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The Coasean analysis of lighthouse financing: myths and realities

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In ‘The Lighthouse in Economics’ (Coase, 1974), Coase reached the conclusion that in England there existed a relatively efficient privately financed lighthouse system, which would refute economists’ traditional statements concerning the production of public goods. The purpose of this paper is to challenge his conclusion. We first show that, from a methodological and theoretical perspective, ‘The Lighthouse’ is consistent with ‘The Problem of Social Cost’ (Coase, 1960). Then, applying Coase’s own method (historical case studies), we attempt to re-examine the respective roles and efficiencies of private initiative and government.

Key words: Coase, Lighthouses, Public utilities, Externalities.

JEL Classification: B25, B41, D62, H41

1. Introduction

Coase’s articles mainly consist of empirical case studies, from the pig-cycle (e.g. Coase and Fowler, 1935) to the acquisition of Fisher Body by General Motors (Coase, 2000), through the allocation of radio frequencies by the Federal Communications Commission (Coase, 1959).¹ In opposition to the analysis developed by comparison with an ‘ideal world’ (Coase, 1960, p. 43), Coase recommends incremental solutions, and comparisons between different institutional arrangements. His break with orthodox microeconomics can be understood as resulting from his desire to explain the working of ‘our actual economic system’ (Coase, 1978, p. 244). Coase develops his case-based analysis, in opposition to the study of an ideal world (Medema, 1994; Mäki, 1998A, 1998B). A theoretical consequence of these methodological considerations is that Coase questions ‘blackboard’ economic policies.

‘The Lighthouse in Economics’ (Coase, 1974), reprinted in *The Firm, the Market and the Law* (Coase, 1988)², is an illustration of Coase’s project in the wake of ‘The Problem of Social Cost’. First, this empirical study emphasizes the methodological deficiencies of mainstream economics. Coase observes that lighthouses are often used by 19th and 20th century economists as examples of services whose production³ has to be provided by government. Yet,

* LEMMA, University of Littoral Côte d’Opale. A preliminary version of this paper was presented to the EAEPE 2002 conference and won its author the 2002 Herbert Simon Young Scholar Prize. It has benefited from the comments made by the participants, by two anonymous referees, and by Bruno Deffains, John Finch, and Francisco Vergara; I am of course fully responsible for any remaining mistakes.

he points out that, until the early 19th century, some English lighthouses were built and maintained by private individuals. He concludes that economists should not quote examples before having rigorously studied empirical cases. At a second level, ‘The Lighthouse’ is a theoretical extension of ‘The Problem of Social Cost’: Coase’s observation refutes some statements by Pigou (1932) and Samuelson (1964) which claim that the production of public goods can only be provided by government. We must add that Coase does not discuss any theoretical issue in this article, although he wrote a criticism of the theory of natural monopoly pricing (Coase, 1946), and although ‘The Lighthouse’ was published during the debate on public utility regulation – initiated by Demsetz (1968), and pursued by Williamson (1975) and Goldberg (1976). But, even though Coase only mentions specific, empirical and case-based considerations, he once again questions one of the standard arguments in favour of public intervention and brings up the possibility of other institutional frameworks.⁴

Boldly, Coase criticises a great deal of economic theory and makes an interesting attempt to confront it with reality. In ‘The Lighthouse’, he provides an example of a case study showing how he applies his method. Only Van Zandt (1993), Professor of Law, qualified the scope of Coase’s conclusion, by showing that the “private” form Coase describes, which will be defined later, never existed. More specifically, the English lighthouse financing system was a mixed one. In fact, when examining the same historical experience, we are led to doubt Coase’s conclusions: the system was not as private, and above all not as efficient as he suggests, in the sense that it was not well adapted to needs. Almost paradoxically, this mixed system encountered the problems traditionally mentioned by economists. Our analysis illustrates the difficulty of empirical studies: their interpretation depends on the choice of described elements. The following questions must therefore be answered: What role did government play? How did the mixed system operate? Why did it disappear?

In section 2, ‘The Lighthouse in Economics’ will be placed in the context of Coase’s methodological and theoretical project. I shall then expose in detail the core of his argument (a brief history of the English lighthouse financing system). In section 3, I shall apply Coase’s own method in order to evaluate his assertions. Coase’s conclusions will thus be challenged by concentrating on the role of government and on some failures of “private” financing.

2. ‘The Lighthouse in Economics’: a private financing possibility

2.1. From theory to empirical cases studies

2.1.1. The lighthouse example in economic theory

In order to evaluate the critical impact of Coase’s empirical study, we must first present the economic theory underlying the lighthouse example. Coase begins ‘The Lighthouse’ by quoting 19th and 20th century economists. They refer to the practical impossibility of getting payments from users, which discourages private entrepreneurs from providing this service, in order to justify the public production of lighthouses. Coase quotes John Stuart Mill (1848, p. 968), then Sidgwick (1901, p. 406) who is the first to refer to the appropriation or free-rider problem. Pigou (1932, p. 184) mentions Sidgwick’s example of the lighthouse. If we use his well-known terms (defined p. 132), the marginal social net product of the service of a lighthouse

is greater than its marginal private net product. In modern language, this is an example of a positive externality.

