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Regulatory Opportunism and Asset Valuation: Evidence from the US Supreme Court and UK Regulation

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Abstract

This paper compares the evolution of the treatment of the asset base in the US with the equivalent evolution in the regulatory framework applied to privatised utilities in the UK. A particular concern is to look for common themes and lessons. We analyse the relevant US Supreme Court cases between Smyth v Ames (1897) and Hope Natural Gas (1944). These cases suggest that changes in preference as to the appropriate asset base appear to be somewhat sensitive to underlying changes in prices. This is tested using logit and multinomial logit regressions. We find that both the companies and regulators are opportunistic and that regulators appear to be more opportunistic than companies. We then assess the UK regulation evidence. The UK evidence is consistent with and supportive of the US conclusions but because of the limited data it cannot be more than suggestive.

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Summary

The last two decades have probably witnessed more rapid growth of utility regulation that at any other previous time, fuelled by the wave of privatisation that has taken place all over the world. Privatisation has shown itself to be a significant additional ingredient to the traditional regulatory framework. It has thrown up fresh and unforeseen challenges and proved the catalyst to revisit and revise some of the established conventions. In particular, since the vexed question as to what is the appropriate asset base for regulation turned out to be one of the longest running and hardest problems to resolve in the US regulatory framework, it was no surprise to find that it is a central and equally awkward problem in the development of the regulation of privatised utilities. This paper compares the evolution of the treatment of the asset base in the US with the equivalent evolution in the regulatory framework of privatised utilities in the UK. A particular concern is to look for common themes and lessons.

In the US the relevant asset base for regulatory purposes was confused until 1944. The uncertainty stemmed from the Smyth v. Ames case at the end of the nineteenth century, which established the ill defined notion of 'fair value', and was only resolved to any significant degree in the seminal Hope Natural Gas Case of 1944, which Bonbright described as 'one of the most important economic pronouncements in the history of American law'. We summarise the primary events between Smyth v Ames and Hope Natural Gas. Two points emerge. One, an extremely obvious point, is that the time that was taken to reach a moderate consensus was extremely long. The impasse between the company and the state regulator in the Smyth v. Ames case occurred in 1893 and the Supreme Court judgement in the FPC v. Hope case was delivered in 1946, i.e., more than 50 years difference. The second, more tentative and interesting conclusion, is that the changes in preference as to the appropriate asset base appear to be somewhat sensitive to underlying changes in prices. Several authors have already drawn attention to the fact that the companies appear to have switched sides in the early twentieth century and it has been inferred that this switch was caused by movements in the price level.

We seek to test the view that companies and/or regulators are opportunistic in this sense. Although data is limited there are sufficient Supreme Court cases to conduct some formal statistical tests of the view that the 'contestants' have been largely opportunistic. The specific question we address is whether the probability that the participants choice of asset base is informed by changes in capital good prices in the previous 15 and 20 years (more formally, we conduct logit regressions on the participants' views given in the critical Supreme Court cases between 1998 and 1944).

There are 26 relevant Supreme Court cases. With the exception of two, a ferry bridge and a stockyard, they are concerned with main network utilities. Within the 26 cases the preferred choice of asset base of any particular party is complex and difficult to categorise simply. However, it is not possible to apply statistical techniques unless we have few categories so we focus on historical cost (HC - essentially assets valued at purchase price) or reproduction cost (RC - essentially some estimate or recognition of what it would cost to replace the assets at the time of rate setting). Given this categorisation, companies preferred a historic cost asset base in the earliest three cases, but thereafter consistently chose reproduction cost. The pattern for regulators is less clear-cut and the change over time is quite rich. Ordering the cases to reflect the relevant regulatory date shows there are nine switches between HC and RC.

Companies appear more likely to select reproduction cost in times when the price index was trending upwards, although this effect is marginally significant (at the 5% level). In contrast, we find that that regulators tended to favour historic cost asset bases in times of rising prices (if we exclude the bridge and stockyard) and that this relationship is highly significant. It is essential to emphasise that we have found this result on regulatory data that stops at the Hope Case. Taking advantage of the Hope Judgement, many regulators shifted to historical cost. Given the levels of inflation from 1944 onwards, statistical tests based on data that incorporates this wider data would presumably overwhelmingly find strong evidence of opportunism. Assessing data that stops at Hope creates a very tough test. There is very limited data to assess the Supreme Court but we conclude, extremely tentatively, that the Supreme Court behaved impartially in this respect.

A difficulty with interpreting the results is that there may be a sample selection bias introduced by focusing on cases which reached the Supreme Court. A possible interpretation is that companies are behaving opportunistically but that the regulators only appear to do so because we are looking at cases with some form of asset base dispute. The existing evidence indicates that this may not be the case for two reasons. One is that there is far more switching in the regulatory context that the companies context. If companies were the main driver of the regulator's choice of asset base within the data set then one would expect to see at least as much switching by companies. Second, once the unusual cases are omitted, the statistical results are far stronger for regulators than for the companies.

However, there are additional ways to throw more light on the driver for the opportunistic results. If the sample selection argument is a significant problem then

one might expect to find that the results would be improved if they are estimated for a sub-sample where those cases where the regulator and the company agreed about the form of the asset base are omitted. We find that the significance levels generally fall significantly. Another way of 'testing' whether it is the results for the company which are driving the results for the regulator is to include the companies preference along with change in capital good prices as a potential explanatory variable of the regulator's choice. We find that the price change remains significant but the company's preference is not significant in explaining the regulator's choice. These results provide support for the hypothesis that it was not the companies preferences that are explaining the results for the regulators.

The US evidence shows explicitly the 'political' import of the asset base issue and how difficult it is to reach consensus. However, this lesson was not taken on board in the privatisation process in the UK. Our analysis of the prospectuses and debate prior to the early privatisations shows that no effort was made to consider the asset base issue before privatisation. It is surprising in the light of the US experience. Indeed, when one puts the US and UK evidence together it is somewhat amazing that tens of billions of pounds worth of companies were privatised without there being any discussion, let alone assurances, as to how the assets of the company would be valued when prices came to be set in regulatory reviews.

We find that, in the context of the type of opportunism that we have found in the US Supreme Court evidence, the UK evidence is consistent and tends to suggest opportunism. However, because of the limited data it cannot be more than suggestive. All UK utilities were privatised at values below the current cost accounting (CCA - loosely reproduction cost) value of the assets so the use of market value (share price plus debt) has been significant in the UK model.

The evidence for the companies is that they always preferred higher asset definitions than the regulator but given the strong preference for CCA by most companies there is, as with the US, little shift in the data. The regulatory position is more varied. Briefly, the situation, viewed from a focus on potential opportunism, is as follows. The telecommunications regulator made one shift of asset base. This decision to shift to CCA from HC occurs at the point when the relevant CCA values fall below their HC equivalent is strongly consistent with an opportunism interpretation. Furthermore, the market value in telecommunications was far higher than the HC values used as the asset base but less than CCA. The argument that shareholders paid less than CCA is normally the one that is used to underpin the market value approach. A market value approach could have been used by the regulator given the regulator's

stated lack of confidence in the CCA figures of the regulated company. In the gas context the prices paid by shareholders were lower far than CCA and the regulator argued that the assets purchased at privatisation should earn no more than what they had earned before privatisation. This led to the implementation of an implicit market value approach. In the water sector it was clear that CCA was completely unacceptable and an alternative model was used for analysis at privatisation. These were the indicative values. They were consistent with the gas regulator's view that pre privatisation assets return should be based on pre privatisation returns. However, at the first review the regulator rejected the indicative values, preferring to use a lower initial market valuation as the asset base. In electricity the initial market value was taken with an uplift of 50% but this has been adjusted from 50% to 15% at review and has since been reduced to 7.5% in the case of NIE. The uplift was zero for NGC and Railtrack.

Taken together the UK evidence is consistent with opportunistic behaviour. Indeed, if one approaches the UK evidence with a prior view derived from the US evidence, i.e., that there is a strong case for the view that there is inherent opportunism in the regulatory system, then the analysis of the UK evidence strengthens this view. However, the data is such that one can only draw suggestive conclusions from the UK evidence; it is far from conclusive since there are other arguments in each case for the regulatory choice.

1. Introduction

Traditionally governments have relied heavily on direct ex ante regulation of prices rather than ex post mechanisms of general competition law to control market failures arising from market power of privately owned utility companies. The ex ante model of regulation has been refined in the US in the first half of the twentieth century and, albeit with shifts in emphasis, in particular from rate of return to price cap regulation, has been exported widely to the rest of the world. The last two decades have probably witnessed more rapid growth of utility regulation than at any other previous time, fuelled by the wave of privatisation that has taken place all over the world.

Privatisation has shown itself to be a significant additional ingredient to the traditional regulatory framework. It has thrown up fresh and unforeseen challenges and proved the catalyst to revisit and revise some of the established conventions. In particular, since the vexed question as to what is the appropriate asset base for regulation turned out to be one of the longest running and hardest problems to resolve in the US regulatory framework, it was no surprise to find that it is a central and equally awkward problem in the development of the regulation of privatised utilities. This paper compares the evolution of the treatment of the asset base in the US with the equivalent evolution in the regulatory framework of privatised utilities in the UK. A particular concern is to look for common themes and lessons.

In the US the relevant asset base for regulatory purposes was unresolved for the first half of the twentieth century. The uncertainty stemmed from the Smyth v. Ames case, which established the ill defined notion of 'fair value, at the end of the nineteenth century and was only resolved to any significant degree in the seminal Hope Natural Gas Case of 1944 which Bonbright described as 'one of the most important economic pronouncements in the history of American law'. We summarise the primary events between Smyth v Ames and Hope Natural Gas in Section 2.1. One of the conclusions we draw from this study is that during this period the preferred choices of regulators and, to a lessor extent, companies appeared to be opportunistic to some degree, being influenced by changing prices. Sections 2.2 and 2.3 consider this issue in more detail

by applying logit and multinomial logit regressions to data drawn from the critical Supreme Court cases of the period. We find evidence that the probability that companies and regulators chose historical cost or reproduction cost as their preferred asset base is affected by the change in capital good prices over the preceding 15 and 20 years. The evidence is stronger for the regulators. An important point to note is that we have created a tough test since we use data that stops at the Hope case. Including any data that essentially incorporates the consequences of the Hope judgement on regulators would provide for a far weaker test.

The US evidence shows explicitly the 'political' import of the asset base issue and how difficult it is to reach consensus. However, this lesson was not taken on board in the privatisation process in the UK. We show in section 3.1 that no effort was made to consider the issue before privatisation. It is surprising, particularly in the light of the US experience, that there was no mention of asset base issues in a regulatory context in the run up to the UK privatisations. Section 3.2 shows how the asset base issue developed in the UK. We find the approaches differ markedly between the industries. A particular feature of the UK privatisation process is that the companies were all sold for less than the replacement cost of the assets. This feature has had a growing impact on regulatory decisions over time. In the light of the results of the investigation of the US evidence we assess the regulators' choices in the UK in relation to the difference in valuations between alternative preferred asset bases. We conclude that the choices of the companies and regulators are consistent with an interpretation of opportunism but given the lack of data it is far from conclusive.

Section 4 draws conclusions. Detailed evidence of the US cases are given in Appendices 1 and 2.

2. Evidence from the US Supreme Court

The preferred choice of asset base in the United States was debated and finally settled in a long series of Supreme Court cases which took place between the 1890s and the 1940s. We begin by looking at these cases, describing how the controversy over the choice of asset base arose, the directions that the debate took and how it was finally decided. Using the limited data available, we then formally test the extent and nature of opportunistic behaviour by companies and regulators.

2.1 Case Law from the US Supreme Court

The case which began the major debate about the asset base question in the United States was *Smyth v. Ames.* This exercised a powerful and confusing influence on US regulation for the following fifty years. The origins of this case went back to 1893 when the state of Nebraska established a Board of Transportation to determine maximum prices that could be charged by railroads. There was much popular support for reducing railroad prices in Nebraska, particularly from farmers, and the Board ordered a substantial cut in prices. The new prices set were unacceptable to the railroads, and their legal challenge reached the Supreme Court as *Smyth v. Ames* (1898).[1] Several of the railways had been built in the 1860s and 1870s, when prices were much higher than they were by the end of the nineteenth century. Therefore, the railways argued that they should receive a return on the original cost of their investment. The state contended, on the other hand, that the capital should be measured at reproduction cost, which would give a much lower figure.

When the Supreme Court gave judgement in the matter it found that railroads were entitled to fair payment, and that prices too low for fair reward were confiscatory, and therefore illegal under the Fourteenth Amendment. The Supreme Court laid down what it thought should be the method for valuing the assets of regulated firms:

[1] See Huneke, *The Heavy Hand*, Ch VI for details of the background to Smyth v. Ames.

> We hold, however, that the basis of all calculations as to the reasonableness of rates to be charged by a corporation maintaining a highway under legislative sanction must be the fair value of the property being used by it for the convenience of the public. And, in order to ascertain that value, the original cost of construction, the amount expended in permanent improvements, the amount and market value of its bonds and stock, the present as compared to the original cost of construction, the probable earning capacity of the property under particular rates prescribed by statute, and the sum required to meet operating expenses, are all matters for consideration, and are to be given such weight as may be just and right in each case. We do not say that there may not be other matters to be regarded in estimating the value of the property. What the company is entitled to ask is a fair return upon the value of that which it employs for the public convenience. On the other hand, what the public is entitled to demand is that no more be exacted from it for the use of the public highway than the services rendered by it are reasonably worth.[2]

This judgement gave six different criteria for assessing the value of the asset base: the original cost of construction and the amount spent on permanent improvements; the amount of bonds and stock; the market value of bonds and stock; the present as compared with the original cost of construction; the probable earning capacity of the property; and operating expenses.

Of these measures, four were rejected in the early years of the twentieth century. Operating costs were irrelevant to the asset base while using the amount of bonds and stock was an inducement to over-capitalisation. Earning capacity and the market value of bonds and stock were rejected on the grounds of circularity: they depend on the earnings of the utility, which in turn depend on the prices that are charged.[3] Although the basic form of circularity was ruled out quite quickly by the Supreme Court, other more subtle forms continued to be included in the rate base, for example through the inclusion of factors such as good will or going value. [4] But, having ruled out four of the six possible rate base measurement methods, the most contentious debate was over the choice between the remaining two: original cost of construction and the amount spent on permanent improvements (i.e., historic cost) and the present as compared with the original cost of construction (i.e., reproduction cost).

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[2] Smyth v. Ames 169 U.S. 466 (1898).
[3] Phillips, *Regulation of Public Utilities*, p 321.

The next important case following *Smyth v. Ames* was *Willcox v. Consolidated Gas Co*. (1909). The background to this case was that the Public Service Commission of New York State had enacted a law in 1905 limiting the price of gas sold in the city of New York to 75 cents per thousand cubic feet. The Consolidated Gas Company regarded this as confiscatory. In its verdict the Supreme Court held that:

> The value of the property is to be determined as of the time when the inquiry is made regarding the rates. If the property which legally enters into the consideration of the question of rates has increased in value since it was acquired, the company is entitled to the benefit of such increase.[5]

Clearly this statement emphasised current costs rather than historic costs, and was often to be cited as a precedent in later cases.

In the Minnesota rate cases of 1913 suits were brought by the stockholders of three railroad companies (Northern Pacific, Great Northern, Minneapolis & St Louis) to restrain the enforcement of two orders of the Railroad and Warehouse Commission of the state of Minnesota and two acts of the legislature of that state from bringing into force various maximum charges for transporting freight and passengers (for example setting two cents per mile as the maximum fare for passengers).[6] The judgement of the Supreme Court again tended to lay stress on the importance of reproduction cost:

> The making of a just return for the use of the property involves a recognition of its fair value if it be more than its cost. The property is held in private ownership and it is that property, and not the original cost of it, which the owner may not be deprived without due process of law.

So, in both of the major cases, *Willcox v. Consolidated Gas Co* and *Minnesota,* and in six minor cases which were decided prior to the First World War, the Supreme Court consistently supported the position that the company was entitled to the increase in value.[7]

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[4] For an early example see Henderson, 'Railway Valuation and the Courts'. *Harvard Law Review*, 1919/20; for further discussion and references refer to Bonbright, *Valuation of Property*, Ch. 30; Bonbright, *Principles of Public Utility Rates*, (2nd edn) pp 216-220.

[5] Willcox v. Consolidated Gas Co 212 U.S. 19 (1909).

[6] Minnesota Rate Cases (Simpson v. Shepard) 230 US 352 (1913).

[7] Montgomery, 'Judicial Fair Value and the Price Level' p 225.

As the general price level rose in the 1920s, so the gap between reproduction cost and historic cost valuation widened. Confusion in the Supreme Court persisted. Three important cases were settled in 1923. In the *Southwestern Bell Telephone* case the company was contesting the Public Service Commission of Missouri's decision to adopt, essentially, historic cost for the asset. The company sought a valuation based on replacement cost at the much higher price level prevailing in 1923. The Supreme Court found that rates had been set too low by not allowing for replacement costs in asset valuation.[8] Supreme Court decisions were majority verdicts, and dissents by one or more justices on the panel were not uncommon. In this case, a famous dissent by Justice Brandeis agreed that rates had been set too low, but maintained that historic cost, not replacement cost, should be used as the basis for asset valuation. Such an asset base would include only 'prudent investment', not investment which was obviously wasteful or unnecessary. The asset base had to be, 'definite, stable, and readily ascertainable'. Using these criteria Brandeis first ruled out the use of market value, referred to in *Smyth v. Ames*, on grounds of circularity.

> It is impossible to find an exchange value for a utility, since utilities, unlike merchandise or land, are not commonly bought and sold in the market. Nor can the present value of the utility be determined by capitalising its net earnings, since the earnings are determined, in large measure, by the rate which the company will be permitted to charge; and thus, the vicious circle would be encountered.

Brandeis argued that replacement cost was subject to wide margins of error since experts could not agree what the correct replacement cost should be:

> The conviction is widespread that a sound conclusion as to the actual value of a utility is not to be reached by a meticulous study of conflicting estimates of the cost of reproducing new the congerie of old machinery and equipment, called the plant, and the still more fanciful estimates concerning the value of the intangible elements of an established business.

