimise costs, and to adjust tariffs in line with costs. If the grid attempts to buy electricity at too low a price from one generator and sell at too higher price to a consumer, then provided the generator has third party access right to transmission and can pay an appropriate charge it will sell direct to the final customer and undermine unbalanced tariff structures. In an extreme case it may pay the generator and customer to build additional transmission capacity to bypass the system, and although this may be inefficient, the threat of such action may constrain the tariffs charged by the grid. Further liberalisation would allow customers to contract directly with foreign electricity suppliers, eroding the ability of the grid to cross-subsidise customers or producers, and providing additional competitive pressures on the industry. Once again, the problem is to balance the difficulties of regulating access pricing against the advantages of the additional competition, and it seems prudent to leave open the possibility of subsequent bypass, even if it is initially prevented (much as Mercury was protected against additional entry into the British telecoms market for a limited period).

Of these various options, allowing IPPs to build and contract the sale of electricity creates the least disturbance and offers the fewest benefits, as these generators could also have been financed by international agencies like the World Bank, perhaps under BOT (build, operate, transfer) or BOOT (build, own, operate, transfer) schemes of the kind already common in public utilities. The great advantage of further restructuring and privatisation is that it forces the government to address systemic problems of cross-subsidisation and under-pricing without which privatisation will not be feasible. As these problems are widely observed throughout Eastern Europe, and even in some Western European countries, they are obviously inherent in the nature of public ownership, and are unlikely to be addressed satisfactorily or permanently without a change of owner. Corporatisation may go a considerable distance in addressing these problems, but will remain vulnerable to a change in government or political priorities, as the government as shareholder can always intervene and require a change of operating practice.

7. Sequencing of Regulation, Corporatisation and Privatisation

Spiller and Martorell (1992) contrast the experience of regulating electricity in Argentina, Brazil, Uruguay and Chile. They list various alternative preconditions for stable and credible regulation, and for restraining arbitrary political interventions. Disputes between the utilities and the government are unlikely to be a problem if there is a well functioning judicial system to provide a conflict resolution process in the event of disputes. Alternatively, a properly functioning independent regulatory institution which is insulated from government policy may suffice, provided that governments are sufficiently stable or weak so that they are either unlikely or unable to change the law governing the regulatory institutions.[16] They also note that a high rate of growth reduces the temptation for governments to expropriate assets and also reassures investors.

Argentina, Brazil and Uruguay have had a history of poor performance in the electricity sector, exemplifying the necessity of these preconditions. Chile, in contrast, has performed well since 1978. The industry was restructured by separating generation and transmission from local distribution and the system of regulation was reformed in 1980. The National Energy Commission (NEC) was set up to regulate the industry in 1978 and consists of seven Ministers and a Secretary directly under the President. It determines regulated prices subject to approval by the Minister of Economics, but approval is automatic if the price adjustments result from the application of the specified and automatic adjustment clauses. These clauses specify the formula for calculating prices, essentially long-run marginal cost, designed to achieve long-run efficiency. These prices are therefore regionally differentiated, though local prices are not allowed to differ substantially from local

[16] This does not deal with the problem of disputes against regulatory discretion, so a properly designed regulatory system still needs a dispute resolution procedure.

competitive wholesale prices. Margins in retail distribution are regulated and recomputed every four years, thus providing incentives for cost minimisation much as in Britain.

The system has been successful in promoting investment for several reasons. The apparent considerable power of the government through Ministerial representation on the NEC is tightly restrained by the Electricity Act, and the possibility of appeal to an independent judiciary. In addition, shares in the privatised companies are widely held, giving a wide political constituency for ensuring the financial viability of the industry.

The other useful lesson from Chile's experience is that regulatory reform was undertaken while the industry was in public ownership, first to force the state enterprises to adjust to the new system of regulation, and second to demonstrate the viability and robustness of the new regulation. The lesson for Hungary is clear: regulation and restructuring, including corporatisation, should precede privatisation and demonstrate that the regulatory system is robust against changes of government (which are to be anticipated, certainly in the next few years), changes in the price level and in the relative prices of different fuels.

Some investment constraints can be rapidly overcome by contracting with IPPs as the form of contracts they are likely to sign would not be much affected by the ownership structure of the industry. Selling the regional distribution companies is also relatively straightforward in that there is a ready test whether foreign investors are willing to buy them for a reasonable price. To date, the evidence is that they are not because the system of regulation is unsatisfactory, but at some stage it may be found that this obstacle has been overcome. Subsequent privatisation steps are more complex, as they involve decisions about the structure of transmission and generation, and are less urgent, as the immediate investment needs lie in distribution and possibly replacement generation, both of which can be met by the early stages of restructuring.

8. Conclusions

The main argument advanced by the Hungarian authorities for privatising electricity is that it would raise foreign exchange without increasing official borrowing, by selling parts of the industry to foreign investors, probably foreign electricity utilities. This will not be possible at an acceptable price unless the investors are confident that price regulation is robust against political change and pressures to hold prices too low. The evidence from the past is that these political pressures are strong and endemic in Eastern Europe, which suggests that the regulatory authority must be insulated against political pressure. The draft Electricity Act does not provide sufficient detail to inspire confidence that this has been achieved, but it may be that a revised Price Act and the detailed form of the licenses will go some way to allay concern. Prices will have to be adjusted to efficient levels, and if that is done, the revenue generated should be enough to finance new investments, especially as additional finance is available from international organisations for this purpose. The budgetary argument for

privatisation is therefore not particulary strong.