Coase then examines two arguments advanced by Samuelson. The first one is similar: '[L]ighthouse keepers cannot reach out to collect fees from skippers' (Samuelson, 1964, p. 159, quoted in Coase, 1974, p. 189). The second argument is novel: even if these payments could be enforced, a private enterprise could never fix an optimal price since the marginal cost of this service is equal to zero.

Samuelson raises two distinct theoretical problems. First, the light provided by a lighthouse is a public good (non-rivalry and non-excludability). Second, the use of the lighthouse service by a ship does not imply extra costs: the problem is one of setting the price of a natural monopoly.⁵

Finally, at the end of 'The Lighthouse', Coase mentions, in a footnote, a further argument for the public production of lighthouse services: the problem of small numbers of buyers and sellers raised by Arrow (1969). According to the latter, the main problem of the lighthouse case is not one of indivisibility or of non-excludability, even if these are present. It is the one of the bargaining relationship that could exist between the shipowner and the lighthouse owner over the fixing of the price. To bring out the problem, Arrow assumes that the lighthouse keeper can turn the light off when he wants to and turn it on again when a paying ship requires it, so that no other ship could free ride. In this case, a problem of bilateral bargaining arises and hence the impossibility of finding a competitive equilibrium price (Arrow, 1969, pp. 146-7). Ignoring the theoretical argument, Coase quotes Arrow and holds his example to ridicule: 'Arrow's surrealist picture of a lighthouse keeper shutting off the light as soon as it became useful while arguing with the captain about the charge to be made (assuming that the vessel has not run on the rocks in the meantime) bears no relation to the situation faced by those responsible for lighthouse policy' (Coase, 1974, p. 212, n. 42).

2.1.2. A metaphorical example

Coase is not interested in these theoretical arguments, but only in the practical issues that underlie them. His explicit aim is to understand Mill's, Sidgwick's and Pigou's arguments, in their practical aspects, and to appraise Samuelson's (Coase, 1974, p. 191). 'The Lighthouse' is mainly a study of the actual system of lighthouse financing and maintenance at times (from the 17th to the 19th century) and places (Great Britain, particularly England) that 'must have been in the back of [these authors'] minds' (*ibid.*). According to Coase (see below), on the one hand, the public type organization in charge of lighthouses did not build enough lighthouses. On the other hand, payments could be enforced, which made building a lighthouse profitable for a private individual.

In conclusion, Coase compares this historical evidence with the traditional arguments quoted above: 'The sketch of the British lighthouse system and its evolution (...) shows how limited are the lessons to be drawn from the remarks of Mill, Sidgwick, and Pigou' (*ibid.*, p. 208). He emphasizes that payments were obtained from all ships.

The evaluation of Samuelson's arguments, justifying a public lighthouse service financed out of general taxation, consists in comparing two actual financing systems. The English lighthouse system, now centralised, has always been financed by dues levied on ships in ports. Coase examines the changes that would result from changing this system to one financed by general taxation (*ibid.*, p. 208-9). First, he argues that a general tax would compel the government to oversee the lighthouse service more closely, which would reduce its 'efficiency'.⁶ Second, the lighthouse service would not be accountable to the Light Advisory Committee, which represents administrators, insurers, and shippers. According to Coase, this would reduce the profitability of the service provision, relative to the existing system where needs and costs considerations are said to be better addressed. He concludes: '[T]he service would therefore become somewhat less efficient. (...) In general it would seem to be a safe conclusion that the move to support the lighthouse service out of general taxation would result in a less appropriate administrative structure' (*ibid.*, p. 210). Coase's assertion that the dues system is more efficient is important since, in the introduction to his 1988 book, he reduces the argument of the 1974 article to this claim: '[T]he lighthouse service was better adapted to the needs of shipowners (...) than it would be if it were financed out of general taxation' (Coase, 1988, p. 30).

Coase concludes 'that economists should not use the lighthouse as an example of a service which could only be provided by the government. (...) [E]conomists wishing to point to a service which is *best* provided by the government should use an example which has a more solid backing' (Coase, 1974, p. 213, italics added). According to him, the lighthouse system was well adapted to needs, and hence was, at least to some extent, efficient. Pareto-optimality is obviously not referred to here since no solution is ideal in a Coasean perspective.

2.1.3. 'The Lighthouse', a further application of 'The Problem of Social Cost'

From a methodological perspective, 'The Lighthouse' shows that empirical research can be more relevant to matters concerning economic policy, than 'blackboard' general theories. This issue is what justifies the 1988 reprint of the paper. In the introduction to his book, Coase writes: '[Most economists] paint a picture of an ideal economic system, and then, comparing it with what they observe (or think they observe), they prescribe what is necessary to reach this ideal state without much consideration for how this could be done. The analysis is carried out with great ingenuity but it floats in the air' (Coase, 1988, p. 28). Coase first quotes Meade's example (1952) of the positive externality between bees and orchards, challenged by Johnson (1973) and Cheung (1973), who raised the existence of contracts between beekeepers and farmers. He then introduces 'The Lighthouse' in line with this critical approach: 'A comprehensive illustration of the inadequacies of the usual approach of economists to questions of economic policy, at any rate in micro-economics, is provided by the example of the lighthouse' (Coase, 1988, p. 29).