Thus, historic cost was preferred on grounds of certainty:

> Such measures offer a basis for decision which is certain and stable. The rate base would be ascertained as a fact, not determined as a matter of opinion. It would not fluctuate with the market price of labor, or materials, or money. It would not change with hard times or shifting populations. It would not be distorted by the fickle and varying judgments of appraisers,

[8] Southwestern Bell Telephone Co. v. Public Service Commission, 262 U.S. 276 (1923).

> commissions, or courts. It would, when once made in respect to any utility, be fixed for all time, subject only to increases to represent additions to plant, after allowance for the depreciation included in the annual operating charges. The wild uncertainties of the present method of fixing the rate base under the so-called rule of Smyth v. Ames would be avoided; and likewise the fluctuations which introduce into the enterprise unnecessary elements of speculation, create useless expense, and impose upon the public a heavy, unnecessary burden.

Despite this eloquent defence of the use of historic cost the Supreme Court continued to give varying views of the appropriate measure of the asset base.

In two further cases in 1923, both handed down on the same day, June 11th, the Supreme Court supported reproduction cost in one, and historic cost in the other. In the *Bluefield Water Works* case, the Public Services commission of the state of Virginia had made an order setting rates for the company which supplied water in the city of Bluefield, West Virginia in 1920. The Commission had based its decision on historic cost valuation of assets of the company of $460,000 but the company presented evidence that reproduction cost gave a much higher figure of as much as $900,000 and argued that this should form the asset base. The Supreme Court concluded that the Commission's valuation could not be sustained, and gave judgement in favour of the company. In the second of these cases, *Georgia Railway and Power Co v. Railroad Commission*, with Justice Brandeis delivering the verdict, it substantially endorsed the use of original cost.[9] The Georgia Railway and Power Company supplied gas in Atlanta and was regulated by the Railroad Commission. In 1921 the Commission decided that the maximum price for gas, of $1.65 per thousand cubic feet, was too high and, after evidence had been heard, ordered that the rate should be reduced to $1.55. Once again, at the heart of the dispute were differences of opinion about the valuation of the asset base, with the Commission determining a figure of $5,250,000 and the company estimating it at $9,500,000. In fact it seemed that the Commission had allowed the company to raise its prices in a series of stages from $1 per thousand cubic feet in 1918 to $1.90 when costs were at their highest in 1921. Thereafter the maximum price had been reduced back down to $1.65 and then

[9] Bluefield Waterworks v. Public Service Commission, 262 U.S. 679 (1923); Georgia Railway and Power Co. v. Railway Commission, 262 U.S. 625 (1923).

to $1.55 as prices fell again. Thus the Commission had done all it could to allow the company a fair rate of return in this case.

In stating the verdict of the Supreme Court Brandeis maintained that the rule under *Smyth v Ames* said that the Court should take reproduction cost into account but it did not determine the rate base to be set. But the verdicts in these three cases of 1923 revealed many contradictions. Thus, by the mid-1920s, there was considerable confusion about what the appropriate asset base of a utility should be.

Not surprisingly, academic discussion by economists became particularly intense at this time. The *American Economic Review* carried an early paper by Gray that laid out the issues and interestingly cast the discussion in terms of principal and agent and incentives. There were many further contributions in the inter-war years, with multi-author debates occurring in the journal in 1924, 1927 and 1928. Those arguing for historic cost included James Bonbright of Columbia University and John Bauer of Princeton, while the leading defender of reproduction cost was Harry Gunnison Brown from the University of Missouri.[10] Loosely, the advocates of historic cost tended to argue that it was a stable and certain way of measuring the asset base, whilst reproduction cost was difficult to measure (and forever changing) so that its use caused frequent and lengthy regulatory hearings. Supporters of reproduction cost argued from basic economic principles emphasising that a reproduction cost asset base would enable the regulatory system to mimic the effects of a competitive market.

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[10] John H. Gray, 'The Regulation of Public Service Corporations: The Vagaries of Valuation', AER 4/1, Papers and Proceedings, 1914, 18-44; John Bauer, 'Bases of Valuation in the Control of Return on Public Utility Investments', AER 6/3, 1916, 568-588; John Bauer 'Recent decisions by the Supreme Court of the United States on Valuation and Rate Making', with discussion by Robert L Hale and William L Ransom, AER 14/2, 1924, 254-282, and reply by Bauer to Ransom's comments, AER 14/4, 1924, 658-672; Harry Gunnison Brown, 'Railroad Valuation and Rate Regulation', JPE, 33, 1925, 505-530; John Bauer, 'Rate Base for Effective and Non-speculative Railroad and Utility Regulation', with reply by Harry Gunnison Brown and Bauer's rejoinder, JPE, 34, 1926, 479-513; Round Table conference on 'The Problem of Effective Public Utility Regulation' with contributions by John Bauer, Robert L Hale, Clarence E McNeill, J.C. Bonbright, Martin G. Glaeser, AER Papers and Proceedings, 17/1, 1927, 123-127; Arthur T. Hadley 'The Meaning of Valuation' and James C. Bonbright, 'Railroad Valuation with special reference to the O'Fallon decision' with comments by L Sharfman and Harry Gunnison Brown, AER Papers and Proceedings, 18/1, 1928, 173-216; G Lloyd Wilson and Joseph R Rose, 'Some Recent Trends in Public Utility Regulation', AER 29/4, 1939, 746-759; James C. Bonbright, 'Major Controversies as to the Criteria of Reasonable Public Utility Rates' AER Papers and Proceedings, 30/5, 1941, 379-389; James C. Bonbright, 'Utility Rate Control Reconsidered in the Light of the Hope Natural Gas Case, AER Papers and Proceedings 38/2, 1948, 465-482.

If, on the other hand, utilities set their prices on the basis of historic costs then serious distortions would be introduced into the economy. Underlying the wide-ranging debate in the 1920s and 1930s was the concern that if public utility regulation was not reformed and improved then the existing trend towards government ownership of utilities would be strengthened.[11]

In the later 1920s, the Supreme Court appeared to be leaning towards reproduction cost as the best measure of the asset base, as shown by its verdicts in *McCardle v. Indianapolis Water Co* (1926), and in *St Louis & O'Fallon Railway Co v. United States* (1929).[12] The starting point in the Indianapolis case was a request by the Indianapolis Water Company to its regulator, the Public Service Commission of Indiana for an increase in prices in 1923, because its rate of return was too low. The Commission decided that the existing rates were indeed too low but that the rates the Company wished to charge would be exorbitant and discriminatory. The Commission set a compromise figure for the allowed increase but the company was not satisfied. In estimating the rate base the Commission had used a figure for reproduction cost but based on the average prices prevailing in the ten years to the end of 1921. The Supreme Court found this to be inadequate:

> But in determining present value, consideration must be given to prices and wages prevailing at the time of the investigation; and in the light of all the circumstances, there must be an honest and intelligent forecast as to probable price and wage levels during a reasonable period in the immediate future.

So, the verdict in this case was in support of 'spot' reproduction costs.

Although the O'Fallon Railway was small, the results of this case were keenly awaited because of the many years of work which had been put into railroad valuation by the Interstate Commerce Commission. The Commission had eventually decided on a method predominantly based on historic cost, and rejected current costs. The Supreme Court overturned the Commission's decision since it did not 'give

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[11] Bonbright, *Valuation of Property*, Vol. II, p 1154; Cabot, 'Public Utility Regulation I, p 264.

[12] McCardle v. Indianapolis Water Co, 272 US 400; St Louis & O'Fallon Railway Co v. United States, 279 U.S. 461 (1929)

consideration to current, or reproduction costs'. The Court did not state how much weight should be placed on reproduction cost since 'that is not the matter before us'. Nonetheless, the verdict was seen as implying that reproduction cost should be the main factor taken into account in valuation.[13]

However, in *Los Angeles Gas and Electric Corp. v Railroad Commission* (1933), Chief Justice Hughes, delivering the verdict of the Supreme Court in an era of falling prices following the Wall Street Crash, stated that estimates of reproduction cost made in the late 1920s were unreliable.[14] The Railroad Commission of California, which regulated the Los Angeles Gas and Electric Company, had set its gas prices in 1928 in a way which it estimated would yield a return of just over 7.5 per cent. However, by 1930 the Commission believed that the company was actually earning far more and it fixed new gas prices to prevent excess returns. The company argued that its estimate of reproduction cost implied that its rate of return was now too low. The Supreme Court found that the company's estimate of reproduction cost were based on average prices over 1926 to 1929, but the price level in the 1930s was much lower. Thus the Supreme Court found in favour of the Commission. The judgement did not endorse the use of historic cost as such, but it clearly reversed the tide which had been running towards reproduction cost. Furthermore, according to Bonbright's survey academic writing on the asset base question also now began to swing in favour of historic cost.[15]

Eventually it was the *Hope* case of 1944 which put an end to the confusion begun by *Smyth v Ames*. It was this case which settled the matter of the asset base, and effectively took the courts out of the regulatory process for many years.[16] Hope Natural Gas Co. was based in West Virginia, a wholly owned subsidiary of Standard Oil of New Jersey. It produced and sold natural gas in West Virginia and in several other states. In 1938 some of its customers filed complaints with the Federal Power Commission that certain of the rates charges by Hope were excessive. The

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[13] Montgomery, 'Judicial Fair Value and the Price Level', p 231.
[14] Los Angeles Gas and Electric Corp. v. Railroad Commission of California, 289 US 287 (1933).
[15] James C. Bonbright, 'Major Controversies as to the Criteria of Reasonable Public Utility Rates' AER Papers and Proceedings, 30/5, 1941, 379-389.
[16] Federal Power Commission v. Hope Natural Gas Co. 320 U.S. 591 (1944).

Commission investigated and reached a verdict in 1942. Essentially it upheld the complaints and instructed Hope to reduce its interstate rates. In reaching this decision, the Commission had used original cost valuations of the assets to determine a rate base of $33,712,526. In its defence, the Company argued for a reproduction cost valuation yielding a rate base of some $66,000,000. The Supreme Court found in favour of the Commission - that the required price reductions were not unreasonable. The judgement made a number of points. Firstly, it confirmed that the market value of shares should not be used on the grounds of its circular dependence on the rate of return that was allowed:

> The heart of the matter is that rates cannot be made to depend upon "fair value" when the value of the going enterprise depends on earnings under whatever rates may be anticipated.[17]

Thus, an external cost basis for asset valuation was recommended but a uniquely valid method for determining the asset base was not specified in the Hope judgement.[18]

The most important result of the case was that it put an end to the involvement of the courts in settling disputes between regulated and regulators, by its emphasis on pragmatism and a presumption in favour of the Commissions:

> Under the statutory standard of "just and reasonable" it is the result reached not the method employed which is controlling..... It is not theory but the impact of the rate order which counts. If the total effect of the rate order cannot be said to be unjust and unreasonable, judicial enquiry under the Act is at an end. The fact that the method employed to reach that result may contain infirmities is not then important. Moreover, the Commission's order does not become suspect by reason of the fact that it is challenged. It is the product of expert judgement which carries a presumption of validity. And he who would upset the rate order under the Act carries the heavy burden of making a convincing showing that it is invalid because it is unjust and unreasonable in its consequences.[19]

As long as the company was able to operate successfully and to attract capital, the courts should not become involved. This doctrine of the end result made it much more

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[17] *Ibid.*, 601.
[18] Sherman, *Regulation of Monopoly*, p 188.
[19] Federal Power Commission v. Hope Natural Gas Co. 320 U.S. 591 (1944), 602.

difficult for utilities to appeal to the courts, and left decisions in practice to the regulatory commissions.

The long-term effect of the Hope was that most regulatory commissions used historic cost as their measure of the rate base. A survey of 43 states in 1954 found that 19 had explicitly switched to historic cost as a result of Hope; a further 8 had adopted historic cost in practice, though they had not formally disavowed fair value; 4 had used historic cost prior to Hope and continued to do so; while 9 were still using fair value, leaving 3 states in the survey as indeterminate.[20] A 1991 study of 53 regulatory commissions revealed that 44 were using historic cost, while 7 still adhered to fair value, and two commissions considered all the evidence, without a predetermined choice of rate base.[21]

Assessing the evidence, two conclusions appear to emerge.

- One, an extremely obvious point, is that the time that was taken to reach a moderate consensus was extremely long. The impasse between the company and the state regulator in the Smyth v. Ames case occurred in 1893 and the Supreme Court judgement in the FPC v. Hope case was delivered in 1946, i.e., more than 50 years difference. In part, the failure to converge rapidly stems from the fact that the underlying theory was being developed alongside the judicial process but this in itself cannot fully explain the time-scale since it is clear from the academic literature that the underlying economic principles were well established before 1944. This is an issue we will return to when considering the lessons of the US experience for the UK privatisation programme.

- The second, more tentative, conclusion is that the changes in opinion as to the appropriate asset base appear to be somewhat sensitive to underlying changes in prices. The companies appear to strongly favour historical cost in the 1890s when prices had been falling considerably for many years and then shift towards favouring reproduction cost. In contrast, the regulators uniformly favour

[20] Rose, in *Columbia Law Review*, 1954.
[21] Phillips, *Regulation of Public Utilities*, p 338.

> replacement cost during the early period, begin to show a stronger preference for historical cost in the period 1919 to 1923 (when the rapid capital goods inflation of the First World War began to bite), favour replacement cost strongly during the depression of the thirties before shifting back to historical cost for the Hope case during the Second World War. Several authors have already drawn attention to the fact that the companies appear to have switched sides in the early twentieth century and it has been inferred that this switch was caused by movements in the price level.[22]

These two conclusions are unlikely to be independent. It far harder for the Supreme Court to impose a consensus when the parties have opposed interests in the cases under consideration.

As indicated above, the conclusion of opportunism is more tentative than that of slow convergence and worthy of further investigation. There is limited evidence on which to base a detailed investigation of opportunism since the number of legal cases that addressed the specific issue of asset valuation is limited. However, there are sufficient cases to conduct some formal statistical tests of the view that the 'contestants' have been largely opportunistic. The specific question we address is whether the probability that the contestants opt for historical or reproduction cost is informed by changes in capital good prices in the previous 15 and 20 years. Formally, we conduct logit regressions on the participants' views given in the critical Supreme Court cases between 1998 and 1944. To achieve this we need to identify objectively the relevant cases and relevant date for each participant, and develop an appropriate price index for capital goods. The next section outlines this process and the logit results.

2.2 The Data

The initial aim is to draw up a data set of cases in as objective a manner as possible. We have used three core sources. American Jurisprudence and the Supreme Court

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[22] Phillips, *Regulation of Public Utilities*, pp 321-2; Pierce and Gellhorn, *Regulated Industries in a*

Digest are the authoritative digests that provide detailed coverage of Supreme Court cases grouped according to topic. These are included in the sources for this reason. Phillips' Regulation of Public Utilities is the leading text on utility regulation and contains a specific chapter devoted to the rate base and is included for this reason.[23] Any Supreme Court case that was referred to under 'rate base' or in the rate base section of at least two of these three sources is included. This provided 39 such cases but not all of these cases related to choice of asset base.[24] The 39 cases have been examined carefully and reduced to a subset which contain information on the choice of the asset base. The subset consisted of 26 cases.

The 13 cases that have, for our purposes, been rejected deal with topics such as the appropriate division of the asset base between interstate and intrastate business, the treatment of depreciation, etc. The 26 cases remaining include the important Supreme Court cases on the asset base question including Smyth v. Ames, the Southwestern Bell case, the Minnesota rate cases, the Los Angeles Gas case and the Hope case of 1944. Further information on the reasons behind the inclusion and exclusion of cases is contained in Appendix 1.

The 26 cases are listed in Table 1 along with the relevant sector and the type of regulator involved. The main network utilities such as water, railways, electricity and telecommunications are all represented, while the gas industry is a particularly strong presence. There is a preponderance of local, municipal regulators in the early cases, while state and federal regulators are preponderant in the later cases. This reflects the history of the development of regulation in the United States. Local regulators were gradually replaced by the introduction of state-level commissions, while federal regulatory bodies became increasingly common in the 1930s. There are two unusual cases - one involving a ferry bridge and the other a stockyard. Both of these are outside what would normally be regarded as the utility sector.

Nutshell, pp 104-5.

[23] The relevant sections were Phillips, *Regulation of Public Utilities* (3rd edn), Chapter 8: The Rate Base; Digest of US Supreme Court Reports, Volume 11B, Public Utilities, B18 – B25; American Jurisprudence (2nd edn, 1972), Volume 64, Public Utilities, Rate Base, Sections 138-172.

[24] Here we use rate base and asset base interchangeably.

Within the 26 cases the preferred choice of asset base of any particular party is complex and difficult to categorise simply. However, it is not possible to apply statistical techniques unless we have few categories so we focus on historical cost (essentially assets valued at purchase price) or reproduction price (essentially some estimate or recognition of what it would cost to replace the assets at the time of rate setting). These are obvious categories, but even so the cases do not fall fully into each one. For this reason, we have categorised the preference of asset base made by companies, regulators, and the Supreme Court into, on the one hand, a historic cost group or, on the other, a group consisting of either reproduction cost or a significant element of reproduction cost. Even with this broader grouping all participants choices cannot be categorised. The results of this categorisation are listed in Table 2. A star indicates when the preference is for a significant element of reproduction cost but falls short of full endorsement of reproduction cost.

Table 2 also contains relevant dates. We wish to test whether past changes in capital goods prices influence participants choices so it is essential that the appropriate date be attached to the participant's preference. Choice of date is not straightforward because there are often long lags between the initial regulatory decision and the final settlement of the matter in the Supreme Court. The Supreme Court's date is obvious but this is less so for the regulator and the company. In general the date for these is the point at which the impasse was reached and the case sent to the Supreme Court. In every case this is at least one year before the Supreme Court judgement. Evidence for our dating of each case is listed in Appendix 2.

Table 2 shows that companies preferred a historic cost asset base in the earliest three cases, but thereafter consistently chose reproduction cost. That is, there is only one switch in preference. The pattern for regulators is less clear-cut and indeed the change over time is quite rich. The cases are ordered in Table 2 according to Supreme Court date. If the cases are re-ordered to reflect the regulatory date then there are nine switches.[25] Note that it is not possible for the regulator to categorise all 26 cases. It is harder still to categorise the Supreme Court judgements since they

resolve specific aspects of the dispute and do not always elaborate on the form of the asset base. It is only possible to identify 13 cases. The details of each case, including the reasons for our categorisations of the choices of asset base, are discussed in Appendix 1.