The evidence from Britain is that the main argument for privatisation is to disturb the unsatisfactory politico-economic equilibrium that leads to underpricing to domestic electricity and underinvestment in the replacement of old plant and distribution networks. The main benefits from privatisation are that it forces the government to provide a robust and credible regulatory framework, whose efficacy can be tested by attempting to sell the industry. This test has already been applied and the system found wanting. If the industry is restructured to de-integrate component parts, so that the potentially competitive elements are exposed to market competition, then considerable improvements in efficiency should result, while effective regulation of the natural monopoly elements may also improve efficiency, though this is more difficult. The main problem lies in adequately regulating the transmission and distribution system to retain the benefits of coordination and optimising the overall system while providing incentives for improvements. The British experience suggests that this process can be lengthy, and may result in large mistakes before the price signals are adjusted. It may therefore make sense to delay the deintegration of generation and transmission, even though many of the benefits of competitive pressure on generation will thereby be delayed.

The choice between rate-of-return regulation and price-cap regulation is also difficult. As rate-of-return regulation is more robust, it may be an appropriate formula with which to start, while leaving open the possibility of subsequently introducing price-cap regulation. Finally, it is worth thinking carefully about the dispute resolution procedure that will be needed if unanticipated events require a change in either the license or the regulator's rules. There will also need to be an appeal procedure against changes in the law since legal changes are rapid in transitional economies.

The lack of urgency to undertake heavy investment, together with the ability of the state-owned electricity industry to finance generation expansion from IPPs and raise revenue by correcting tariffs suggests that privatisation is not urgent, but that the design of the regulatory system is if tariff distortions are to be corrected and kept at sensible levels.

References

DTI (1993) *The Prospects for Coal: Conclusions of the Government's Coal Review*, Department of Trade and Industry, Cm 2235, London: HMSO

ESMAP (1993) *Poland: Energy Sector Restructuring*, Vol 1, Report 153/93

Frydman, R., A. Rapaczynski, J.S. Earle *et al*, (1993a) *The Privatization Process in Central Europe*, CEU Privatization Reports Vol 1, Budapest: CEU Press.

Frydman, R., A. Rapaczynski, J.S. Earle *et al*, (1993b) *The Privatization Process in Russia, Ukraine, and the Baltic States*, CEU Privatization Reports Vol 2, Budapest: CEU Press.

House of Commons (1993) *British Energy Policy and the Market for Coal: Report* London: HMSO

Gilbert, R. J and D.M. Newbery, (1988) 'Regulation Games' CEPR Discussion Paper 267, September, 1988

Gilbert, R. J and D.M. Newbery, (1993) 'The dynamic efficiency of regulatory constitutions' mimeo, Universitywide Energy Research Group, UC Berkeley.

Jarái, Zsigmond, (1993) '10 per cent sold: Privatisation in Hungary', chapter 5 in *Hungary: an Economy in Transition*, edited by István P. Székely and David M.G. Newbery, Cambridge: University Press.

Layfield, Sir Frank, (1987), *Sizewell B Public Inquiry*, Report by Sir Frank Layfield, Department of Energy.

Mihályi, Péter, (1993) 'Hungary: a unique approach to privatisation - past, present and future', chapter 6 in *Hungary: an Economy in Transition*, edited by István P. Székely and David M.G. Newbery, Cambridge: University Press.

NBH (1992) *National Bank of Hungary Annual Report 1992*, Budapest, National Bank of Hungary.

OECD (1992a) *Energy Policies: Hungary, 1991 Survey*, Paris: OECD/IEA

OECD (1992b) *Energy Policies: Czech and Slovak Federal Republic, 1992 Survey*, Paris: OECD/IEA

Newbery, D.M. and R. Green (1993) 'Regulation, public ownership and privatisation of the English electricity industry', mimeo DAE Cambridge, forthcoming in R.J. Gilbert (ed.) *International Comparisons of Electricity Regulation*

Newbery, D.M. (1993) 'The Impact of EC Environmental Policy on British Coal' *Oxford Review of Economic Policy*, Dec.

Spiller, P. and L.V. Martorell (1992) 'How should it be done? Electricity regulation in Argentina, Brazil, Uruguay and Chile', mimeo UC Berkeley, forthcoming in R.J. Gilbert (ed.) *International Comparisons of Electricity Regulation*

Valentiny, Pál, (1979) *Company Development and State Intervention (The case of the heavy electrical industry)*, Hungarian Academy of Sciences Institute of Economics Studies No. 16, Budapest.

World Bank (1992) *Czech and Slovak Federal Republic Energy Sector Review*, Report 9768-CS, January 28, 1992, World Bank, Washington, DC

Yergin, D. (1992) *The Prize: the epic quest for oil, money and power*, New York: Simon and Schuster