More precisely, and as soon as 1974, Coase draws two methodological conclusions from his study of the English lighthouse system, which fit perfectly with the project developed in 'The Problem of Social Cost'. The first one is to argue that the lighthouse is often used by

economists as a metaphorical example, illustrating the lack of empirical studies, and distance from the real world. Coase writes: 'The question remains: How is it that these great men have, in their economic writings, been led to make statements about lighthouses which are misleading as to the facts, whose meaning, if thought about in a concrete fashion, is quite unclear, and which, to the extent that they imply a policy conclusion, are very likely wrong? (...) Despite the extensive use of the lighthouse example in the literature, no economist, to my knowledge, has ever made a comprehensive study of lighthouse finance and administration. The lighthouse is simply plucked out of the air to serve as an illustration. (...) This seems to me to be the wrong approach' (Coase, 1974, p. 211).

According to his second methodological conclusion, case studies must be based on comparisons between the different actual ways of organizing economic activities: 'I think we should try to develop generalizations which would give us guidance as to how various activities should best be organized and financed. But such generalizations are not likely to be helpful unless they are derived from studies of how such activities are actually carried out within different institutional frameworks' (*ibid.*).

In 'The Lighthouse', although he emphasizes methodological matters and the empirical standpoint of his analysis, Coase draws theoretical conclusions, since he deems the traditional policy solutions to be erroneous. His theoretical project in that paper is also consistent with 'The Problem of Social Cost'. Coase wrote in 1972: 'An inspired theoretician might do as well without such empirical work, but my own feeling is that the inspiration is most likely to come through the stimulus provided by the patterns, puzzles, and anomalies revealed by the systematic gathering of data, particularly when the prime need is to break our existing habits of thought' (Coase, 1972, p. 71). In 'The Lighthouse', Coase wants to break with the systematic interventionist solution to the problem of public goods. In the same vein, 'The Problem of Social Cost' aimed at showing that harmful effects, *i.e.* negative externalities, do not provide a *prima facie* case for public intervention: it would be justified if and only if it solves the problem at least cost.⁷

Moreover, the lighthouse is in itself an example of a positive externality, as are Meade's bees. 'The Lighthouse' could be thought of as an application of 'The Problem of Social Cost': Coase may be attempting to show with an empirical example that external effects do not necessarily call for public intervention. In this way, Coase may be suggesting that if property rights in lighthouses are well defined and enforced – the possibility of making users pay – then private production is conceivable.

The footnote devoted to Arrow confirms this interpretation. Arrow's paper (1969) to which Coase refers concerns externalities. It presents a perfect competition model in which they would be regarded just as any other commodity, which would lead, at least on the blackboard, to Pareto optimality. However, Arrow's aim is precisely to explain why these externalities have characteristics inconsistent with the assumptions of the competitive model, such as non-excludability or the possibility of bargaining over the price. To illustrate this point, Arrow mentions the lighthouse example. Coase therefore does not randomly tackle Arrow. Rather, he attempts to bring the logic of 'The Problem of Social Cost' to completion and to defend it.

2.2. The history of English lighthouse financing according to Coase

The core of Coase's argument lies in the history of the financing and maintenance of lighthouses in England and Wales⁸ since the 16th century. We shall now look at the way Coase tells it.⁹

2.2.1. The birth of Trinity House in the 16th century

During the first half of the 16th century, supplying buoys, regulating beacons and seamarks, and collecting funds were the Lord High Admiral's exclusive responsibility. This regulation also applied to seamarks belonging to private individuals, who had to ensure their maintenance.¹⁰ Receipts came from dues, called 'light dues', paid by ships, on departure from or on arrival at a British harbour, and collected by Customs officials. In 1566, these rights of supervision, maintenance, and the collection of dues (the amount of which depended first on the number of ship masts, then on the tonnage) were shared with Trinity House of Deptford Strond. Founded in 1514 by Henry VIII, it was a charity, which had evolved out of the medieval Guild of Mariners, and which helped seamen's families. From 1594 onwards, all the Lord High Admiral's rights were progressively passed on to Trinity House.