Turning to the issue of a capital goods index we are able to use official US Department of Commerce data for the period from 1929 to obtain an annual series for the price of capital goods. We obtain this from the difference between the gross private domestic investment in current prices and the equivalent series in constant prices. (Gross private domestic investment from Tables 1.1 and 1.2 of US Dept of Commerce, *National Income and Product Accounts of the United States*, Volumes I and II). For the period prior to 1929 there are no official series for capital goods prices available. However, Simon Kuznets produced annual series for gross capital formation in both constant and current prices for the period before 1929. Again an implicit price index of capital goods can be constructed from this data which we use up to the year 1929.[26] Unfortunately, this Kuznets annual series commences in 1889. Since we are using a twenty-year index of prices we need price data well before 1889. Kuznets has a five-year moving average for as far back as 1871 and we have used this for the period up to 1889. Therefore, our final capital goods price series comes from splicing together the Kuznets five year moving average (1871 to 1889), the Kuznets annual series (1889 to 1929) and the US Department of Commerce series (for 1929 onwards). This provides a series for capital goods prices, on an annual basis, from 1871 onwards. This series is given in Appendix 3.

Having obtained the annual series for capital goods prices, we use it to construct an index of movements in capital goods prices over the long term. The measure which we construct is based on the notion that capital for such industries will wear out gradually and so does not give too much weight to current prices. Specifically, we take the following index over T years:

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[25] A switch is defined as a Supreme Court case where the stated preference for the previous case is a different category.

[26] Simon Kuznets, *Capital in the American Economy: its Formation and Financing*, (Princeton University Press, 1961), Tables R4, R5, R22, R23.

$$I_T = (1/T)\, \Sigma_T\, P_t/P_{t-1}$$

for the cases T=20 and T=15. These are given in Appendix 3. These measures are essentially a ratio of the average current prices of capital goods to their historic costs. Subtracting unity provides a positive measure when prices have been rising and a negative measure when prices are falling. This is multiplied by the average age of the equipment and used as a measure of price change (I'). That is, the INDEX variable is:

$$I'_T = [I_T - 1]\, T/2.$$

These are given in Appendix 3.

2.3 Analysis

To assess the effect of price movements on the companies' and regulators' choices of asset bases we conduct a series of logit (and one multinomial logit) regressions. The dependent variables in the equations are the choices of asset base by either the companies (CCOMP), the regulators (CREG) or the Supreme Court (CSCOURT). In the logit regressions the dependent variable takes either the value 1 for historic cost, or 0 for reproduction cost. Logit regressions have to be used as it is inappropriate to use ordinary least squares estimators because the dependent variable takes on discrete values and OLS regressions will predict out of bounds.

We are testing for a relationship between these choices of asset base and movements in the price level. For example, if companies became more likely to select a reproduction cost asset base in response to a rising trend of capital goods prices we would expect to see a significant relationship between choice of asset base and the price index we have constructed. The detailed results of our analysis are presented in Tables 3 to 11.

Table 3 reports the results of logit regressions for the companies in the data set. The relationship between the companies' choice of asset base and the capital goods price index are shown, both for the fifteen year price movements and twenty years. We report results for the full data set and where one or both of the unusual cases are

omitted. The two special cases are Clark's Ferry Bridge (Case 18) and Denver Union Stock Yard (case 23). The relationship is significant in these regressions albeit marginal at the 5% level.[27] The signs on the INDEX variable in the equations are negative, indicating that the companies became more likely to select reproduction cost in times when the price index was trending upwards.

Table 4 reports equivalent results for the regulators. Here, the effects of the two special cases are crucial. For the full data set, we do not obtain a significant coefficient on the INDEX variable, either for price movements over 15 or over 20 years. However, once the two unusual cases are omitted the results become highly significant. In practice only one of the two special cases is critical as is seen when Clark's Ferry Bridge alone is omitted. Omitting the two cases makes little difference to the results with Clark's Ferry Bridge alone omitted. These estimates support the hypothesis that regulators tended to favour historic cost asset bases in times of rising prices. In particular the z-statistics are higher for the regulators' case than for the companies. This reflects the far larger number of switches in the regulator context.

Estimates for the Supreme Court's preferred asset base have to be conducted on a very small data set of only twelve cases and one must exercise care in trying to read very much into equations obtained for such a small number of observations. The estimates are shown in Table 5. Generally, the results for the INDEX variable are insignificant. However, in one equation, estimating using a 15-year price index with Clark's Ferry Bridge omitted, a significant result was obtained. We suspect that this is an aberrant result.

There are two interpretations of the Supreme Court results. One is that the lack of significance is a sign, albeit a weak one, that the Supreme Court has not displayed opportunism. The other is to suggest that the data set is too small to find any significance even if opportunism is present. In an attempt to clarify the situation we have conducted the test for regulatory opportunism on the limited cases in the Supreme Court data set. The results are given in Table 6. When Clark's Ferry Bridge

[27] Throughout when we refer to significance we will be implying significance at the 5% level.

is omitted a significant value for the coefficient on the INDEX variable is present. Thus we conclude extremely tentatively on the basis of the information available that the Supreme Court behaved impartially and did not reach decisions on the basis of a preference for any particular form of the asset base.

All the above results are based on a dependent variable which takes the value 1 if historic cost was chosen by company or regulator and 0 if there was any element of reproduction cost included. Given the small number of observations this simple binary variable is our preferred way of characterising the data. However, as we have indicated it is possible to divide the data three ways: between historic cost, pure reproduction cost and some choice that lies between the two. The difficulty with introducing a third category is that it is asking the limited data to do a great deal. However, we do estimate results where the dependent variable is allowed to take the value 1 for historic cost, 0 for reproduction cost and 0.5 for middle category.

All the company decisions take the value 0 or 1, so the additional regressions are only necessary for the regulators (on the assumption that it is not worthwhile to conduct a similar exercise on the Supreme Court data set). The three categories requires the use of multinomial logit regressions rather than logit regressions. These estimates are presented in Table 7. As expected, it makes a difference whether or not the unusual cases are omitted. With Clark's Ferry Bridge excluded there is significance for the INDEX variable when the dependent variable (CREG) takes the value 1 but not when it takes the value 0.5. This is a useful additional test for regulatory opportunism since it indicates that the 'opportunistic' preference for replacement cost is robust to the removal of these cases. The number of cases in the middle category is so small that it is difficult to read anything into the lack of significance.

There are several difficulties with our approach one of which is that there may be a sample selection bias introduced by focusing on cases which reached the Supreme Court. A possible interpretation is that companies are behaving opportunistically (as might be expected if they are profit maximisers) but that the regulators only appear to do so because we are looking at cases of dispute. Cases which reach the Supreme Court are likely to be ones in which companies and regulators have strongly

disagreed. Given that companies are behaving opportunistically and there is dispute between regulator and company then the former may be appearing to be behaving opportunistically when they are not.

The existing evidence indicates that this may not be the case for two reasons. One is that there is far more switching in the regulatory context that the companies context. If companies were the main driver of the regulator's choice of asset base within the data set then one would expect to see at least as much switching by companies. Second, once the unusual cases are omitted, the absolute values of the z-statistics on the INDEX variable are far higher for regulators (2.84 to 3.00) than the companies (2.04 to 2.21). However, there are additional ways to throw more light on the driver for the opportunistic results.

One is to address the subset of cases where they disagree. The sample consists of some cases in which the regulator and the company agreed about the form of the asset base but went to the Supreme Court in dispute over some other aspect of the asset base: for example disputes over going value or the like. If the sample selection argument is a significant problem then one might expect to find that the results would be improved if they are estimated for a sub-sample where those cases where the regulator and the company agreed about the form of the asset base are omitted. Tables 8 and 9 give these results. We find that the significance levels do not generally improve. For example, in Table 4 (that estimating the effect of the 20-year price index on the regulators' choice of asset base) with both outliers omitted yields a z-statistic of 2.837. The equivalent regression in Table 9 gives a z-statistic of only 2.583. Similarly, for the 15-year price index, the z-statistic falls from 3.004 in Table 4 to 2.691 in Table 9. These results lend some support to the view that the regulatory opportunism results are not merely reflecting a form of bias in our sample.

Another way of testing whether it is the results for the company which are driving the results for the regulator is to include the CCOMP variable on the right hand side of our equations for the regulators. Essentially, we allow for the regulator's choice to be affected both by the index and the company's choice. The results of OLS estimates including CCOMP are shown in Tables 10 and 11. The CCOMP variable is not

significant in any of the regressions and the INDEX remains significant once case 18 is omitted. This provides support for the hypothesis that it was not the companies preferences that are explaining the results for the regulators.

Taken together we have some evidence that companies and regulators have behaved opportunistically. Probably the most interesting result is that on balance the evidence that the regulators have behaved opportunistically is somewhat stronger than the evidence that the companies have done so. Finally, there is no evidence that the Supreme Court have behaved opportunistically. However, due to the limited data in the Supreme Court case it is difficult to draw much of a conclusion. There is however some very weak evidence that the Supreme Court have not have behaved opportunistically in that the implication that the regulators were opportunistic remained robust when tested on the very limited set of cases that could be used to test the behaviour of the Supreme Court. We now turn to the experience of UK regulation.

3. Evidence from UK Regulation

In this section of the paper we examine the history of choice of asset base by regulatory bodies in the UK. The issue is inextricably linked with the privatisation programme in the 1980's and 1990's since before this time the major utilities were state owned. In the light of the time that was required to arrive on an agreed process in the US one would have expected that the government and regulatory agencies created by the government would have addressed the issue from the start. For this reason we begin by considering the assessment of the asset base question that occurred in the run-up to the early privatisations. As will be shown there discussion was almost non-existent. The companies were purchased with no statement of the asset base that would be used to set prices in the regulatory process. The form of asset base was developed during price reviews across the industries. Hence, we look in some detail at the asset base problem for each main privatisation and the consequent regulatory framework.

3.1 Pre-Privatisation Analysis of the Asset Base

Littlechild's *Regulation of British Telecommunications Profitability* (1983) is the first formal statement of what form the UK regulatory regime would take. A number of suggestions for regulating British Telecommunications (BT) were considered in the debate within government in the early 1980s prior to the privatisation of BT. These included proposals for a maximum rate of return, and for an output-related profit levy. In the run up to privatisation Stephen Littlechild was commissioned to study these various options and to adjudicate between them. He concluded that the existing proposals all had serious flaws and argued for a different scheme of his own, the 'local tariff reduction scheme', more usually referred to as RPI-X.

It is worth noting that Littlechild rejected the US rate of return approach notably on the US evidence showing that it gave very poor incentives for efficiency and innovation. He argued that it distorted the pattern of investment, either by discouraging desirable investment projects, or by means of Averch-Johnson effects. The burden of regulation would be heavy and the likelihood of regulatory capture

high. This might well lead to restrictions on entry and competition within the industry. The Littlechild report was brief and left a good deal of the detail for further discussion. The RPI-X regulation scheme was preferred because it would ensure that the burden of regulation was light and would have good incentive properties. There was no explicit reference to the asset base. It was not clear from the report what role the rate of return or the asset base would play in determining the price constraints that BT would face. Indeed, there is almost a feeling in the report that rate of return and asset base issues would not be a central issue.

The early documents on British privatisation made no reference to the question of how the appropriate regulatory asset base was to be determined. The Acts of Parliament which put the privatisation of particular industries (telecommunications, gas, water) into practice contained very little on the economic regulation which would be established. The RPI - 3 pricing formula that was to be applied to BT was set out in its licence (condition 24) but this did not say anything about rates of return or the asset base. The share prospectus issued at the time BT was privatised contained information about the assets of the company, both on the basis of historic costs and current costs, but it did not discuss the regulatory asset base as such.

Similarly, the water industry share prospectus and the Instruments of Appointment in 1989, although they discussed asset management plans, the pricing formula, and the setting of the initial K factors for each company, did not discuss the value which might be placed on the regulatory asset base.[28] There was, however, analysis of a derived asset base for each company at the time of privatisation. These were called indicative values and there was some expectation that these would be used for regulatory purposes (see below). Professor Littlechild's consultation document on water privatisation did, however, explicitly acknowledge that the rate of return could not be ignored even under an RPI-X system.[29] In setting a value for X, he noted that the water industry's regulator would have to take into account a good deal of detailed

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[28] British Telecom Share Prospectus, 1984; Dept of Trade and Industry, *Licence granted to British Telecommunications under Section 7 of the Telecommunications Act*, 1984; The Water Share Offers Prospectus, November 1989; Department of the Environment, *Instruments of Appointment*, August 1989.

[29] *Economic Regulation of Privatised Water Authorities* (1986)

information about the industry, including its profitability. The report stated that, 'It should now be evident that rate of return considerations are necessarily implicit in setting and resetting X'.[30]

As experience of regulation in telecommunications and gas began to accumulate, other commentators were also taking up the point that there might, in practice, be fewer differences between the British and US systems of regulation than appeared at first sight and stressing that the rate of return of the privatised industries needed to be considered by the regulator in establishing price limits. Vickers and Yarrow pointed this out, for example, in their textbook on privatisation that was first published in 1988.[31]

We have established that there was no discussion of the problem of actually determining the value of the asset base for these industries before they were privatised. The problem was left to the discretion of each regulator, and was usually considered in the run-up to the first regulatory review of pricing in each industry. We therefore need to look at experience in each of the major privatised utilities.

3.2 Industry by industry experience.

This section addresses the choice of asset base in each sector. The order presented follows the chronological order of discussion of the asset base issue in the sectors. It almost mirrors the order that the sectors were privatised with the exception that the water sector precedes the electricity sector whereas the water sector was privatised after the electricity sector.

A central issue we will consider is the evidence of opportunism. Although there are many cases that we consider (when measured in terms of the number of companies) in practice the regulators make single decisions for all the companies in their sector. Therefore, there are comparatively few independent observations and it is not possible to use statistical analysis. We are still able, however, to throw some light on this

[30] Littlechild, *Economic Regulation of Privatised Water Authorities*, para 10.21.

issue by looking at the relative size of the potential measures. The information is given in Table 12. When many of the companies were privatised their market value (stock market value plus debt) was below the CCA replacement cost of their assets. For this reason, the market value has played a significant role in the choice of asset base in the UK. Hence market value is given in Table 12 alongside the more conventional replacement cost (or CCA to be exact) and historical cost.

Finally, it is worth noting the difference between the US and UK appeal system. The US regulatory evidence was separated between the regulatory agency and the legal agency (Supreme Court). In the UK there is an industry specific regulator and the Monopolies and Mergers Commission (MMC).[32] If a company does not agree with the industry specific regulator then the case goes to the Monopolies and Mergers Commission. However, the latter is not a legal court and there is scope for a company to make a legal appeal against the MMC, so called Judicial Review. Therefore, the MMC sits somewhere between the regulator and the Supreme Court in the US system.

3.2.1 The Telecommunications Sector

The Director General of Oftel made some estimates of the acceptable rate of return for BT in 1986, and the topic was further investigated in 1988, during the first regulatory review.[33] During the 1988/89 review the Director General noted that measuring the asset base on a current cost basis would be superior in principle to the use of historic costs but he used historic cost as the asset base. He stated:

> 'After considering the above arguments, I have taken the view that the choice of a price control rule should take some account of current cost accounting results and I did so in formulating my proposals. However, I do not think that current cost accounting can be used as the sole basis for regulation unless it is also used as the main basis for reporting to shareholders.'[34]

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[31] Vickers and Yarrow, *Privatization*, pp 207, 227.
[32] The MMC is now the Competition Commission (since 2000).
[33] See Oftel, *BT's Cost of Capital* (Jan 1992), p 3 for a summary of the main results.
[34] The Control of British Telecom's Prices, OFTEL July 1988

The regulatory review that was initiated in 1992 went into much more detail. In the document which summarised the main issues[35] the Director General of Oftel stated his concern about the form of BT's accounts, particularly the problems of using historic costs to value assets, so that, 'Serious consideration must be given, as part of the price control review to requiring BT to produce more relevant accounting reports'. At this time Oftel produced a detailed document on the cost of capital for BT, which set out the alternative ways of measuring BT's rate of return, suitable types of companies to compare BT's return with and so on.[36] However, little change resulted from these discussions; historic costs continued to be used.