2.2.2. Private initiatives in the 17th and 18th centuries

At the beginning of the 17th century, Trinity House was solely responsible for the building and maintenance of lighthouses in England. However, it built very few new lighthouses and notably none between 1610 and 1675. According to Coase, 'the difficulty was that those who were motivated by a sense of public service did not build lighthouses' (Coase, 1974, p. 196). In other words, Coase suggests a certain form of inefficiency on the part of Trinity House, which did not build lighthouses. Trinity House also tried to prevent private individuals from building lighthouses by attempting to have the exclusive nature of its building right recognized. However, it did not succeed. Some individuals, supported by petitions of shipowners and seamen, obtained authorization from the Crown to build lighthouses and to collect the corresponding dues, with a profit motive and not a public service one. As a consequence of this private initiative, ten lighthouses were built during that period. The authorizations were granted by the Crown in the form of patents, sometimes approved by Act of Parliament. Dues were collected in the ports at the end of the trip by Customs officers, according to the ship's route and the lighthouses it was supposed to have benefited from – just like dues for Trinity House lighthouses. The amount of the tax was calculated by applying a fixed rate per ton and per lighthouse passed. The rate was different for each lighthouse.

Another policy was adopted in 1679. Only Trinity House, having itself obtained the patent, could rent the corresponding rights to a private individual (sometimes applying an Act of Parliament), mainly in the form of a lease. The entrepreneur who financed the construction and maintenance paid Trinity House an annuity to use the lighthouse and sometimes shared the profits with it. The lease was signed for a specific duration and could be renewed.

2.2.3. From 19th century centralisation to the present system

During the 19th century, Trinity House bought the lighthouses leased to private individuals and began recovering them when the leases expired. Some lighthouses were bought as early as 1822, at the suggestion of a first Report from the House of Commons. Then, in 1836, an Act of Parliament compelled Trinity House to buy all of the remaining lighthouses.¹¹ The process was completed in 1842. The purpose of the purchase is explained in a second Report of the Commons in 1834, quoted by Coase. The lack of uniformity of the different dues applied made the system very complex. High tax levels, serving the interest of a few privileged individuals, damaged the competitiveness of British merchant shipping (*Report*, 1834, quoted in Coase, 1974, pp. 201-3).

By mentioning this report, Coase is indirectly raising the problems created by this type of financing. However, he immediately minimizes them and finds this report excessive. He claims that the aim was to reduce light dues: ‘Although there was emphasis in this report on the untidiness of the then existing arrangements and suggestions (here and elsewhere) that some of the private lighthouses were not run efficiently, there can be little doubt that the main reason why the consolidation of lighthouses under Trinity House received such strong support was that it was thought that it would lead to lower light dues’ (Coase, 1974, p. 203). He claims that the lowering of dues did not occur until 1848, since they were used to finance non only lighthouse purchases but also the charity expenses of Trinity House until 1853 (*ibid.*, pp. 203-7). Coase seems to deplore this centralisation, which he thinks unjustified. He rejects the accusation of inefficiency raised against the private system, and reduces the aim of the centralisation to a lowering of dues, judging it to be of less significance. Coase finally emphasizes that Trinity House’s charity expenses, derived from lighthouse income, were not devoted to building or maintaining lighthouses.

Coase provides figures to highlight the small number of lighthouses built by Trinity House (*ibid.*, p. 199): in 1820, 24 lighthouses belonged to Trinity House (only 11 of which had been originally built by it) and 22 to private organizations and individuals. Between 1820 and 1834, Trinity House built 9 (plus 2 replacing 1 purchased), purchased 5 from private hands and 3 from Greenwich Hospital. By 1834, this results in a total of 42 lighthouses belonging to Trinity House, with 14 still in private hands. Only 10 “private” lighthouses remained in 1836, when Trinity House was ordered to buy them all, which was done at considerable expense.

A reorganisation occurred in 1853: the Mercantile Marine Fund would receive the dues and provide for the expenses of the lighthouses; then the General Lighthouse Fund was created in 1898 without great modification until the present system (*ibid.*, p. 207). This Fund was supervised by the Department of Trade (today the Department of the Environment, Transport and the Regions). This last reform was accompanied by a simplification of the dues system. They were made independent of the number of lighthouses passed.¹²

Coase sees in the old system the possibility for a private entrepreneur to finance and maintain a lighthouse with financial gain as his sole motive¹³: ‘The early history shows that, contrary to the belief of many economists, a lighthouse service can be provided by private enterprise. (...) The lighthouses were built, operated, financed, and owned by private

individuals, who could sell a lighthouse or dispose of it by bequest. The role of government was limited to the establishment and enforcement of property rights in the lighthouse. The charges were collected at the ports by agents for the lighthouses' (*ibid.*, p. 212). Of course, Coase does not claim that lighthouse financing must always be private¹⁴, but only that it could have been in the past, contrary to the economists' assessments.

We can draw from this history, as Coase relates it, five implicit arguments used in his criticism of the lighthouse example: (1) Trinity House, in charge of the public interest, built few lighthouses; (2) private individuals could obtain payments from users for a lighthouse service; (3) this activity must have been profitable for private individuals since many began building lighthouses; (4) this "private" financing system was efficient, *i.e.* adapted to needs; (5) the role of the government in the production of lighthouse services was similar to that of any other private good: it was limited to the definition and enforcement of property rights. Applying Coase's method will lead me to question these five arguments. I shall re-examine the respective roles of private initiative and government, and the efficiency of the English system.

3. Reappraisal of the respective roles and efficiency of private initiative and government

3.1. The role of the public authority in the lighthouse production system

Let us first recall that seamarks belonging to private individuals were supervised by the Lord High Admiral and then by Trinity House. The "owners" were compelled to replace them in case of natural destruction, and to pay a fine if they destroyed them. Regarding the lighthouses built by private individuals, they needed the authorization from the public authority, issued by the King, Parliament or Trinity House. Light dues for private "owners" and for Trinity House were collected in the same way, and by the same individuals – Trinity House employees assisted by Customs officers or these officers themselves. Although Trinity House was a private organization, it was supervised by government, and the original Charter of its foundation (1513) put it in charge of shipping activity. In the early 19th century, this involvement became associated with trade and consumer objectives, and thus with public interest (see below n. 17). As Taylor writes: 'Trinity House was a private corporation, but performed a public role which would otherwise have had to be performed by a central government agency' (Taylor, 2001, p. 767).

We can see the role of the government in the details of the authorizations, in the form of contracts. We have already quoted Coase's conclusion: '[A] lighthouse service can be provided by private enterprise. (...) The role of government was limited to the establishment and enforcement of property rights in the lighthouse.'¹⁵ As Van Zandt (1993, p. 48) suggests, Coase uses the terms 'private' and 'government' too vaguely and without careful definitions. The previous formulation helps us to define these terms. A 'private' activity is an activity for which the government's role is 'limited' to the definition and enforcement of property rights to the same extent as for any other private good. According to Coase, lighthouses are private properties as soon as they are built and maintained out of private funds. That said, this definition does not exclude a significant governmental intervention, different from the one Coase admits.

According to Coase, property rights in lighthouses had a sole specificity. They ‘were unusual only in that they stipulated the price that could be charged’ (Coase, 1974, p. 212).¹⁶ Having bargained with the patentee, the King fixed the dues for each lighthouse. This point deserves more attention than Coase and Van Zandt pay to it. It recognizes the peculiarity of the lighthouse service (whose marginal cost is equal to zero), and the possibility of strategic behaviour in bilateral bargaining between a shipowner and a lighthouse “owner” (the problem raised by Arrow). Price fixing avoids this bargaining and protects the user from strategic behaviour on the part of the single provider. Indeed the builder, in exchange for his funds, was granted a monopoly. The monopoly protected him and made lighthouse construction profitable (with its high fixed price). The contract thus included a further specificity, the granting of a monopoly, and the terms of the contract (the annuity and the dues, the mode of profit sharing, the number of years of the lease) set the monopoly income and its distribution.

The relationship between the shipowner and the lighthouse “owner”, however, was not really bilateral. The Crown itself not only fixed the dues but also imposed their payment directly on shipowners. The King even helped the lighthouse “owners” to collect their dues, if necessary with fines or prison sentences immediately imposed on shipowners. The patent-holder’s ‘collection of revenues got a substantial subsidy from the state because of its readiness to use force to extract light dues from recalcitrant mariners’ (Van Zandt, 1993, p. 69). Conversely – and Van Zandt did not emphasize this point –, the lighthouse “owner” did not have the right to enforce the payment of dues without the Crown’s authorization. In some patents, the obligation of paying dues did not appear because the shipowners had promised, in their petition, to contribute voluntarily to the lighthouse upkeep. For example, Killigrew obtained one of these patents. He did not succeed in collecting the dues, and they were made compulsory. It seems that dues payment had to be made compulsory by constraint for their collection to become effective. Another example confirms this interpretation. In the competition for Royal privileges, Sir John Clayton obtained no less than five patents, all with voluntary contributions. Among the five lighthouses built, only two were lit (in Corton) since the dues remained unpaid (information provided by the Lighthouse Society of Great Britain, LSGB below). We see here the difficulty of obtaining payment for “private” lighthouse services, mentioned by the economists quoted by Coase.

Price fixing was not the sole peculiarity of property rights in lighthouses. As Van Zandt writes: ‘[T]he nature of these patents required some level of government support beyond simple property protection and contract enforcement in order to make the provision of lighthouse services viable’ (Van Zandt, 1993, p. 69). Coase seems to diminish the scope of the government’s role in the “private” financing system. Nevertheless, the English lighthouse financing system was no more wholly public than it was wholly private, thus refuting economists’ traditional assertions. To complete our demonstration and go further than Van Zandt, we need to show that the mixed system was not as adapted to needs as Coase suggests.

3.2. *The problems of the “private” lighthouse production*

In the few pages he devoted to the English case, Van Zandt takes up again the advantages of the English system over a public one: ‘As Coase points out, this (...) institutional form had the decided advantage of providing a decision maker who had a personal stake in controlling the costs of lighthouse services, an advantage usually missing when the government administers the provision of a good. (...) Thus, the institution of patents (...) did have a decided administrative advantage over straight government provision’ (Van Zandt, 1993, p. 69). It will be shown that, contrary to this claim, the English lighthouse service was expensive relative to its quality, and that several personal stakes were involved, which made the situation less clear.