The issue was raised again in the 1996 review. Oftel proposed 'a move from an HCA basis of asset valuation to a CCA valuation, which would be consistent with the basing of charges on long run incremental costs. There ensued a debate between the company and regulator as to whether the company would gain or lose by this. Initially, Oftel argued that, because this would involve an upward revaluation in BT's overall asset base, there was the prospect that windfall gains to shareholders could result'.[37] BT claimed that this would not be the case for the regulated activities. After consultation and further analysis, Oftel concluded that there was a small difference between BT's HCA and CCA asset valuations for the relevant assets, and that therefore there did not need to be a gradual transition to a CCA basis. 'Oftel therefore proposes to move the basis of assessing BT's cost to a CCA basis from the beginning of the next price control period'.[38]

3.2.2 The Gas Sector

The asset base for the gas industry was settled around the time of the first regulatory review. Ofgas, the regulatory body for the gas industry, reviewed the working of British Gas's (BG's) tariff formula for the five years commencing 1 April 1992

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[35] *The Regulation of BT's prices: a consultative document* (Oftel, Jan 1992).
[36] Oftel, *BT's Cost of Capital* (Jan 1992).
[37] Oftel (March 1996), *Pricing of Telecommunications Services from 1997: Second Consultative Document on BT Price Controls and Interconnection Charging*, pp 70-1.
[38] Oftel (June 1996), *Pricing of Telecommunications Services from 1997: Oftel's proposals for Price Control and Fair Trading*, para 6.45.

between June 1990 and February 1991. As part of the review process, Ofgas commissioned studies by consultants on the appropriate rate of return for British Gas, and the valuation of the company's assets.[39] Unlike BT, British Gas prepared its accounts on a current cost basis, and pre-privatisation had been required to earn a return of 4% on the current cost value of assets. During the Review there was much disagreement between British Gas and Ofgas about what the appropriate rate of return should be, with Ofgas aiming to allow BG a CCA ROR of between 5 and 7 per cent on the assets allocated to the tariff business, and BG claiming that a higher figure, of 9.5 per cent was appropriate.[40] Ofgas essentially took the view that the assets purchased at privatisation should earn no more than what they had earned before privatisation. The outcome of this review was that BG accepted (albeit reluctantly) RPI - 5 for the non-gas component of its prices, and this came into effect in April 1992. Alongside this the issue of access prices had to be resolved. British Gas was becoming increasingly concerned that changes in the regulatory regime were having an adverse effect on its position in the market. In March 1992, BG published a consultation document on its transportation charges that dealt with the financial impact of changes in the regulatory regime, and expressed disagreement with Ofgas findings on the rate of return for third party transportation charges. In June 1992, BG put to Ofgas detailed arguments in favour of higher rates of return.[41] British Gas and Ofgas could not agree on the appropriate rate of return and the matter was referred to the Monopolies and Mergers Commission for adjudication on 31 July 1992. During the review Ofgas formulated their view on asset value arguing that since shareholders had not paid the CCA value for the assets they should only receive a return on what they paid. The Chapter in MMC report that summarised the views of Ofgas stated:

> Ofgas attached great importance to the fact that BG was privatised at a value that was considerably lower than the current cost of the assets in its balance sheet. Ofgas considered that market returns should be reduced to reflect the ratio of market capitalisation to CCA balance sheet assets…[42]

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[39] MMC (Sept 1993), *Gas and British Gas plc*, Vol 2, Cm 2316, para 8.11.
[40] MMC (Sept 1993), *Gas and British Gas plc*, Vol 1, Cm 2314, para 2.187.
[41] The events leading up to the MMC referral are discussed in MMC Report on Gas and British Gas plc, Vol 2 (Cm 2316), Ch 1.
[42] Para 11.90 of Chapter 11 of MMC Report on Gas and British Gas plc, Vol 3 (Cm 2317)

BG did not accept this view (see 16.331). The report by the MMC was published in August 1993 backed the Ofgas position. The MMC pointed out that when BG was privatised in December 1986 its market capitalisation was substantially below the replacement cost of the assets and argued that this was an important factor in assessing its rate of return. The MMC obtained several different estimates of the market to asset ratio from Ofgas and from BG. These varied according to the method of calculation and the time at which it was applied. The MAR varied from a low of 48 per cent to a high of 68.3 per cent.[43] One of the figures put forward by BG was that the MAR at 31 December 1991 was 61.9 per cent based on CCA balance sheet value and market capitalisation at that date. BG maintained that this was the most up-to-date value before the increasing uncertainty caused by the likelihood of an MMC inquiry.[44]

The conclusion reached by the MMC was as follows:

> If there was no allowance for the MAR, shareholders would enjoy significant and excessive gains at the expense of BG's customers. There is, however, no clear-cut way to allow for the MAR: indeed, there is necessarily circularity between what 'X' is permitted and stock market valuation of shares, which will reflect current and expected profitability, including the effect of regulatory uncertainty. There can clearly be no absolute precision in deriving an appropriate MAR, which will be subject to the daily fluctuations of the stock market. On balance a MAR of about 60 per cent would seem reasonable, allowing shareholders to retain many of the gains since privatisation.[45]

Thus Ofgas and the MMC adopted what was essentially a market value approach to the asset base although this was implemented through a CCA asset base with reduced cost of capital. This gave a figure that was equivalent to one substantially less than a CCA valuation of the assets (see Table 12). The underlying principle was to 'reward shareholders in a manner which takes account of the price they paid at privatisation for their assets but does not burden BG's customers with prices which reward BG excessively'.[46]

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[43] MMC Report on Gas and British Gas plc, Vol 2 (Cm 2316), paras 7.27 - 7.34.
[44] MMC Report on Gas and British Gas plc, Vol 2 (Cm 2316), para 7.28.
[45] MMC Report on British Gas plc, Vol 1 (Cm 2315) para 2.149.
[46] MMC Report on British Gas plc, Vol 2 (Cm 2316) para 7.89.

In 1996, BG again refused to accept Ofgas' proposals for pricing and regulation over the 1997-2002 period and there was a further reference to the MMC. The resulting MMC report confirmed its 1993 finding that end-1991 MAR should be used as the basis for valuation, and it also confirmed that a value for Transco (the newly separated network business) should be extracted from the end-1991 market value for BG by using an 'unfocused' approach, i.e. it was assumed that the level of discount to book value was uniform across the various constituent businesses of BG.[47] However, the MMC amended its position on depreciation:

> We accept the Director General's arguments that to allow full depreciation in revenues during the period under review may be expected to result in prices higher than necessary to finance the carrying on of Transco's activities, to the detriment of consumers of gas. We have concluded that for the period under review only MAR-adjusted depreciation should be allowed on pre-1992 assets and full depreciation on subsequent investment.[48]

3.2.3 The Water Sector

Unlike the preceding privatisation of telecommunications, gas and electricity, the asset base was explicitly considered at the time of privatisation. At the time of privatisation, in 1989, the Government made an assessment of the value of the existing assets, based on a net present value approach, which it termed 'indicative value'. Underlying the calculation was the principle that the existing owners of the companies should neither gain nor lose from the change of regulatory regime consequent on privatisation. Hence, the indicative values were set by reference to what the companies would have earned had they remained in the public sector. Prior to privatisation, the water and sewerage companies had been earning about two per cent on the replacement cost of their assets. It was assumed that they would continue to do so after privatisation, and these hypothetical cash flows were discounted by the cost of capital to determine the initial value of the assets, the indicative value.[49]

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[47] MMC, (May 1997) *BG plc*, pp 3-5, 10-12, 33-44; see also Ofgas, (June 1997), *BG Transportation and Storage: the Director General's position following the 1997 Monopolies and Mergers Commission Report.*

[48] MMC, (May 1997) *BG plc*, para 1.6.

[49] Armstrong, Cowan and Vickers, *Regulatory Reform*, p 345.

Indicative values met the Ofgas criteria of allowing pre-privatisation assets to continue to earn their pre-privatisation return.

However, in the run-up to the first periodic review Ofwat published a consultation paper (in November 1992) in which it was argued that market data now existed which could form a better measure of the asset base than indicative values.

> In advance of flotation, the Secretaries of State had no market evidence for the capital value of the former water authorities. They therefore made an assessment of the value of the existing assets of the companies, based on the cash flows that they might have generated had the authorities remained in the public sector. This approach involved a number of important assumptions, and the resulting value was subject to a wide degree of uncertainty.
>
> The market capitalisation of companies since flotation gives the Director evidence that was not available to the Secretaries of State. It provides a more direct measure of the value to which the 'reasonable return' should be applied although a number of adjustments may be required, as discussed later in this paper. [50]

The adjustments discussed in the paper included allowing for debt as well as the equity component of the companies' capital, adjusting for the expected premium on flotation, and rolling forward the asset base to take account of new expenditure.

The water industry was critical of these proposals.[51] The industry regarded the new proposals as a radical change from what had been adopted by the Secretaries of State when price regulation had first been put in place. The water industry would have much preferred to retain the higher indicative values. The industry acknowledged that these values were considerably higher than the proceeds of the privatisation of the water industry in 1989 but it was argued that this might reflect the stock markets' lack of confidence that the initial regulatory contract would actually be fulfilled in practice.[52]

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[50] Ofwat (November 1992), *Assessing capital values at the Periodic Review*, pp 4-5.
[51] The terminology water industry is used to refer to the companies. With the sector there are water only companies and water and sewerage companies. Thus the terminology water companies has a specific meaning.
[52] MMC (June 1995), *Portsmouth Water plc*, p 69.

Prior to the beginning of the regulatory review process the water industry had assumed that indicative values would continue to establish the starting value of the regulatory asset base. In fact, there was a common view that indicative values were the appropriate starting point for determining the asset base, including amongst academic commentators.[53]

In a document published in November 1993, the Director General of Water Supply (DGWS) set out the framework he was minded to adopt, including the use of initial market values, rather than indicative values. In discussing the reasons behind this decision the DGWS acknowledged that there were several alternative approaches to the valuation of the asset base, including the use of CCA or historic cost accounting valuations, indicative values, and various forms of market value. The current cost regulatory accounts were ruled out because:

> They do not provide a meaningful measure of the capital which needs to be remunerated. For example, the total net value of assets, on a current cost basis, for the industry at 31 March 1993 was £140 billion; the market value at that date (including debt) was about £15 billion.

Current market values were ruled out on grounds of circularity: the values at the time of a periodic review would be strongly influenced by expectations of the price constraints that the regulator was about to set. The reasons that the DGWS gave for not using the indicative values at the time of privatisation were that:

> This approach implies that the profits being earned by the water and sewerage companies in their final years in the public sector were appropriate indicators of their future profitability in the private sector, and also depends crucially on the discount rate assumed.

Thus, the regulator preferred a measure of initial market value. This was defined as:

> the initial capitalisation, based on share prices adjusted for the part-paid nature of the shares, plus any debt and deduction of the cash injection. This has the advantage of reflecting the value of the companies as between a

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[53] Cowan, 'Privatization and Regulation of the Water Industry in England and Wales', pp 129-30; Grout, 'Cost of Capital in Regulated Industries' , pp 405-6.

> willing buyer and a willing seller, and thus shows the market's capitalisation of expected returns.
>
> A number of measures of initial capitalisation could be taken. Average measures avoid some of the pitfalls of using a valuation on a particular day, although overall the differences between the various measures are small.
>
> For the water and sewerage companies, the Director is minded to adopt the market value based on share prices averaged over the first 200 days' trading as offering the most reasonable measure of initial share value to be remunerated.

To this figure would be added the value of debt less cash balances to determine the total initial valuation of the asset base. In adjusting the initial value forward, the DGWS proposed to take account of new capital expenditure assumed by the Secretaries of State rather than actual capital expenditure. This was to avoid giving companies the incentive to over-invest.

For the water-only companies there was an additional problem. They had always been privately owned and so had not been privatised. So there was no initial value in the sense of an opening share price. The DGWS suggested making use of the assumption that the ratio of initial value to indicative value or the current cost asset value of the companies should be the same as the average for the water and sewerage companies.[54] Most of the water companies accepted the price limits set by Ofwat in the 1994 periodic review, but two were sufficiently aggrieved to pursue their case at the Monopolies and Mergers Commission. The resulting MMC reports included some discussion of the regulatory asset base in the water industry. Essentially, the MMC supported the use of market value in the water industry, and rejected the indicative values favoured by the water companies. The MMC also stated that the difference between the approach used in the water industry and that adopted by the MMC in its report on British Gas was acceptable.

> The circumstances of the water industry are different, in particular the extent of the Director's involvement in the investment programme of the companies, both in requiring that particular investment programmes are

[54] Ofwat (Nov 1993), *Setting Price Limits for Water and Sewerage Services*, pp 35-7.

> undertaken, and in disallowing investment in certain cases over and above the statutory requirements in setting prices.[55]

In the most recent periodic review which determined price limits for the years 2000 to 2005 the asset value issue played a less prominent role since the DGWS stated that capital values would be set on the same lines as in the previous review.

3.2.4 The Electricity Sector

After privatisation the electricity distribution companies were regional monopolies, known as regional electricity companies, or RECs, and were subject to regulation by the Office of Electricity Regulation (Offer). Offer issued a document on the RECs' price controls on their distribution businesses in August 1994.[56] This rejected the CCA approach to valuing assets in favour of a market valuation. There was no reference to the experience of other regulators or the MMC in this document. The RECs had argued that CCA was the best measure of the expenditure required to replace the assets of the distribution business. But the electricity regulator, Professor Stephen Littlechild thought that:

> actual replacement expenditure will not follow the depreciation pattern suggested by a CCA valuation. In allowing future revenue account must of course be taken of likely future expenditure on replacing assets.
>
> However, replacement value is not the most appropriate basis for calculating the revenue which should be earned now in respect of existing assets if a lower revenue could yield an adequate return to shareholders' investment.
>
> It seems to me appropriate to have regard to the money actually paid to purchase a company, not just to the value of assets in the accounts. The valuation of a company at flotation reflected what the original shareholders considered was the likely stream of future dividends, taking into account the information in a very full prospectus and the risks attached to the investment, and valuing the whole of each company. It would be wrong not to give considerable weight to this.

Furthermore, the DGES decided that it was necessary to scale up the value at flotation to make allowance for (i) initial expectations of dividend growth which would imply a rise over time in a company's share value, (ii) investment in the distribution business

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[55] MMC Report on Portsmouth Water Plc (June 1995), para 4.52.
[56] Offer (Aug 1994), *The Distribution Price Control: Proposals.*

since flotation, and (iii) any change in the cost of capital from which investors at the time of flotation might expect to benefit.[57] An uplift of 50 per cent on flotation value was selected. The resulting valuations varied from company to company but, on average, were equivalent to about 90 per cent of CCA asset value.[58] This, then, seemed to be the conclusion that the electricity regulator had reached by late 1994.

However, the share prices rose considerably after the announcement of the results of the review. At the same time there was a bid by Trafalgar House, a holding company, for one of the RECs, Northern Electric. In their defence against the bid, the management of Northern Electric offered major additional benefits to shareholders if the company was not taken over. Offer decided, in March 1995, that the new information made it imperative that the proposed price control review should be reconsidered, and this included looking again at the asset base.[59]

A few months elapsed between Offer's decision to re-open the question and the final outcome of its review. In this time, several reports were published which moved the debate forward. These included the reports by the MMC on two water companies, Portsmouth and South West discussed earlier, and an MMC Report on Scottish Hydro Electric. The Scottish companies had been part of the price review conducted by the electricity regulator during 1994, but when the results were published in September of that year, Scottish Hydro had found the proposed tightening of its price controls unacceptable and the matter was referred to the MMC. The findings of the MMC were published in May 1995. They included discussion of the initial market value of the company, and the way in which this should be apportioned among the various parts of its business. In calculating the initial value of distribution assets the DGES had made an adjustment because he believed that the Scottish Office had used a six per cent rate of return in its original calculations while he, the regulator, thought that seven per cent should be the right figure. He had therefore made an adjustment to the opening balance. The MMC stated that this was not necessary.

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[57] Offer (Aug 1994), *The Distribution Price Control: Proposals*, pp 64-9.
[58] Offer (Aug 1994), *The Distribution Price Control: Proposals*, para 5.65.
[59] See Offer (7 March 1995) *REC Price Controls*; and also Offer (March 1995), *Statement on REC Price Controls*.

In the light of all this new information, then, the DG of Offer put forward new proposals for the RECs in July 1995.[60] He concluded that an uprate of 50 per cent was too large, and settled instead on a figure of 15 per cent i.e. an increase of 15 per cent on the flotation value of the RECs at the close of the first day of trading.[61]

Afterwards the regulator was involved in debates with the National Grid Company and with Northern Ireland Electricity about the appropriate determination of their respective asset bases. Beginning in November 1995, Offer undertook a lengthy consultation process on the value to be attributed to the National Grid Company (NGC). NGC had initially been owned by the RECs but was floated on the Stock Exchange in December 1995. The November 1995 consultation document noted that the distribution price control review had included the deduction of a value for the RECs shareholding in NGC. It added that the appropriateness of using this implicit estimate of the value of NGC would be considered against the alternative of using the initial market value of NGC once its Stock Exchange listing had taken place.[62]

NGC argued that the earlier price review had been conducted on the basis of CCA valuation of assets, and that this should be continued.[63] Most other respondents to the consultation favoured the use of some form of market value.

The fourth consultation paper (August 1996) dealt with the topic at some length.[64] Littlechild argued that, at the time of the first price control review, no clear methodology on asset valuation had been established and he did not commit himself to any specific approach. In the REC price review, market value was preferred to accounting asset value, and, 'subsequent experience and regulatory practice has reinforced this view'. The remainder of the discussion of asset valuation was devoted to showing that the method of valuing NGC implicitly from the REC review gave the

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[60] Offer (July 1995), *The Distribution Price Control: Revised Proposals.*
[61] Offer (July 1995), *The Distribution Price Control: Revised Proposals*, pp 13-19.
[62] Offer, *The Transmission Price Control Review of the National Grid Company*, p 32.
[63] Offer, *The Transmission Price Control Review of the National Grid Company, Second Consultation,* pp 7, 21.

same value as the direct evidence of the NGC flotation. Offer also decided that the direct evidence of NGC's December 1995 flotation was better than the indirect evidence of the RECs' July 1995 flotation. The outcome was to set the value of NGC's asset base at £4.15 billion instead of £4 billion.[65]

The MMC Report on Northern Ireland Electricity (NIE), published in March 1997, reaffirmed market value. The background to the case was that the DGES had carried out a review of the price controls on Northern Ireland Electricity's regulated businesses (power procurement, transmission and distribution, supply) during 1995 and 1996. This was to determine the new price controls that should take effect from April 1997. NIE rejected the proposals for new price controls on the transmission and distribution and supply businesses, although it accepted those which were to apply to power procurement. The matter was referred to the MMC in September 1996.

An important part of the disagreement between the DGES and NIE was over the regulatory asset base.[66] The DGES had used initial market value at the close of the first day of trading to value the asset base. NIE suggested, firstly that if initial market value was to be used it should be for a longer period, perhaps 100 days, 129 days (to cover the period to the Downing Street Declaration on the politics of Northern Ireland), or 200 days. Furthermore, NIE argued that, if initial market value was used, there should be an uplift on the close of first day value, as there had been for the RECs on the mainland. In any case, NIE preferred the use of initial CCA book value rather than market values for the asset base.

The MMC decided that initial market value was preferred. It was argued that investors at the time of flotation did not use CCA book values since it would have been impossible to discern the CCA value with sufficient certainty for the investment decision to be based on that alone. The MMC rejected arguments about a need for a longer period to determine initial market value, since it estimated that the end of first

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64 Offer, *The Transmission Price Control Review of the National Grid Company, Fourth Consultation*, pp 31-2 and Annex 4.

65 Offer (Oct 1996), *The Transmission Price Control Review of the National Grid Company: Proposals*, pp 14-18.

66 MMC Report on Northern Ireland Electricity plc, (March 1997), paras 2.64 - 2.84.

day trading value was high enough to have fully allowed for the element of underpricing in the initial flotation. For instance, NIE's share price was stable for several days after the end of the first days trading.

The MMC also decided the question of whether precedent demanded a further uplift. It was argued that there was a wide variety of uplifts, from a high of 26 per cent for British Gas to much lower figures in other cases, including negative uplifts in one or two. Furthermore, the MMC noted that the trend in the size of uplifts had been downwards. It recommended an uplift of 7.5 per cent.

3.2.5 Railways

As the most recent of the major privatisations, the railways have also been the last to settle the question of valuing the regulatory asset base. In December 1997 the Rail Regulator as part of the review of Railtrack's charges issued a consultation document for the year 2000. The Rail Regulator stated that he was likely to use some form of market value approach rather than the replacement cost of the assets, and that he would make use of the work done by other regulators in setting price controls for the first time after a company has been transferred to the private sector, especially the conclusions reached by the MMC in its various inquiries.[67] Indeed, the emphasis given to precedents established in other regulated industries has been a remarkable feature of the Railtrack review.

A second consultation document appeared in July 1998. The Rail Regulator confirmed his preference for using initial market value, and stated that he would use the value at the end of the first day's trading as his estimate of initial market value. The document devoted a good deal of space to debating whether the regulator should add an uplift to the value of equity at the end of the first day of trading, and if so, what the size of the uplift should be.[68]

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[67] Office of the Rail Regulator (Dec 1997), *The Periodic Review of Railtrack's Access Charges, a Proposed Framework and Key Issues: a Consultation Document*, pp 47-8, see also pp 59-62.

[68] Office of the Rail Regulator (July 1998), *The Periodic Review of Railtrack's Access Charges: the Framework and Timetable and Further Consultation on Financial Issues, Second Consultation Paper,* pp 51-6.

The Rail Regulator announced his decisions in December 1998. The regulatory value of Railtrack was set at the value at the close of the first day of share trading, a figure of £2.54 billion. No additional uplift was added to this. The Regulator considered the arguments put forward by Railtrack for an uplift - political risk because of the Labour Party's initial opposition to rail privatisation, and the precedents for uplifts derived from other industries - and rejected them both. On the question of political risk, the Regulator took the view that all relevant risk was already incorporated into the share price. On the matter of precedent, the Regulator concluded that, since the range of uplifts varied from 0.0 per cent to 9.3 per cent in the water industry, and from -3.4 per cent to 26 per cent in the energy sector, and that the trend over time had been downwards, there was no clear precedent for an uplift in the case of Railtrack.[69]

3.2.6 Summary

In telecommunications, the company argued for CCA valuations. These were significantly higher than historical cost. As Table 12 shows BT's HC valuation was less than half of the CCA value (although with telecommunications equipment falling in price the difference was rapidly eroding). The regulator argued for CCA in principle but stated that he would have to use HC valuations. Later the regulator pushed BT to improve and report its CCA valuations, eventually changing the regulatory regime to one based on CCA. The shift to CCA from HC appears to have occurred at the point when the relevant (for regulatory purposes) CCA valuation had fallen to the HC value and would be henceforth be lower in the future.

In the gas sector, Ofgas and the MMC moved towards a redefinition of the asset base. The accounting base approach of the telecommunications industry was not followed. The value used was based on an implicit market value based approach since the cost of capital was reduced to reflect the ratio of market value (before the price review) to CCA value. Again as indicated in Table 12 the market value used was significantly

[69] Office of the Rail Regulator (December 1998), *The Periodic Review of Railtrack's Access Charges: the Regulator's Conclusions on the Financial Framework,* pp 32-8.

below the CCA value. The company argued initially for CCA but later, although not actually accepting that a implicit market value approach was correct did engage in debate over the appropriate date to assess the market value suggesting a time that was most favourable.

In water an explicit market value approach was used by the regulator. The specific approach represented two changes from the earlier Ofgas position. One is that it was the initial market value that was used whereas in the gas sector the value prior to review had been taken. Second, the machinery explicitly existed at the time of privatisation, the indicative values, to implement a valuation approach that reflected the present value of expected returns and had been developed as part of the privatisation process. As is clear from Table 12 CCA and, to a lessor extent, HC were 'none starters' as potential candidates for the asset base so it is not surprising that the companies did not argue for either in this context. The companies preference was to use the indicative values that were produced at the time of privatisation. These were higher than the market values imposed by Ofwat.

The regulatory outcome in the electricity sector was similar to water; however, the uplift on market value was reduced in the review period and has been reduced further in reviews for NIE and NGC. He companies argued for CCA valuations which were significantly higher. Table 13 summarises this information on preferred asset base in the UK.

In terms of the type of opportunism that we have addressed in the US section the evidence is consistent with and tends to suggest opportunism but because of the limited data it far from conclusive. The evidence for the companies is that they always preferred higher asset definitions than the regulator but given the strong preference for CCA there is, as with the US, little shift in the evidence.

The regulatory position is more varied. Briefly, the situation, viewed from a focus on potential opportunism, is as follows. The telecommunications regulator made one shift of asset base. This decision to shift to CCA from HC occurs at the point when the relevant CCA values fall below their HC equivalent is strongly consistent with an

opportunism interpretation. Furthermore, the market value in telecommunications was far higher than the HC values used as the asset base but less than CCA. The argument that shareholders paid less than CCA is normally the one that is used to underpin the market value approach. A market value approach could have been used by the regulator given the regulator's stated lack of confidence in the CCA figures of the regulated company. In the gas context the prices paid by shareholders were lower far than CCA and the regulator argued that the assets purchased at privatisation should earn no more than what they had earned before privatisation. This led to the implementation of an implicit market value approach. In the water sector it was clear that CCA was completely unacceptable and an alternative model was used for analysis at privatisation. These were the indicative values. They were consistent with the gas regulator's view that pre privatisation assets return should be based on pre privatisation returns. However, at the first review the regulator rejected the indicative values, preferring to use a lower initial market valuation as the asset base. In electricity the initial market value was taken with an uplift of 50% but this has been adjusted from 50% to 15% at review and has since been reduced to 7.5% in the case of NIE. The uplift was zero for NGC and Railtrack.

Taken together the UK evidence is consistent with opportunistic behaviour. Indeed, if one approaches the UK evidence with a prior view derived from the US evidence, i.e., that there is a strong case for the view that there is inherent opportunism in the regulatory system, then the analysis of the UK evidence strengthens this view. However, the limited evidence is such that one can only draw suggestive conclusions from the UK evidence if viewed alone since there are other arguments in each case for the regulatory choice.

4. Conclusions

The analysis and comparison of the US and UK has revealed that the asset base issue is a thorny problem that is not easily resolved. Of course, since the allowed return is applied to the asset base to determine profitability, the asset base question is probably at least as critical as any other single component of a regulatory regime. In the US the issue took over fifty years to reach a consensus and in the UK the issue has been controversial and it has taken more than a decade to be relatively settled albeit still displaying varied models between sectors. Looking at the UK evidence in the light of US experience it is tempting to conclude that the UK model could have learned from the US history. It somewhat amazing that tens of billions of pounds worth of companies were privatised without there being any discussion, let alone assurances, as to how the assets of the company would be valued when prices came to be set in regulatory reviews.

Of course, this could in part have been deliberate policy. The mechanisms employed by UK regulators to estimate the cost of capital, the Capital Asset Pricing Model and the Dividend Growth Model, are close to what would have been expected pre-privatisation. They are soundly routed in academic finance theory and consistent with US experience. In contrast, although the initial asset base approach employed to regulate British Telecommunications is consistent with US practice, the asset valuation model employed most commonly applied, that of initial market value, was unlikely to have been anticipated at the time of privatisation and is at odds with the US approach (of course, the existence of privatisation itself is part of the reason for the difference). However, during the run up to a privatisation a detailed discussion of the regulatory framework may not be a particularly appealing backdrop for the management of the companies or a government trying to emphasise the benefits and freedom of private ownership.

The evidence points to a degree of opportunism in the preferences displayed by companies and regulators. It is not altogether surprising that this is the case for companies since the management's responsibility to their shareholders implies that the company will be inclined to argue for an asset base that will provide for higher

revenues. The evidence that regulators appear to be similarly affected is more surprising and it is particularly interesting that the statistical significance in the US data (once the stockyard and bridge are excluded) is far stronger for the regulators than the regulated companies. It is essential to emphasise that we have found this result on regulatory data that stops at the Hope Case. Taking advantage of the Hope Judgement, many regulators shifted to historical cost. Given the levels of inflation from 1944 onwards, statistical tests based on data that incorporates this wider data would presumably overwhelmingly find strong evidence of opportunism. Assessing data that stops at Hope creates a very tough test. There is very limited data to assess the Supreme Court but we conclude, extremely tentatively, that the Supreme Court behaved impartially in this respect. Turning to the UK, if one opens with a prior expectation of this type when looking at the UK evidence then it confirms the view of opportunism. However, this is no more than suggestive since there is limited independent evidence and there are other arguments in each case for the regulatory choice.

A potential message of the paper is, since it takes so long to settle on an agreed asset base, that prior to privatisation it would be beneficial to address the issue of what asset base will be used at the future reviews. However, if the choice of asset base is opportunistic then not clear how much this restricts future policy and so an absence of specification is less of a problem in the absence of pre commitment. The presence of opportunism creates 'regulation risk' and this may have consequences on the efficiency of the regulation processes and the companies being regulated. The market value model in various forms now seems established in the UK. In this situation regulatory opportunism reduces the value of the business which, through the asset base, feeds into the output price which is lower than would otherwise be the case. This suggests that potentially the biggest economic problem arises in the context of pricing of output of privatised companies and the ensuing problems for allocative efficiency.

Table 1
Supreme Court Cases by Sector and Type of Regulator

	Supreme Court Case	Sector	Regulator
1	Smyth v. Ames, 169 US 466 (1898)	Railroad	State
2	San Diego v. National City, 174 US 739 (1899)	Water	Local
3	San Diego v. Jasper, 189 US 439 (1903)	Water	Local
4	Knoxville v. Knoxville Water, 212 US 1 (1909)	Water	Local
5	Willcox, 212 US 19 (1909)	Gas	State
6	Lincoln Gas & Elec. v. Lincoln, 223 US 349 (1912)	Gas	Local
7	Cedar Rapids Gas Light Co, 223 US 655 (1912)	Gas	Local
8	Minnesota Rate Cases, 230 US 352 (1913)	Railroad	State
9	Des Moines Gas Co., 238 US 153 (1915)	Gas	Local
10	Galveston Elec v. Galveston, 258 US 388 (1922)	Street Railway	Local
11	Southwestern Bell, 262 US 276 (1923)	Telephone	State
12	Georgia Railway, 262 US 625 (1923)	Gas	State
13	Bluefield, 262 US 679 (1923)	Water	State
14	Pacific G & E. v. San Francisco, 265 US 403 (1924)	Gas	Local
15	Ohio Utilities v. PUC, 267 US 359 (1925)	Electricity	State
16	McCardle v. Indianapolis, 272 US 400 (1926)	Water	State
17	Los Angeles Gas, 289 US 287 (1933)	Gas	State
18	Clark's Ferry Bridge Co., 291 US 227 (1934)	Toll Bridge	State
19	Lindheimer v. Illinois Bell, 292 US 151 (1934)	Telephone	State
20	West Ohio Gas Co v. PUC, 294 US 63 (1935)	Gas	State
21	West v. Chesapeake, 295 US 662 (1935)	Telephone	State
22	Railroad Comm v. Pacific, 302 US 388 (1938)	Gas	State
23	Denver Union Stock Yard, 304 US 470 (1938)	Agriculture	Federal
24	Driscoll v. Edison, 307 US 104 (1939)	Electricity	State
25	FPC v. Nat Gas Pipeline, 315 US 575 (1942)	Gas	Federal
26	FPC v. Hope, 320 US 591 (1944)	Gas	Federal

Table 2
Asset Base Preference: Companies, Regulators, and the Supreme Court

		The Companies		The Regulators		The Supreme Court	
		Date	Company's choice of asset base	Date	Regulator's choice of asset base		Supreme Court's choice of asset base
1	Smyth v. Ames, 169 US 466 (1898)	1893	HC	1893	RC	1898	RC*
2	San Diego v. National City, 174 US 739 (1899)	1895	HC	1895	-	1899	-
3	San Diego v. Jasper, 189 US 439 (1903)	1897	HC	1897	RC	1903	RC
4	Knoxville v. Knoxville Water, 212 US 1 (1909)	1901	RC	1901	RC	1909	-
5	Willcox, 212 US 19 (1909)	1906	RC	1906	HC	1909	RC
6	Lincoln Gas & Elec. v. Lincoln, 223 US 349 (1912)	1906	RC	1906	RC	1912	-
7	Cedar Rapids Gas Light Co, 223 US 655 (1912)	1906	RC	1906	-	1912	-
8	Minnesota Rate Cases, 230 US 352 (1913)	1906	RC	1906	-	1913	RC
9	Des Moines Gas Co., 238 US 153 (1915)	1910	RC	1910	RC	1915	-
10	Galveston Elec v. Galveston, 258 US 388 (1922)	1920	RC	1919	-	1922	-
11	Southwestern Bell, 262 US 276 (1923)	1919	RC	1919	HC	1923	RC
12	Georgia Railway, 262 US 625 (1923)	1921	RC	1921	RC*	1923	RC*
13	Bluefield, 262 US 679 (1923)	1920	RC	1920	HC	1923	RC
14	Pacific G & E. v. San Francisco, 265 US 403 (1924)	1913	RC	1913	RC	1924	-
15	Ohio Utilities v. PUC, 267 US 359 (1925)	1921	RC	1921	RC	1925	-
16	McCardle v. Indianapolis, 272 US 400 (1926)	1923	RC	1923	RC*	1926	RC
17	Los Angeles Gas,	1930	RC	1930	RC*	1933	RC*

	289 US 287 (1933)						
18	Clark's Ferry Bridge Co., 291 US 227 (1934)	1929	RC	1932	HC	1934	HC
19	Lindheimer v. Illinois Bell, 292 US 151 (1934)	1923	RC	1923	HC	1934	-
20	West Ohio Gas Co v. PUC, 294 US 63 (1935)	1928	RC	1933	RC*	1935	-
21	West v. Chesapeake, 295 US 662 (1935)	1933	RC	1933	RC*	1935	RC
22	Railroad Comm v. Pacific, 302 US 388 (1938)	1933	RC	1933	RC*	1938	RC*
23	Denver Union Stock Yard, 304 US 470 (1938)	1937	RC	1937	RC	1938	-
24	Driscoll v. Edison, 307 US 104 (1939)	1937	-	1937	RC*	1939	-
25	FPC v. Nat Gas Pipeline, 315 US 575 (1942)	1940	RC	1940	RC	1942	-
26	FPC v. Hope, 320 US 591 (1944)	1942	RC	1942	HC	1944	HC

Table 3
Logit Estimates for the Companies

Historic Cost = 1, Reproduction Cost = 0						
	20 year price index			15 year price index		
	CCOMP (z stats)	CCOMP (z stats)	CCOMP (z stats)	CCOMP (z stats)	CCOMP (z stats)	CCOMP (z stats)
Constant	-1.6590 (-2.608)	-1.6332 (-2.582)	-1.5874 (-2.509)	-1.6467 (-2.408)	-1.5887 (-2.304)	-1.5552 (-2.265)
Index	-0.7638 (-2.298)	-0.7501 (-2.250)	-0.7291 (-2.215)	-0.7228 (-2.071)	-0.7029 (-2.070)	-0.6834 (-2.041)
N	25	24	23	25	24	23
Pseudo R^2	0.3893	0.3831	0.3790	0.2680	0.2692	0.2639
		Case 18 omitted	Case 18 and 23 omitted		Case 18 omitted	Case 18 and 23 omitted
Note: Robust Standard Errors Throughout						

Table 4
Logit Estimates for the Regulator

Historic Cost = 1, Reproduction Cost = 0						
	20 year price index			15 year price index		
	CREG (z stats)	CREG (z stats)	CREG (z stats)	CREG (z stats)	CREG (z stats)	CREG (z stats)
Constant	-1.5299 (-.913)	-2.5386 (-2.94)	-2.4377 (-2.84)	-1.4999 (-1.77)	-2.8070 (-3.07)	-2.6818 (-2.99)
Index	0.1745 (1.273)	0.3416 (2.872)	0.3315 (2.837)	0.2580 (1.125)	0.6108 (2.995)	0.5934 (3.004)
N	22	21	20	22	21	20
Pseudo R^2	0.1015	0.2813	0.2765	0.1001	0.3255	0.3254
		Case 18 omitted	Case 18 and 23 omitted		Case 18 omitted	Case 18 and 23 omitted
Robust standard errors throughout						

Table 5
Logit Estimates for the Supreme Court

Historic Cost = 1, Reproduction Cost = 0				
	20 year price index		**15 year price index**	
	CSCOURT (z stats)	CSCOURT (z stats)	CSCOURT (z stats)	CSCOURT (z stats)
Constant	-1.5660 (-1.711)	-2.9580 (-2.720)	-1.7227 (-1.713)	-5.3464 (-4.728)
Index	-0.0685 (-0.311)	0.1891 (1.400)	0.0137 (0.030)	1.2082 (2.983)
N	13	12	13	12
Pseudo R^2	0.0053	0.0321	0.0001	0.2105
		Case 18 omitted		Case 18 omitted
Robust standard errors throughout				

Table 6:
Logit Estimates for Regulator on Supreme Court Dataset

Historic Cost = 1, Reproduction Cost = 0				
	20 year price index		**15 year price index**	
	CREG (z stats)	CREG (z stats)	CREG (z stats)	CREG (z stats)
Constant	-0.6992 (-0.876)	-1.6423 (-1.766)	-0.6827 (-0.839)	-1.8545 (-1.908)
Index	0.1311 (1.080)	0.2769 (2.471)	0.2160 (1.110)	0.5158 (2.792)
N	12	11	12	11
Pseudo R^2	.0889	0.2786	0.1137	0.3720
		Case 18 omitted		Case 18 omitted
Robust standard errors throughout				

Table 7
Multinomial Logit Results for the Regulators

Historic Cost = 1, middle category = 0.5, reproduction cost = 0						
	20 year price index			**15 year price index**		
	CREG (z stats)	CREG (z stats)	CREG (z stats)	CREG (z stats)	CREG (z stats)	CREG (z stats)
CREG = 0.5						
Constant	-0.2037 (-0.382)	-0.1817 (-0.329)	-0.0716 (-0.127)	-0.1558 (-0.302)	-0.9946 (-0.194)	-0.0082 (-0.015)
Index	-0.0330 (-0.285)	-0.0483 (-0.284)	-0.0433 (-0.266)	-0.1243 (-0.749)	-0.1971 (-0.760)	-0.1721 (-0.694)
CREG = 1						
Constant	-0.9335 (-1.115)	-1.9357 (-2.120)	-1.7823 (-1.949)	-0.8790 (-0.990)	-2.1929 (-2.235)	-2.0146 (-2.088)
Index	0.1608 (1.177)	0.3226 (2.600)	0.3130 (2.504)	0.2105 (0.943)	0.5478 (2.680)	0.5313 (2.659)
N	22	21	20	22	21	20
Pseudo R^2	0.0563	0.1464	0.1458	0.0646	0.1843	0.1833
		Case 18 omitted	Case 18 and 23 omitted		Case 18 omitted	Case 18 and 23 omitted
CREG = 0 is the comparison group Robust standard errors throughout						

Table 8
Logit Estimates for the Companies, cases in which the regulator and the company agreed omitted.