3.2.1. *An expensive and defective service*

Several sources agree in insisting that the English lighthouse system, in the 17th and 18th centuries, operated with problems. According to the 1834 Report of the House of Commons quoted by Coase, light dues were too high in comparison with what was sufficient to maintain lighthouses and even to build and maintain new ones. The levels of dues and their modes of collection showed lack of uniformity. It was also difficult to redistribute the dues to the different lighthouse “owners”.¹⁷ These problems were raised from 1820 onwards. The high level of dues was cited as being an impediment to national and foreign trade: ‘These charges attracted much criticism both from merchants, who argued that high light dues inhibited foreign trade, and shipowners, who complained that in a period when shipping was “dull and unprofitable”, the high fixed costs of light and other dues prevented them from cutting back their expenditure’ (Taylor, 2001, p. 756). Criticisms were also made concerning the complexity of the system: ‘[P]rivate ownership of lights led to inefficiency in management, high collection costs, and wide variation in charges for light’ (*ibid.*).¹⁸ Contrary to what Coase suggests, the confusion which prevailed in this field at the beginning of the 19th century actually motivated the centralisation. It allowed for standardisation and the constant lowering of dues. Trinity House had already lowered its dues rate: its net surplus per light was reduced from £1572 in 1820 to £736 in 1832 (*ibid.*, p. 757), compared to the £4309 per “private” light in 1832 (*ibid.*, p. 760).

A French writer of the end of the 19th century, Louis Figuier, also emphasized the high levels of dues for “private” lighthouses. He added that their lights worked poorly (Figuier, *ca* 1870, pp. 489-90). This is confirmed by the LSGB: ‘Shipowners displayed open annoyance at being forced to contribute to the upkeep of lighthouses, most poorly managed, some indistinguishable from other lights along the coast and in many cases not lit at all.’ The poor quality of the “private” service seems to come from price fixing: the lighthouse “owners” could only lower their costs to increase profits. With the lack of control over the service actually provided, there followed a tendency to reduce costs, which resulted in poorly lighted or even unlit lighthouses.

Moreover, privately financed lighthouse construction was not necessarily carried out by engineers, but rather by rich and sometimes eccentric inhabitants who did not avail themselves of all the technical guarantees required. The first Smalls lighthouse – a ‘shed’, according to Figuier (*ca* 1870, p. 495) – was built by a violin-maker. The history of the Eddystone lighthouse

and of its successive reconstructions is instructive from this point of view.¹⁹ An agreement was first signed in 1692 between Trinity House and Walter Whitfield which authorized the latter to build and maintain a lighthouse on the Eddystone rocks, in exchange for an equal share of profits. Since Whitfield did not begin the building, his rights were transferred to Henry Winstanley, an eccentric inventor and rich London merchant who had already lost many ships on this reef. The 1696 agreement with Trinity House stated that he would receive all the profits during five years, but that these would be shared equally with Trinity House during the following 50 years. The Eddystone wooden lighthouse was first built between 1696 and 1698, then rebuilt in 1699 and swept by the sea in 1703. Figuiet points out the eccentricity and fragility of Winstanley's construction.²⁰ Rudyerd, a silk mercer, and Lovett, rebuilt it between 1706 and 1709, much more solidly. The authorization of building and of collecting dues was accompanied by a lease (annuity) of 99 years, all the profits going to both builders. A fire destroyed the lighthouse in 1755 and it was eventually rebuilt by the engineer Smeaton, at the new owners' request (the lease was still valid) between 1757 and 1759.

This repeated rebuilding suggests that the technical control of the quality of buildings was insufficient. Lighthouse construction, as well as maintenance, were not always closely inspected, largely owing to lack of regulations. Once again, this poor quality was partly due to the search for maximum profits, helped by collusion with the Crown.

3.2.2. Conflicts of interest

In 'The Lighthouse', Coase emphasizes at several points that individuals embarked on lighthouse construction for their own private financial interest. This point is essential in his argument, since it is contrary to the economists' statements quoted at the beginning of his article. However, English experience showed, on the one hand, that these particular interests, favoured by the Crown, could come into conflict with the public interest represented by Trinity House and, on the other hand, that greater financial interests would not automatically lead to lighthouse construction.

In 1580, Queen Elizabeth I refused to grant Gawen Smith the right to build a lighthouse on the Goodwin Sands. She thought his interest was only in financial gain and not in the welfare of sailors. Trinity House was consulted in this case and ruled against Smith on account of his known associations with smugglers (LSGB). The "private" lighthouses had to wait until these entrepreneurs offered to share their profits with the sovereign, thus appealing to his own interest, which Hugh Bullock did in 1612. Taking advantage of his position in Court, he obtained a patent in 1617 from James I to maintain a light at Dungeness, with the right to collect a compulsory tax of a penny per ton on English ships – despite the opposition of Trinity House, whose exclusive right to build was not recognized (LSGB).