	20 year price index		15 year price index	
	CCOMP (z stats)	CCOMP (z stats)	CCOMP (z stats)	CCOMP (z stats)
Constant	-1.2769 (-1.915)	-1.2214 (-1.831)	-1.3238 (-1.908)	-1.2344 (-1.746)
Index	-0.6169 (-2.117)	-0.5902 (-2.050)	-0.5760 (-1.924)	-0.5491 (-1.938)
N	18	17	18	17
Pseudo R^2	0.3643	0.3559	0.2393	0.2419
		Case 18 omitted		Case 18 omitted
Note: Robust standard errors throughout				

Table 9
Logit Estimates for the Regulator, cases in which regulator and company agreed omitted

	20 year price index		15 year price index	
	CREG (z stats)	CREG (z stats)	CREG (z stats)	CREG (z stats)
Constant	-0.8687 (-1.157)	-1.7850 (-2.252)	-0.8181 (-1.074)	-1.9526 (-2.388)
Index	0.1735 (1.361)	0.3336 (2.583)	0.2636 (1.307)	0.5896 (2.691)
N	15	14	15	14
Pseudo R^2	0.1295	0.3219	0.1420	0.3842
		Case 18 omitted		Case 18 omitted
Robust standard errors throughout				

Table 10
OLS Estimates of Effects of Inclusion of Company's Choice of Asset Base on Results for Regulators (20 year index)

Historic Cost = 1, Reproduction Cost = 0				
	20 year price index			
	CREG (t stats)	CREG (t stats)	CREG (t stats)	CREG (t stats)
Constant	0.1903 (1.704)	0.2286 (1.666)	0.0866 (1.279)	0.1012 (1.162)
Index	0.0365 (1.412)	0.0302 (1.161)	0.0538 (3.573)	0.0528 (3.299)
CCOMP		-0.1844 (-1.130)		-0.0238 (-0.257)
N	22	21	21	20
R^2	0.1194	0.1325	0.3018	0.3010
			Case 18 omitted	Case 18 omitted
Note: Robust standard errors throughout				

Table 11
OLS Estimates of Effects of Inclusion of Company's Choice of Asset Base on Results for Regulators (15 year index)

Historic Cost = 1, Reproduction Cost = 0				
	15 year price index			
	CREG (t stats)	CREG (t stats)	CREG (t stats)	CREG (t stats)
Constant	0.2019 (1.813)	0.2406 (1.810)	0.0933 (1.411)	0.1117 (1.363)
Index	0.0473 (1.308)	0.0436 (1.140)	0.0813 (4.005)	0.0803 (3.861)
CCOMP		-0.2026 (-1.312)		-0.0418 (-0.506)
N	22	21	21	20
R^2	0.1139	0.1353	0.3213	0.3847
			Case 18 omitted	Case 18 omitted
Note: Robust standard errors throughout				

Table 12
Acquisition Discounts in Regulated Industries

	Market value at end of first day's trading £m	**CCA net asset values in year preceding privatization** £m	**HC Pro Forma net asset values in year preceding privatization** £m
British Telecom	13,938.5	14,318.0	5,990.0
British Gas	7,376.1	17,558.5	
Water			
Anglian	648.2	8,805.2	1,112.0
Northumbrian	47.2	2,742.5	625.2
North West	312.4	15,297.1	1,551.9
Severn Trent	574.1	16,520.3	1,606.4
Southern	425.7	8,021.3	647.3
South West	62.3	2,732.8	609.5
Thames	855.0	28,381.5	1,250.7
Welsh	141.3	6,085.8	769.5
Wessex	198.1	4,358.8	550.6
Yorkshire	460.2	9,695.2	939.2
Total Water	3,723.7	102,640.7	9,662.3
Electricity			
Eastern	902.0	1,490.9	639.9
EME	667.8	1,021.4	465.2
London	636.0	1,094.5	463.2
Manweb	401.4	680.3	350.5
Midlands	672.3	1,164.5	476.7
Northern	383.2	675.4	269.7
NORWEB	643.1	1,048.8	402.6
SEEBOARD	392.7	842.3	343.4
Southern	846.5	1200.3	469.8
South Wales	324.7	496.6	244.7
South Western	454.9	839.6	349.6
Yorkshire	713.4	1083.8	444.6
Total RECs	7,037.9	11,638.4	4,919.9
NGC	1,867.0	4,618.0	780.0
Source: Prospectuses and A. Carey *et al, Accounting for Regulation in UK Utilities.*			

Table 13
Outcomes of Regulation in the UK

Companies and Regulatory Bodies	Company and Preferred Asset Base	Regulator and Preferred Asset Base	Outcome of Periodic Reviews/MMC Enquiries
		Telecommunications Industry	
British Telecom & Oftel	CCA	Historic Cost	Historic cost at the first two regulatory reviews (1988 and 1992), CCA from third regulatory review (1996)
		Gas Industry	
British Gas & Ofgas	CCA/Market Value	Implicit Market Value	Implicit Market Value at end 1991 adopted in MMC enquiry
		Water Industry	
Water and Sewerage Companies & Ofwat	Indicative values	Market Value averaged over first 200 days	Market Value averaged over first 200 days
		Electricity Industry	
RECs & Offer	CCA	Market Value at close first day trading plus 50 per cent, later change to 15 per cent	Market Value at close first day trading plus 15 per cent
National Grid Company & Offer	CCA	Market value at close first day trading	Market value at close first day trading
Northern Ireland Electricity & Offer	CCA	Market Value at close first day	Market Value plus 7.5 per cent recommended by MMC
		Rail Industry	
Railtrack & Office of Rail Regulator		Market Value at close first day trading	Market Value at close first day trading

APPENDIX 1

PREFERRED ASSET BASE OF REGULATOR, COMPANY AND THE SUPREME COURT

Cases included in the final data set

1. Smyth v. Ames, 169 US 466 (1898)

Company prefers historic cost, regulator favours reproduction cost, we place the Supreme Court in the 'middle category'.

> "The state of Nebraska in 1893 passed a law that established a Board of Transportation. Among other things, the board was given the authority to determine the rates charged for hauling freight. One of its first orders, setting maximum rates, was challenged by the railroads on the basis that the rates were confiscatory. The roads contended that much of their property had been constructed during and after the Civil War when prices were high and that they were entitled to a return on their original cost. The state, represented by William Jennings Bryan, based its measure of reasonable earnings on the lower reproduction cost." (Phillips, *Regulation of Public Utilities*, 3 ed, p 320).

The Supreme Court judgement stated that:

> "We hold, however, that the basis of all calculations as to the reasonableness of rates to be charged by a corporation maintaining a highway under legislative sanction must be the fair value of the property being used by it for the convenience of the public. And, in order to ascertain that value, the original cost of construction, the amount expended in permanent improvements, the amount and market value of its bonds and stock, the present as compared to the original cost of construction, the probable earning capacity of the property under particular rates prescribed by statute, and the sum required to meet operating expenses, are all matters for consideration, and are to be given such weight as may be just and right in each case. We do not say that there may not be other matters to be regarded in estimating the value of the property. What the company is entitled to ask is a fair return upon the value of that which it employs for the public convenience. On the other hand, what the public is entitled to demand is that no more be exacted from it for the use of the public highway than the services rendered by it are reasonably worth.".

2. San Diego Land & Town Co. v. National City, 174 US 739 (1899)

The company claimed original cost. It is not clear what the regulator preferred as the asset base. The Supreme Court rejects original cost, but does not rule on the particular form of the rate base.

> "The contention of the appellant [i.e. the company] in the present case is that in ascertaining what are just rates the court should take into consideration the cost of its plant, the cost per annum of operating the plant, including interest paid on money borrowed and reasonably necessary to be used in constructing the same; the annual depreciation of the plant from natural causes resulting from its use; and a fair profit to the company over and above such charges for its services in supplying the water to consumers, either by way of interest on the money it has expended for the public use, or upon some other fair and equitable basis. Undoubtedly, all these matters ought to be taken into consideration, and such weight be given them, when rates are being fixed, as under all the circumstances will be just to the company and to the public. The basis of calculation suggested by the appellant is, however, defective in not requiring the real value of the property and the fair value in themselves of the services rendered to be taken into consideration. What the company is entitled to demand, in order that it may have just compensation, is a fair return upon the reasonable value of the property at the time it is being used for the public. The property may have cost more than it ought to have cost, and its outstanding bonds for money borrowed and which went into the plant may be in excess of the real value of the property", (1161).

3. San Diego Land & Town Company v. Jasper, 189 US 439 (1903)

The company demanded original cost, the regulator favoured reproduction cost, and the Supreme Court ruled clearly against original cost.

The plant had been sold shortly before the regulatory hearing, and the lawyers for the regulator argued that,

> "The true price paid for this water system at the foreclosure sale, represented by the value of the bonds and claims with which the price was paid, constitutes the most direct, trustworthy, and contemporaneous measure of the true value of the whole property of the Kansas corporation, including the water system here in question", (893).

The Supreme Court ruling stated that,

> "The main object of the attack is the valuation of the plant. It no longer is open to dispute that under the Constitution "what the company is entitled to demand, in order that it may have just compensation, is a fair return upon the reasonable value of the property at the time it is being used for the public" [citation]. That is decided, and is decided as against the contention that you are to take the actual cost of the plant, annual depreciation, etc, and to allow a fair profit on that footing over and above expenses. We see no reason to

> doubt that the California statute means the same thing. Yet the only evidence in favor of a higher value in the present case is the original cost of the work, seemingly inflated by improper charges to that account and by injudicious expenditures.....In this way the appellant makes the value over a million dollars. No doubt, cost may be considered, and will have more or less importance according to circumstances. In the present case it is evident, for reasons, some of which will appear in a moment, that it has very little importance indeed." (894-5).

4. Knoxville v. Knoxville Water Co., 212 US 1 (1909)

Here, both the regulatory body and the company use reproduction cost. The main disagreement is about the measurement of depreciation.

According to the Supreme Court judgement, the value of the property was determined by a neutral 'master':

> "The value of the tangible property found by the master is, of course, $608,000 lessened by $70,000, the value attributed to the intangible property, making $538,000. This valuation was determined by the master by ascertaining what it would cost, at the date of the ordinance, to reproduce the existing plant as a new plant. The cost of reproduction is one way of ascertaining the present value of a plant like that of a water company, but that test would lead to obviously incorrect results if the cost of reproduction is not diminished by the depreciation which has come from age and use. The company contends that the master, in fixing upon the valuation of the tangible property, did make an allowance for depreciation, but we are unable to agree to this", (53 L Ed, 378).

Thus it was depreciation rather than the form of the rate base which was at issue. Furthermore,

> "After the company had closed its case the city undertook to determine the present value of the company's property by the plain method of ascertaining the cost of reproduction, diminished by depreciation. In its case in rebuttal the company followed the same method, though the results differed largely, and, as we have seen, no proper allowance for depreciation was made", (53 L Ed, 380).

5. Willcox v. Consolidated Gas Co., 212 US 19 (1909)

The company claimed reproduction cost, while the regulator favoured historic cost. The Supreme Court ruled in favour of the company, emphasising the importance of reproduction cost.

The lawyer representing the company states that:

> "The basis of calculation is the present value of the property, and not its original cost", (53 L Ed p 390).

The Supreme Court stated that:

> "And we concur with the court below in holding that the value of the property is to be determined as of the time when the inquiry is made regarding the rates. If the property which legally enters into the consideration of the question of rates has increased in value since it was acquired, the company is entitled to the benefit of such increase" (53 L Ed p 399).

6. Lincoln Gas & Elec. v. Lincoln, 223 US 349 (1912)

Both the regulator and the company accepted a reproduction cost rate base, and dispute centred on additions for going value and the like.

In the district court, both sides accepted a core valuation of the plant 'based on the present cost of replacing it', with the company adding certain items to this, and the regulator disputing them (56 L Ed, 470-1).

7. Cedar Rapids Gas Light Co., 223 US 655 (1912)

The company argues for reproduction cost, while it is not clear which asset base was preferred by the regulator or by the Supreme Court.

The company's lawyers argued that:

> "The basis of all calculations as to the reasonableness of rates to be charged by a corporation furnishing gas to the public is the fair value of the property being so used, at the time of fixing the rate.....The value at the time the property is being used is to be ascertained.....The question is not what the plant originally cost, or what amount of capital stock it has issued, but what it will cost to reproduce the plant in its present condition" (56 L Ed, p 596).

There is no clear documentary evidence on the rate base preferred by the regulator, and the Supreme Court does not rule on the matter.

8. Minnesota Rate Cases, 230 US 352 (1913)

The company favoured reproduction cost, there is no clear evidence of the regulator's preferred rate base, and the Supreme Court gave clear support for reproduction cost.

Lawyers for the company argued that:

> "The original cost of the property, as well as the outstanding capital in stocks and bonds, while admissible in evidence, are matters for consideration only in so far as in the particular case they are competent evidence of present value.....It may be stated as a rule in every case where the property has been efficiently located, constructed, and maintained, and

> results of operation as a whole show volume of traffic and earnings sufficient to support the property, pay reasonable dividends, and leave something in addition, that the true value is in excess of the mere cost of reproduction of the physical or tangible property" (57 L Ed, 1531).

The judgement of the Supreme Court stated that:

> "It is clear that in ascertaining the present value we are not limited to the consideration of the amount of the actual investment. If that has been reckless or improvident, losses may be sustained which the company does not underwrite. As the company may not be protected in its actual investment, if the value of its property be plainly less, so the making of a just return for the use of the property involves a recognition of its fair value if it be more than its cost. The property is held in private ownership and it is that property, and not the original cost of it, which the owner may not be deprived without due process of law". (57 L Ed, 1564).

9. Des Moines Gas Co. v. City of Des Moines, 238 US 153 (1915)

The regulator and the company accepted reproduction cost as the form of rate base. The company thought that additional allowances for intangibles should have been included in the rate base.

Value was determined by an impartial 'master'. He found that

> "After valuing the real estate and various items of personal property as hereinafter stated, the master adopted as the only practical way in his judgement of determining the reasonable value of the buildings, their contents, the yard structures and the mains, house and street lamp services and meters, the process of estimating the cost of reproducing them new, and then estimating the depreciation which should be deducted in order to obtain their present value" (59 L Ed, 1249).

Both sides accepted this valuation, but,

> "As appears from the opinion of the court and the arguments of counsel in this case, exceptions to the master's report so far as the Gas Company is concerned pertain principally to two questions: One as to his manner of dealing with what is termed the 'going value' of the concern, and the other as to the addition of the sum of $140,000 to the valuation, because appellant insists, upon the plan of valuation by cost of reproduction less depreciation, it would cost that sum to take up and replace pavements not laid when the mains were put in, but necessary to be removed and replaced in the reproduction thereof", (59 L Ed, 1249).

10. Galveston Elec v. Galveston, 258 US 388 (1922)

In this case, the company argued for reproduction cost, while there is insufficient information about the regulator's choice of asset base. Much of the discussion in this case was about movements in the price level.

The Supreme Court summary of the case was that

> "As the base value of the property, master and court took - instead of the prudent investment value - the estimated cost of reproduction at a later time, less depreciation; and, in estimating reproduction cost both refused to use as a basis the prices actually prevailing at the time of the hearings. These had risen to 110 per cent above those of 1913. The basis for calculating reproduction cost adopted by all was prophecy as to the future general price level of commodities, labor and money. This predicted level, which they assumed would be stable for an indefinite period, they called the new plateau of prices. As to the height of this prophesied plateau, there was naturally wide divergence of opinion. The company's expert prophesied that the level would be 60 to 70 per cent above 1913 prices; the master, that an increase of 33.33 per cent would prove fair; and the court accepted the master's prophecy of 33.33 per cent", (66 L Ed, pp 681-2).

11. Missouri ex rel Southwestern Bell Telephone Co v. Public Service Commission, 262 US 276 (1923)

The company preferred reproduction cost, the commission preferred historic cost, and the Supreme Court stressed the importance of reproduction cost in its judgement.

Lawyers for the company argued that,

> "The value of the property found by the commission was not its present value, but was its actual cost, or its value in 1913, plus net additions since, its present value being ignored, the value found being far below the present value of the property, with the result that the rates prescribed were confiscatory in their effect and operation" (67 L Ed, p 981).

The Commission's lawyers maintained that

> "There is no constitutional or inherent right in the utility company, on the one hand, or in the public, on the other, which imperatively demands that the fair value of property devoted to a public service shall be determined upon the estimated cost of reproduction new, either in a time of abnormally high prices, or in a time of abnormally low prices", (67 L Ed, p 982).

The Supreme Court found that,

> "the Commission undertook to value the property without according any weight to the greatly enhanced costs of material, labor, supplies etc., over those prevailing in 1913, 1914, and 1916. As matter of common knowledge, these increases were large.....It is impossible to ascertain what will amount to a fair return upon properties devoted to public service without giving consideration to the cost of labour, supplies etc., at the time the investigation

> is made. An honest and intelligent forecast of probable future values, made upon a view of all the relevant circumstances, is essential. If the highly important element of present costs is wholly disregarded, such a forecast becomes impossible. Estimates for tomorrow cannot ignore prices of today", (67 L Ed, pp 984-5).

12. Georgia Railway & Power Co v. Railroad Commission of Georgia, 262 US 625 (1923)

The company opted for reproduction cost, the Commission preferred a 'middle category', and the Supreme Court accepted this, taking into account both reproduction cost and historic cost, as reasonable.

The company's lawyers argued that:

> "Reproduction cost, less depreciation, furnishes the approved measure of valuation", (67 L Ed, p 1145).