The King granted patents to those he favoured or to those who offered him the greatest amount of money. The fact that the Crown and the beneficiary negotiated the terms of the patent explains the high level of light dues, the source of a monopoly income, part of which the King received. In the absence of general rules, a certain favouritism prevailed, which did not always result in technical efficiency. Coase also mentions it: 'The King presumably used these grants

of patents on occasion as a means of rewarding those who had served him' (Coase, 1974, p. 197). It seems that James I granted the most patents to private individuals in order to increase his own fortune. So he refused them to Trinity House, who also had to obtain a patent before building a lighthouse.

Trinity House only obtained all the patents from 1679 onwards. It could then lease these rights to private individuals. Before 1679, the appropriation of a part of the monopoly income by the King, when granting a patent to a private individual, explains the impossibility for Trinity House to obtain these building authorizations for itself. Coase emphasizes that Trinity House did not build any lighthouse from 1610 to 1675. But it was often refused patents, to the advantage of private individuals. We can mention the example of the Winterton lighthouse. Trinity House was building a lighthouse on this site in 1617 when Sir William Erskine and Sir John Meldrum obtained from James I a patent authorizing them to build in the same place (LSGB). They benefited from the King's favouritism and Trinity House was supplanted. Hence it is easy for Coase, relying on Harris (1969), to blame Trinity House for not building a lighthouse at this site in spite of the sailors' petitions (Coase, 1974, p. 196). It is essentially these kinds of conflicts of interest which resulted in lighthouses being built mainly by private individuals at that time. Moreover, even after 1822, when Trinity House was authorized to purchase "private" lighthouses and to recover them when the lease expired, the Crown still renewed several of them (Taylor, 2001, p. 758).²¹

Another kind of individual interest could also hinder lighthouse construction and good maintenance in England and Wales. If dues levied on ships could bring in important sums of money, the plundering of these same wrecked ships could bring in even greater sums. For individual interest to lead to lighthouse construction, profits obtained by this activity had to be greater than those resulting from plundering wrecked ships at the same place. For example, at Lizard Point (Cornwall), the lighthouse under construction by Sir John Killigrew, himself a descendent of a family of smugglers, was destroyed. The workers were attacked by neighbouring inhabitants who were making their living by plundering wrecked ships. Killigrew then employed a company of dragoons to protect his lighthouse. The light was lit in 1620 and Killigrew, who did not succeed in collecting dues – which were voluntary – went back to plundering ships. The light was put out at the end of the year, and the number of ships wrecked near Lizard Point increased considerably. In 1622, the King ordered the light be lit again by Killigrew and made the dues compulsory (LSGB). Since protecting ships could sometimes be less profitable than plundering them, we are less confident than Coase on this matter: individual initiative alone might not be sufficient to lead to the building and maintenance of a lighthouse.

We thus have shown that Coase, in his account of the English lighthouse system, underestimates the importance of government, and conversely overestimates the appropriateness of individual initiative.

4. Concluding remarks

In 'The Lighthouse in Economics', Coase attempts to show that the lighthouse service could have been private in England. He concludes that this traditional example of a service

which must be produced by government is badly chosen. Applying his method, and examining what happened at the empirical level, has allowed us to qualify the conclusions he reaches: (1) Trinity House did not build lighthouses so long as the King prevented it from doing so, privileging private individuals; (2) dues for “private” lighthouse services, collected by public officers, could only be obtained with State coercion; (3) the construction and maintenance of a lighthouse by a private individual were made profitable by fixing a high price, granting a monopoly, and guaranteeing the obligation of payment; (4) these “private” lighthouses ended in failure and required a centralisation, which favoured the uniformity of the dues system, their abatement, and the control of the buildings’ and lights’ quality; (5) the government’s role thus appears more clearly: it made the provision of this service *profitable*, but it did not make it *efficient*.

According to Coase, the English system was better than imagined by economists. However, returning to this period of history, we have encountered, almost paradoxically, all the practical elements explaining how the production of a public service, whose marginal cost is equal to zero, cannot be entrusted exclusively to private initiative. Moreover, the mixed English system may fit with John Stuart Mill’s theory: ‘[I]t is a proper office of government to build and maintain lighthouses, establish buoys, etc. for the security of navigation : for since it is impossible that the ships at sea which are benefited by a lighthouse, should be made to pay a toll on the occasion of its use, no one would build lighthouses from motives of personal interest, *unless indemnified and rewarded from a compulsory levy made by the state*’ (Mill, 1848, p. 968, quoted in Coase, 1974, pp. 187-8, italics added).²² It must be added that, if the actual problems of private financing now appear clearly, this is also the case for the actual problems of government, largely noted in Coase’s other works (Coase, 1988): the Crown did not pursue the general interest and was subject to corruption and other pressures.

In his paper on lighthouses, Coase chose the elements that tend to prove that a private lighthouse system could exist and would be appropriate. Choosing other elements seems to show that the English system was mixed, expensive and defective. Our analysis illustrates the difficulty of drawing conclusions from empirical studies. If they are necessary, their possible interpretations must be confronted in order to improve our understanding of the real world.