The Commission maintained that:

> "The correct method is not to consider the cost of reproduction, less depreciation, alone, but to take this into consideration, along with many other elements that properly enter into the question of value, and to arrive at the property value from all these", (67 L Ed, p 1146).

The Supreme Court ruled that:

> "The refusal of the Commission and of the lower court to hold that, for ratemaking purposes, the physical properties of a utility must be valued at the replacement cost, less depreciation, was clearly correct", (67 L Ed, p 1147).

13. Bluefield Water Works and Improvement Co. v. Public Service Commission of West Virginia, 262 US 679 (1923)

The company argued for reproduction cost, the regulator for historic cost. The Supreme Court stressed reproduction cost in its judgement.

The company's case was that

> "Plaintiff is entitled to receive a fair return upon the reasonable value of its property at the time it is being used for the public, and the value of its property, used and useful in the service of the public, is to be determined as of the time the inquiry is made regarding the rates [citations]. The rule of present reproduction cost, less depreciation, has been approved by the Supreme Court of the United States and by numerous state and Federal courts", (67 L Ed, p 1177).

The US Supreme Court's verdict was that

> "The record clearly shows that the commission, in arriving at its final figure, did not accord proper, if any, weight to the greatly enhanced costs of construction in 1920 over those prevailing about 1915 and before the war, as established by uncontradicted evidence; and the company's detailed estimated cost of reproduction new, less depreciation, at 1920 prices, appears to have been wholly disregarded. This was erroneous..... Rates which are not sufficient to yield a reasonable return on the value of the property used, at the time it is being used to render the service, are unjust, unreasonable, and confiscatory, and their enforcement deprives the public utility company of its property in violation of the 14th Amendment", (67 L Ed, p 1181).

14. Pacific Gas & Electric Co. v. San Francisco, 265 US 403 (1924)

Both the company and the regulator accepted a reproduction cost rate base. The verdict by the Supreme Court includes the statement that:

> "The inventory of the many items making up appellant's manufacturing and distributing plant, with their reproduction cost new, was agreed upon by the parties", (68 L Ed, 1079).

15. Ohio Utilities Co. v. PUC, 267 US 359 (1925)

Both sides accepted reproduction cost as the basis of valuation.

> "Property valuation. An examination of the record shows that the engineers of the commission made an itemized inventory and valuation of the company's property, based on reproduction value less depreciation, from which it appears that the aggregate fair value of the property for rate-making purposes was $154,655.93. This valuation was confirmed by the oral testimony of the engineers; it was acquiesced in by the company; and we find no substantial evidence in the record to the contrary", (69 L Ed, 658).

16. McCardle v. Indianapolis Water Co., 272 US 400 (1926)

The company argued for spot reproduction cost. The Supreme Court accepted spot reproduction cost. The regulator put forward reproduction costs but based on a previous ten year price index. This is regarded as a middle category.

The Commission's report said that,

> "Considering all the facts, including all the appraisals and the other evidence concerning the trend of prices, the commission is of the opinion that in this case the average of prices for the ten-year period ending with 1921, the last ten years available, most nearly represents the fair value of petitioner's physical property".

The company contended that:

> "cost of reproduction at the date of valuation has come to be recognized as the starting point and the most influential factor in giving due regard to construction costs, wages, and prices affecting value at the date of the inquiry".

The US Supreme Court decided that,

> "in determining present value, consideration must be given to prices and wages prevailing at the time of the investigation; and in the light of all circumstances, there must be an honest and intelligent forecast as to probable price and wage levels during a reasonable period in the immediate future".

The discussion of the case by Phillips states that,

> "The greatest judicial emphasis on reproduction cost came in the *Indianapolis Water Company* case of 1926. The original cost of the utility's property was $10 million. Its estimated reproduction cost was $22 million. The Indiana Commission valued the property at $15.3 million, while the utility insisted on $19 million. The Supreme Court, accepting the utility's claim, held that rates based on any valuation below $19 million would be confiscatory", (Phillips, *The Regulation of Public Utilities*, p 323).

17. Los Angeles Gas and Electric Corp. v. Railroad Commission, 289 US 287 (1933)

The regulator is placed in a middle category. The company argued for reproduction cost as of 1929. The Supreme Court found in favour of the Commission.

> "It is apparent that the estimates of cost of reproduction new of 1929, or of 1930, upon which the company relies, afforded no secure foundation for prediction of future values, and the rate base as fixed by the Commission is not to be invalidated as involving confiscation by reason of these estimates which the course of events deprived of credit as trustworthy prophesies", (77 L Ed, 1196).

Bonbright writes of this case that:

> "The rates in question had been fixed by the Commission in November 1930, a year after the downward trend began, although the company's witness had testified in the summer of that year that, in his opinion, the slump was temporary and that he did not expect 'any substantial change within the next two or three years'. As we now know, said the Supreme Court, 'The country was facing a most serious decline in prices..... It was not the usual case of possible fluctuating conditions but of a changed economic level.' Under these circumstances, which became apparent after the Commission had made its order, the Court concluded that estimates of reproduction cost as of 1929 or 1930 'afforded no secure foundation for prediction of future values.'

> But the Court went further and accepted the original cost of the structures as measuring their value, despite the fact that the Commission itself had allowed $4,700,000 more than this amount in recognition of the then higher price levels. This abatement from the Commission's allowance was used to offset undervaluations of which the Commission was held guilty with respect to other elements of the appraisal", (Bonbright, *Valuation of Property*, pp 1123-4).

Phillips stated:

> "In the *Los Angeles Gas* case, the California commission made two valuations - one based on 'historical cost' and the other on 'fair value'. It then reduced the company's gas rates. The new rates were estimated to produce a 7.7 percent rate of return on historical cost and 7.0 percent on fair value. The Court, upholding the order, held that the choice of valuation measures was within the discretion of the commission", (Phillips, *The Regulation of Public Utilities*).

18. Clark's Ferry Bridge Co. 291 US 227 (1934)

The regulator preferred historic cost, the company argued for reproduction cost, and the Supreme Court ruled that the historic cost valuation was adequate. The Supreme Court's ruling included the following statements:

> "Appellant [i.e. the company] attacks the finding of fair value upon the grounds that it was based solely on the original cost of the bridge property and that the amount paid by the appellant for the bridge was less than its fair value at that time and less than its fair value in 1930. It is not open to question that the reasonable cost of the bridge is good evidence of its value at the time of construction. And we have said that 'such actual cost will continue fairly well to measure the amount to be attributed to the physical elements of the property so long as there is no change in the level of applicable prices' [citations]." (78 L Ed, 771).

> "Appellant relies upon the estimate of engineers as to the cost of reproduction new of the physical property, as of September 1, 1929..... The [district] Court carefully considered them and properly concluded that the trend in prices from 1924-5, when the bridge was built, to 1931-2, when the Commission determined its present fair value was 'downward rather than upward' and that 'in the absence of proof that the prices paid for the construction of the bridge were abnormally low there is no reason why in the short period of six years after its completion, with a tendency of prices for both material and labor being downward there should be a radical increase in the fair value of the bridge for rate-making purposes'. We agree with this conclusion", (78 L Ed, 772).

19. Lindheimer v. Illinois Bell Telephone Co., 292 US 151 (1934)

The Commission preferred historic cost, while the company argued for reproduction cost. There is no clear statement of what the Supreme Court preferred in this case.

The case is a re-hearing of an earlier case (Smith v. Illinois Bell, 282 US 133, 1930). In that case the Commission's evidence was that original cost was $90,687,816, reproduction cost amounted to $128,769,000 and the property was 'in at least 90 per cent condition'. To be added to estimate the rate base were work in progress at $4,250,000, working capital and supplies of $3,000,000, and going value of $4,196,872. On the basis of these figures, the Commission decided that the fair rate base was $96,000,000. (75 L Ed, 261). We infer from this that the Commission used either historic cost alone, or overwhelmingly historic cost to estimate the rate base.

In the Lindheimer case it was stated that:

> "Appellants submitted no valuations since one made by the Commission in 1923 but presented detailed criticisms of appellee's estimates [i.e. estimates by the company]. The District Court found that the method adopted by appellee's witness in ascertaining the cost of reproduction new was reliable and that appellee's estimates were substantially correct" (78 L Ed, 1189).

20. West Ohio Gas Co. v. PUC, 294 US 63 (1935)

The company submitted estimates of the reproduction cost of its property up to 1928. The Commission used these estimates but did not come to a final judgement until 1933. Thus we treat the company as preferring a reproduction cost rate base, and the commission, a middle category.

The Supreme Court judgement includes the statement that:

> "While the proceeding was pending, there was a final order of valuation, made in January, 1932, whereby the value of the property in Lima, used and useful for the business, was fixed at $1,901,696.26 as of March 31, 1928, approximately the date of the adoption of the ordinance. There being no appeal from that order within the time prescribed by law, it became binding on the company, as well as on the commission, though the valuation was less than the company had urged", (79 L Ed, 767).

This was followed by a further decision by the Commission in 1933, revising its earlier opinion as to the prices which could be charged. The company did not protest about the valuation of the rate base, and the case is concerned mainly with other matters. In a minority (concurring) opinion we learn that the valuation was based on reproduction cost:

> "I am not prepared to say that petitioner sustains the burden of showing confiscation, by showing a rate of return even as low as 4.91 % where it is upon reproduction value determined as of March 31, 1928.....", (79 L Ed, 773)

21. West v. Chesapeake & Potomac Telephone Company of Baltimore City, 295 US 662 (1935)

The regulator used a historic cost measure adjusted for movements in the price level which we treat as a middle category; the company favoured reproduction cost, and Supreme Court ruled for the company, disallowing the regulator's method of valuation.

> "It is true that the court [i.e. district court] discussed the company's evidence as to cost of reproduction new, less depreciation, but it did so only to indicate its disapproval of certain large amounts embodied in the total claimed and to reconcile the figures with its own estimate", (79 L Ed, 1650).

Bonbright argues that

> "The specific point at issue in this case was the validity of an 'index-price' method of valuation, under which the Commission had valued the property by reference to depreciated original cost (with some extra allowance) adjusted for subsequent changes in price levels. Here the adjustments were downward, since the date of valuation was in 1932, when price levels were at a low ebb. The district court had enjoined the resulting rate order; but it did so on the ground that the property should have been valued, not at its then current replacement cost, but at original cost.
>
> The Supreme Court sustained the injunction on the ground that the commission's composite price index was not so devised as to convert the original cost of the property into its then value. But it also took occasion to chide the district court for taking unadjusted original cost (minus the depreciation reserve as the basis of valuation" (Bonbright, *Valuation of Property*, p 1153).

22. Railroad Commission v. Pacific Gas & Electric Co., 302 US 388 (1938)

The Commission set the rate base using historic cost but with land set at its current market value, which we treat as a middle category; the company demanded reproduction cost; the Supreme Court ruled for the commission.

> "The gravamen of respondent's complaint was that the Commission refused to consider the fair value of respondent's property and in fixing the rate base 'gave weight and effect solely to the historical cost'. Respondent supports its contention by referring to the statement of the Commission that during its entire history, 'to determine a proper rate base, this Commission has used the actual or estimated historical costs of the properties undepreciated, with land at the present market value'..... The Commission gave its reasons why this 'historical method has dominated the Commission's findings' ", (82 L Ed, 323).
>
> "In each pricing period offered the estimate to reproduce was higher than the historical cost. For the first six months' period of 1933 the reproduction cost was shown as 8 per cent higher than the historical.....the estimate must be in error. It is not conceivable that a property, 80 per cent of which has been

> constructed in the high price period following 1919, could not be reproduced for a lesser cost under prices prevailing in the first six months of 1933", (82 L Ed 324).

The Supreme Court found that the Commission was right to give weight to historic cost:

> "While reproduction cost is an element to be considered by a state commission in fixing a rate base for a public utility, it is not an exclusive test, and the commission may reject it altogether and take the historical cost as the proper base where the evidence of reproduction cost offered by the company is plainly erroneous and without probative value", (82 L Ed, 320).

23. Denver Union Stockyard Co. v. United States, 304 US 470 (1938)

Both the company and the regulator used reproduction cost as the rate base.

> "To ascertain the amount on which the appellant is entitled to earn a return, the Secretary determined what land and structures were used and useful for performance of the services, and to present value of land added cost of reproduction new less depreciation of structures.....", (82 L Ed, 1474-5).

> "Appellant accepts as correct the Secretary's estimate of cost of reproduction less depreciation of property found to be used and useful and also the allowances above mentioned. But it objects to his exclusion of land and improvements used for a stock show and for trackage and facilities for unloading and loading livestock, to hos valuation of the land, and to his treatment of going concern value", (82 L Ed 1475).

24. Driscoll v. Edison, 307 US 104 (1939)

The Commission took reproduction cost and historic cost into account in computing the rate base, i.e. a middle category. It is not clear how the company and the Supreme Court arrived at their rate base estimates.

> "The Commission made no specific allowance for going concern value. It did, however, state that it had weighed the going concern value with other factors to determine fair value. It gave practical effect to this consideration when it fixed fair value several hundred thousand dollars in excess of its average of original and reproduction cost, both depreciated", (83 L Ed, 1143).

25. FPC v. Natural Gas Pipeline Co., 315 US 575 (1942)

Both the Commission and the company adopted a reproduction cost rate base.

> "After extensive hearings the Commission, for the purpose of issuing an interim order, accepted the company's statement that the book cost of their

> property existing at the end of 1938 was $60,172,843,.... Likewise for the purpose of the order, it accepted the companies' estimate that the value of all physical property - calculated at reproduction cost new ..... was $74,420,424, which the Commission adopted as the rate base, (86 L Ed, 1046).

26. FPC v. Hope, 320 US 591 (1944)

The Commission used original cost as the rate base; the company contended for reproduction cost. The Supreme Court's verdict was that the Commission's use of an original cost rate base was legitimate.

> "The Commission established an interstate rate base of $33,712,526 which, it found, represented the 'actual legitimate cost' of the company's interstate property less depletion and depreciation and less unoperated acreage, working capital and future net capital additions. The Commission, beginning with book cost, made certain adjustments not necessary to relate here and found the 'actual legitimate cost' of the plant in interstate service to be $51,957,416 as of December 31, 1940", (88 L Ed, 341).
>
> The Supreme Court's ruling was that: "Rates which enable the company to operate successfully, to maintain its financial integrity, to attract capital, and to compensate its investors for the risks assumed certainly cannot be condemned as invalid, even though they might produce only a meager return on the so-called 'fair value' rate base. In that connection it will be recalled that Hope contended for a rate base of $66,000,000 computed on reproduction cost new. The Commission points out that if that rate base were accepted, Hope's average rate of return for the four-year period from 1937-1940 would amount to 3.27 %. During that period Hope earned an annual average return of about 9 % on the average investment. It asked for no rate increases. Its properties were well maintained and operated. As the Commission says, such a modest rate of 3.27 % suggests an 'inflation of the base on which the rate has been computed. [Citations]. The incongruity between the actual operations and the return computed on the basis of reproduction cost suggests that the Commission was wholly justified in rejecting the latter as the measure of the rate base" (88 L Ed, 346).

Cases Excluded from the Data Set and Reasons for Exclusion

Illinois CR Co. v. ICC, 206 US 441 (1907).

This case, which was about the rates set by a railroad, largely turned upon matters of law: whether or not the commission had made some error of law in reaching its decision. There was, then, little discussion of the facts, and nothing on the rate base.

Denver v. Denver Union Water, 246 US 178 (1918)
This is an unusual case. Matters of valuation were referred to an impartial 'master' who found that the value of the water plant, at reproduction cost, was some $13, 415, 899. However, the city argued that the company had no right to be occupying the streets with its water plant, since its franchise had expired and that therefore the plant should be valued as scrap rather than its value in use:

> "Defendants now insist that the company is occupying the streets and performing its service merely at sufferance; that its rights arose solely out of a franchise ordinance adopted in 1890 and which expired in 1910; and that the city now has the right to exclude the company from its streets, and hence the right to fix the terms upon which it shall continue to do business, and that the value to the company of the property under these circumstances is what it would bring for some other use in case the city should build its own plant - in other words, as to a large part of the property, 'junk value'.

The Supreme Court did not accept this argument. This case forms as single category and as such is not be included in the logit regressions.

Lincoln Gas & Elec. v. Lincoln, 250 US 256 (1919)
There is no clear evidence on the choice of rate base in the Supreme Court case, much of it being taken up with questions of taxation.

Dayton-Goose Creek R Co., 263 US 456 (1924)
Much of this case was taken up with discussion of constitutional issues arising from the 1920 Transportation Act. There is no evidence on the form of the rate base used by either side.

Public Utility Commissioners v. New York Telephone Co., 271 US 23 (1926)
This case is largely about depreciation and contains no information about the form of the rate base.

United Fuel & Gas Co. v. RC, 278 US 300 (1929)
The question of the rate base only enters in the form of leases on land.

United Fuel & Gas Co v. PSC 278 US 322 (1929)
As previous case.

Smith v. Illinois Bell, 282 US 133 (1930)
This case was subsequently re-heard as *Lindheimer v. Illinois Bell Telephone Co., 292 US 151* (1934), which is in our dataset. Hence is not included as a separate case.

Wabash v. Young, 287 US 488 (1933)
Here, the main issue is the separation between interstate and intrastate business, and there is no evidence on the form of the rate base.

Dayton Power & Light Company v. Public Utilities Commission of Ohio, 292 US 290 (1934)

The only disagreement over the rate base here concerned the value of land leases held by the company. Thus it is not relevant to the question of changes in the value of capital goods due to variations in the price level with which we are concerned.

A central issue in this case was the value to be attributed to leases held by Dayton Power, a gas distribution company, on some three million acres of land in Ohio, some of which were in use as sources of gas supply, and some were potential sources for the future. The Commission maintained that they were to be valued at book cost but did not in practice value them in this way, the company that they should be appraised at market value.

Columbus Gas v. PUC, 292 US 398 (1934)

The issues addressed in this case include the allocation of value between a transmission system which serves several cities, allowance for depreciation and the admissibility of including going value in the rate base, but there is no clear evidence on the form of the rate base preferred by the participants in the case.

West Ohio Gas Co. v. PUC 294 US 79 (1935)

There is no evidence on the choice of rate base in this case.

Lone Star Gas Co. v. Texas, 304 US 224 (1938)

It is mainly about the segregation between interstate and intrastate business. There is some evidence on the size of the rate base preferred by the regulatory commission, but no statement as to whether it is reproduction cost or historic cost, while, in rebuttal, the company produced both reproduction cost and historic cost estimates.

APPENDIX 2:
DATES OF SUPREME COURT CASES

1. Smyth v. Ames, 169 US 466

Regulator and Company: 1893; Supreme Court: 1898.

Act of State of Nebraska regulating railroad rates introduced April 12th 1893, and were scheduled to come into effect August 1st 1893; suits brought against it July 28th 1893, (p 893).

Argued in Supreme Court March 4th, 5th 1896; ordered for re-argument April 20th 1896; Reargued April 5th, 6th,7th 1897; decided March 7th 1898. (p 820).

2. San Diego Land & Town Co. v. National City, 174 US 739

Regulator and Company: 1895. Supreme Court: 1899.

The City approved certain rates on February 21st 1895, they were to come into effect July 1st 1895. (p 1156).

Submitted to the Supreme Court October 11th 1898, decided May 22nd 1899. (p 1155).

3. San Diego Land & Town Company v. Jasper, 189 US 439

Regulator and Company: 1897. Supreme Court: 1903.

The ordinance complained of took effect in November 1897. (p 894).

Case was argued in the Supreme Court March 10th 1903; decided April 6th 1903.

4. Knoxville v. Knoxville Water Co., 212 US 1

Regulator and Company: 1901. Supreme Court: 1909.

An ordinance setting maximum rates was enacted March 30th 1901, and a suit against the ordinance was brought by the company on December 7th 1901 [53 L Ed, 377].

It was argued in the Supreme Court April 28th 1908; decided January 4th 1909. [53 L Ed, 372].

5. Willcox v. Consolidated Gas Co., 212 US 19

Company and Regulator: 1906. Supreme Court: 1909.

The company filed a bill on May 1st 1906 in the circuit court. This was to prevent an order of the legislature of New York state of February 23rd 1906, which was due to take effect May 1st 1906, setting gas rates in New York city [53 L Ed, 384].

In the Supreme Court: Argued November 4th, 5th, 6th, 1908; decided January 4th 1909. [53 L Ed, 384].

6. Lincoln Gas & Elec. v. Lincoln, 223 US 349

Regulator and Company: 1906; Supreme Court: 1912.

Evidence on dates in this case is rather sparse, but the case was subsequently re-heard before the Supreme Court in 1919 [250 US 256], and here we learn that the ordinance reducing gas charges from $1.20 to $1.00 per thousand cubic feet was adopted by the city in November 1906. The company responded with a law suit in December 1906. [63 L Ed, 972-3].

Argued in the Supreme Court, December 6th and 7th, 1911. Decided, February 19th 1912. [56 L Ed, 466].

7. Cedar Rapids Gas Light Co., 223 US 655

Regulator and Company: 1906; Supreme Court: 1912.

A maximum price for gas was set by the regulator in 1906; company appealed against it, court decided the price should be given a fair test before it was declared unlawful. [56 L Ed, 595].

Argued in Supreme Court February 29th 1912. Decided March 11th 1912. [56 L Ed, 603].

8. Minnesota Rate Cases, 230 US 352

Company and Regulator: 1906; Supreme Court: 1913.

An order setting railroad rates was passed by the Commission Sept 6th 1906, and was to come into effect November 15th 1906. The companies initially complied with the Sept 1906 order, but further reductions were made by the Commission on December 14th 1906. The companies responded with a temporary injunction in the circuit court; an Act setting rates was passed by the legislature in April 1907. The companies obtained an injunction on April 18th 1907. [57 L Ed, 1533-4].

Before the Supreme Court: Argued April 1912; decided June 1913. [57 L Ed, 1516].

9. Des Moines Gas Co., 238 US 153

Company and Regulator: 1910; Supreme Court: 1915.

The company brought a suit against an ordinance of the city, passed December 27th 1910, which was scheduled to come into effect from the beginning of January 1911, setting the price of gas in Des Moines at 90 cents per thousand cubic feet. [59 L Ed, 1248].

Argued in Supreme Court, November 10th and 11th, 1914. Decided, June 14th 1915. [59 L Ed, 1245].

10. Galveston Elec v. Galveston, 258 US 388

Regulator: 1919; Company: 1920; Supreme Court: 1922.

Municipal Board of Commissioners reduced maximum fares on the Galveston street railway to 5 cents on June 5th 1919. The company operated under this fare for 11 months, then it brought a suit in Federal Court of southern Texas (i.e. May 1920).

A master heard the case in October 1920, and he filed his report in November 1920; the district judge heard the case in January 1921, and he delivered his findings in March 1921 [66 L Ed, 680-1].

Argued in the Supreme Court: December 15th, 16th 1921; decided April 10th 1922. [66 L Ed, 679].

11. Missouri ex rel Southwestern Bell Telephone Co v. Public Service Commission, 262 US 276

Company and Regulator: 1919. Supreme Court: 1923.

Hearings before the Commission began in August 4th 1919; the Commission's rate reduction became effective on December 1st 1919 [67 L Ed, 982-3].

Argued in the Supreme Court, December 8th 1922; decided May 21st 1923 [67 L Ed, 981].

12. Georgia Railway & Power Co v. Railroad Commission of Georgia, 262 US 625

Company and Regulator: 1921; Supreme Court: 1923.

Hearings before the Commission began on September 20th 1921; rate reductions were put in place on December 30th 1921. The company then brought a suit against the reductions, but exact date not specified [67 L Ed, 1146].

Supreme Court: Argued December 8th 1922; decided June 11th 1923 [67 L Ed, 1145].

13. Bluefield Water Works and Improvement Co. v. Public Service Commission of West Virginia, 262 US 679

Company and Regulator: 1920; Supreme Court: 1923.

PSC made an order prescribing rates on September 27th 1920. Company instituted proceedings against this, but exact date not specified [67 L Ed, 1179].

Argued before the Supreme Court January 22nd 1923; decided June 11th 1923 [67 L Ed, 1177].

14. Pacific Gas and Electric Co. v. San Francisco, 265 US 403

Company and Regulator: 1913; Supreme Court: 1924.

> "By three separate ordinances passed in June of 1913, 1914, and 1915, the board of supervisors directed it to supply such gas during the fiscal year commencing July 1st thereafter at not more than 75 cents per thousand feet. Claiming that the rate so prescribed would not yield fair return, appellant brought suits in July, 1913, 1914, and 1915, to prevent enforcement of the respective ordinances.....December 15, 1916, the causes were consolidated and referred to a master. After taking much testimony he presented an elaborate report, March 2, 1920, which recommended dismissal of the bills and repayment of whatever had been collected above the prescribed rate. The district court affirmed the report and directed an appropriate decree. [68 L Ed, 1078].

Argued in the Supreme Court, April 17th 1923. Reargued, February 19th 1924. Decided, June 2nd 1924. [68 L Ed, 1075].

15. Ohio Utilities v. PUC, 267 US 359

Company and Regulator: 1920; Supreme Court: 1925.

In 1920 the Ohio Utilities Company filed rate schedules for the village of Hillsboro. These were protested and the commission ordered a hearing. The Commission decided that the rate base, as of August 30th 1920, was $145,055. [69 L Ed, 658].

Argued in the Supreme Court, January 20th and 21st 1925. Decided March 2nd 1925. [69 L Ed, 657].

16. McCardle v. Indianapolis Water Co., 272 US 400

Company and Regulator: 1923; Supreme Court: 1926.

On June 8th 1923, the water company filed a petition with the commission claiming that its rates were too low. The city of Indianapolis responded, stating that the rates were adequate. After hearing, the commission set new rates, which were to become effective on January 1st 1924. The company brought a suit which claimed that the new rates were also too low [71 L Ed, 321].

Argued in the Supreme Court April 16th and 19th 1926. Decided November 22nd 1926.

17. Los Angeles Gas and Electric Corp. v. Railroad Commission, 289 US 287

Company and Regulator: 1930. Supreme Court: 1933.

Following a hearing which was completed on July 16th 1930, the commission made an order fixing gas rates on November 24th 1930. The rates were to become effective on January 1st 1931. [77 L Ed, 1185, 1188].

Argued in the Supreme Court, February 7th and 8th 1933. The outcome decided May 8th 1933. [77 L Ed, 1182].

18. Clark's Ferry Bridge Co. v Public Service Commission , 291 US 227

Regulator: 1932. Company: 1929. Supreme Court: 1934.

"In January, 1930, the Commission began the present proceeding on its own motion and, after hearings, determined that the fair value of the appellant's property, as of February 2, 1932, was still $767,800....."[78 L Ed, 770].

> "Appellant [i.e. the company] relies upon the estimate of engineers as to the cost of reproduction new of the physical property as of September 1 1929, together with all additional expenditures required over and above the bare cost of the physical property, to put the bridge in operation as an income-producing property" [78 L Ed, 772].

Argued in the Supreme Court, January 18th, 1934. Decided February 5th 1934. [78 L Ed, 768].

19. Lindheimer v. Illinois Bell Telephone Co., 292 US 151

Company and Regulator: 1923; Supreme Court: 1934.

Although finally decided in 1934, this case originated in 1923.

The judgement by the Supreme Court began:

> "This case comes here for the second time. It presents the question of the validity under the Fourteenth Amendment of rates prescribed by the Illinois Commerce Commission for telephone service in the City of Chicago. The Commission's order, made on August 16, 1923, to be effective October 1, 1923, reduced rates applicable to a large part of the intrastate service of the appellee, Illinois Bell Telephone Company. In this suit, brought by that company in September, 1923, an interlocutory injunction was granted upon the condition that if the injunction were dissolved the Company should refund the amounts charged in excess of the challenged rates. We affirmed that order [citation]. The final hearing was not had until April, 1929, - a delay found to be attributable to the City of Chicago. On that hearing, the District Court, composed of three judges, entered a final decree making the injunction permanent [citation]. We reversed that decree and remanded the case for further proceedings [Smith v. Illinois Bell, 282 US 133]. Further evidence was then taken and the district court made new findings and entered a final decree which permanently restrained the enforcement of the Commission's order and released the Company from obligations to refund the moneys which had been collected pending the suit [citation]. The state authorities and the city bring this direct appeal [citation]. The Company brings a cross-appeal to review the findings below, insisting that its property has been undervalued and that substantial amounts of its operating expenses have been disallowed" [78 L Ed, 1186-7].

In reaching its decision, the Supreme Court had before it evidence of value, operating expenses etc. for the period 1923 to 1932. In essence it was considering whether, in the light of information for the years from 1923 to the early 1930s, the decision reached by the Commission in 1923 was fair and reasonable.

Argued in the Supreme Court, January 15th and 16th 1934. Decided April 30th 1934. [78 L Ed, 1183].

20. West Ohio Gas Co v. PUC, 294 US 63

Company: 1928; Regulator: 1933; Supreme Court: 1935.

Hearings before the Commission began in July, 1928, and ended in July 1932. The size of the rate base was obtained from estimates submitted by the company, covering the period up to 1928. The Commission made its final order on rates to be charged on March 10th, 1933. [79 L Ed, 766-7].

Submitted to the Supreme Court, December 7th, 1934. Decided January 7th, 1935. [79 L Ed, 762].

21. West v. Chesapeake & Potomac Telephone Company of Baltimore City, 295 US 662 (1935)

Company and Regulator: 1933; Supreme Court: 1935.

Early in 1933 PSC of Maryland undertook an investigation of the rates charges; it entered an order on November 28th 1933, which stated that rates were to be reduced from January 1st 1934 [79 L Ed, 1643].

This case was argued in the Supreme Court on April 10th and 11th, 1935; decided June 3rd 1935 [79 L Ed, 1641].

22. Railroad Commission v. Pacific Gas & Electric Co., 302 US 388

Company and Regulator: 1933; Supreme Court: 1938.

The Commission's order of November 13th 1933 fixed rates for gas supplied by the company. [82 L Ed, 321]. Prior to this, hearings had taken place before the Commission: "While these hearings were in progress, and on June 16 1933, respondent was cited to show cause why interim rates should not be put into effect pending the proceeding. Respondent stipulated that it would complete the presentation of its evidence before October 1, 1933, and that the rates which the Commission established in the proceeding might, if lower than the existing rates, be made retroactive so as to apply to meter readings made after July 16, 1933, and before November 15, 1933. That date was later changed by stipulation to January 1, 1934." [82 L Ed, 322]. This implies that the rates were put into effect early in 1934.

Argued in the Supreme Court, April 30th 1937. Reargued November 11th 1937. Decided January 3rd 1938. [82 L Ed, 320].

23. Denver Union Stockyard Co. v. United States, 304 US 470

Company and Regulator: 1937; Supreme Court: 1938.

The Secretary of Agriculture initiated hearings on November 8th 1934. After much investigation an order was made on the maximum rates to be charged by the company on February 17th 1937. On March 9th 1937 the company commenced a suit [82 L Ed, 1473-4].

Argued in the Supreme Court on April 27th 1938; decided May 31st 1938 [82 L Ed, 1471].

24. Driscoll v. Edison, 307 US 104

Company and Regulator: 1937; Supreme Court: 1939.

The investigation by the Commission began on January 27th 1936. A temporary rate order was issued on July 13th 1937. On October 15th 1937 a permanent injunction was obtained by the company. The Commission did not appeal but issued another order on November 30th 1937. On December 14th 1937 the utility filed a bill against the order, this was heard before a court on January 17th 1938, and on October 14th 1938 the company obtained its injunction [83 L Ed, 1138].

Argued in the Supreme Court on February 7th-8th 1939; decided April 17th 1939 [83 L Ed, 1135].

25. FPC v. Natural Gas Pipeline Co., 315 US 575

Company and Regulator: 1940; Supreme Court: 1942.

The Commission began its investigation after 1938. It decided that a new schedule of rates had to be put in place, and they were to become effective from September 1st 1940 [86 L Ed, 1046].

Supreme Court: argued February 10th - 11th 1942, and decided March 16th 1942 [86 L Ed, 1040].

26. FPC v. Hope, 320 US 591

Company and Regulator: 1942; Supreme Court: 1944.

In July 1938 the cities of Cleveland and Akron filed complaints with the Commission about Hope's charges. The Commission began an investigation 'later in 1938'; some other places made complaints during 1939. These complaints were consolidated and hearings began. On May 26th 1942, the Commission made its order [88 L Ed, 340-1].

Argued in the Supreme Court October 20th to 21st 1943; decided January 3rd 1944 [88 L Ed, 335].

APPENDIX 3:
CAPITAL GOODS PRICE DATA

Year	Capital goods price series	I_{20}	I'_{20}	I_{15}	I'_{15}
1871	63.5				
1872	62.2				
1873	61.3				
1874	60.5				
1875	57.4				
1876	53.7				
1877	51.5				
1878	51.2				
1879	50.8				
1880	51.0				
1881	51.4				
1882	51.5				
1883	50.0				
1884	49.1				
1885	47.6				
1886	46.8				
1887	46.4				
1888	46.2				
1889	46.3				
1890	45.6				
1891	44.0	0.852	-1.479	0.895	-0.786
1892	42.7	0.842	-1.582	0.881	-0.896
1893	41.9	0.841	-1.586	0.875	-0.936
1894	40.5	0.829	-1.714	0.858	-1.068
1895	40.3	0.841	-1.591	0.867	-0.999
1896	39.2	0.832	-1.675	0.857	-1.074
1897	40.1	0.865	-1.346	0.893	-0.805
1898	41.7	0.911	-0.886	0.944	-0.422
1899	46.0	1.016	0.156	1.053	0.399
1900	47.2	1.047	0.470	1.085	0.638
1901	46.5	1.035	0.351	1.069	0.521
1902	47.3	1.058	0.578	1.088	0.662
1903	47.8	1.073	0.731	1.098	0.738
1904	47.4	1.066	0.663	1.087	0.652
1905	49.9	1.124	1.244	1.143	1.069
1906	53.0	1.192	1.916	1.207	1.552
1907	54.4	1.216	2.163	1.225	1.686
1908	51.4	1.141	1.411	1.140	1.050
1909	54.9	1.213	2.128	1.201	1.511
1910	55.6	1.219	2.188	1.193	1.446
1911	55.7	1.210	2.100	1.170	1.272
1912	57.1	1.227	2.268	1.170	1.277
1913	58.4	1.238	2.375	1.168	1.260

1914	56.2	1.172	1.719	1.098	0.737
1915	60.1	1.233	2.325	1.159	1.190
1916	70.4	1.415	4.150	1.336	2.519
1917	85.7	1.674	6.741	1.584	4.384
1918	104.3	1.968	9.682	1.863	6.469
1919	112.7	2.046	10.456	1.927	6.955
1920	134.3	2.351	13.513	2.187	8.905
1921	107.0	1.800	7.998	1.653	4.896
1922	96.4	1.563	5.629	1.428	3.209
1923	102.1	1.600	6.003	1.458	3.434
1924	100.6	1.521	5.209	1.372	2.787
1925	100.0	1.456	4.560	1.308	2.312
1926	100.5	1.413	4.128	1.261	1.960
1927	98.0	1.334	3.340	1.178	1.332
1928	97.9	1.293	2.926	1.129	0.966
1929	100.0	1.274	2.741	1.107	0.802
1930	90.5	1.116	1.156	0.954	-0.342
1931	80.3	0.963	-0.373	0.818	-1.368
1932	40.3	0.471	-5.286	0.405	-4.462
1933	58.5	0.706	-2.939	0.640	-2.703
1934	82.4	0.995	-0.055	0.942	-0.433
1935	94.0	1.109	1.086	1.096	0.720
1936	88.5	1.017	0.175	1.051	0.382
1937	104.9	1.190	1.903	1.259	1.941
1938	92.9	1.044	0.445	1.110	0.825
1939	91.1	1.029	0.292	1.094	0.705
1940	102.2	1.165	1.649	1.234	1.753
1941	111.5	1.284	2.840	1.345	2.584
1942	118.0	1.357	3.574	1.416	3.120
1943	104.3	1.190	1.899	1.240	1.797
1944	119.3	1.360	3.600	1.413	3.098
1945	120.7	1.366	3.665	1.417	3.124
1946	146.5	1.645	6.453	1.692	5.186
1947	161.1	1.784	7.841	1.800	5.998
1948	191.5	2.083	10.828	1.902	6.763
1949	179.2	1.904	9.040	1.637	4.781
1950	193.4	2.012	10.124	1.683	5.122