Notes

¹ For a very interesting analysis of Coase’s studies of the BBC monopoly (Coase, 1950) and American broadcasting institutions (summarized in Coase, 1961), see Pratten (2001).

² I shall refer to this reprint.

³ I shall use the generic term ‘production’ of lighthouse service, thereby referring to the financing of the lighthouse construction, its maintenance and lighting, and also its administration.

⁴ Of course I do not mean that Coase is anti-theoretical. We shall see the theoretical scope of ‘The Lighthouse’ in the light of ‘The Problem of Social Cost’. Contrary to Posner’s (1993) claim, Coase does not criticize theory in general, but orthodox microeconomics in particular (Mäki, 1998B).

⁵ For a criticism of the natural monopoly theory, see Demsetz (1968). Van Zandt (1993) uses Demsetz’s framework to study the problem of the lighthouse: according to him, it is the result of negotiating and contracting costs.

⁶ ‘This intervention of the Treasury would tend to reduce somewhat the efficiency with which the lighthouse service was administered’ (Coase, 1974, pp. 208-9).

⁷ Coase (1960) criticized Pigou (1932), and the Pigovian tradition, but several authors showed that Coase provided an erroneous interpretation of Pigou's analysis. See, e.g., Goldberg (1981), De Serpa (1993), and Aslanbeigui and Medema (1998).

⁸ For Scotland and Ireland, there are two distinct authorities: the Commissioners of Northern Lighthouses and the Commissioners of Irish Lighthouses.

⁹ Coase mainly uses the historians Harris' (1969) and Stevenson's (1959) books. We add information provided by the Lighthouse Society of Great Britain (LSGB), and by the historian Taylor (2001).

¹⁰ Actually, there were 'natural' seamarks (trees, church towers, and so on) that could be located on private land.

¹¹ In fact, the local act of 1822 did not compel "private" owners to sell, unlike the 1836 Act (Taylor, 2001, p. 757, p. 761).

¹² For more details about the present dues system, see the 'Statutory Instrument No. 562: The Merchant Shipping (Light Dues) Regulations 1997' and its successive modifications.

¹³ The profitability is confirmed by Taylor: 'As trade expanded in the Elizabethan period, (...) the large volume of trade taxed meant that lighthouses became lucrative possessions' (Taylor, 2001, p. 753).

¹⁴ 'But this paper is not intended to settle the question of how lighthouse service ought to be organized and financed' (Coase, 1974, p. 213).

¹⁵ Coase mentions property rights *in lighthouses*, and not in the service provided. Indeed they would be particularly difficult to define, a difficulty that would justify governmental intervention in the light of 'The Problem of Social Cost'.

¹⁶ Coase argued in 1959 that rights the exercise of which implies an effect on others (an externality) did not differ by nature from other rights (Coase, 1959, p. 26).

¹⁷ '[T]hese Establishments [the lighthouses] have been left to spring up, as it were by slow degrees, as the local wants required, often after disastrous losses at sea; and it may, perhaps, be considered as matter of reproach to this great country, that for ages past, as well as at the present time, a considerable portion of the establishment of lighthouses have been made the means of heavily taxing the Trade of the country, for the benefit of a few private individuals, who have been favoured with that advantage by the Ministers and the Sovereign of the day.' This Report then emphasizes 'the continued exaction (...) of very large sums which have been annually levied, avowedly, as Light Dues, to defray the expenses of Lighthouses but, in reality, to be applied to the use of a few favoured individuals, and for other purposes not contemplated at the time of the establishment of the Lighthouses' (Report, 1834, quoted *in* Coase, 1974, p. 202). We see clearly here the nominal opposition between private and public interest.

¹⁸ The existence of three distinct authorities could only add to this complexity: 'Shipowners and merchants found this mixed economy of private lights and multiple public authorities highly unsatisfactory' (Taylor, 2001, p. 755). And all these problems were seen as obstacles to security at sea: 'Arguments used to justify reform sometimes touched on the issue of safety; shipwrecks were thought to be due in part to the inadequacy of lighthouse coverage, and this inadequacy could be blamed on decentralized management, flaws within the various lighthouse authorities, and the high level of tolls, which was thought to discourage shipowners from petitioning for more lighthouses' (*ibid.*, p. 762).

¹⁹ Figuiet, *ca* 1870, pp. 490-2; Coase, 1974, p. 198; LSGB. Of course, any lighthouse built at that time and in this site would have faced the same successive misfortunes. My purpose is only to emphasize that the persons who wanted to build it were probably not the most qualified. Trinity House had first refused to build it, thinking it was impossible in the then current state of technology: perhaps it was not wrong.

²⁰ '[T]his tower had the most bizarre form. It was a kind of Chinese pagoda, covered with pinnacles and all kinds of fancy appendices, crowned with open galleries, spiked with angles and projections of fantastic appearance, the whole accompanied by mottoes and inscriptions. (...) This strange construction had no solidity, whatever Henry Winstanley may have thought, who rejoiced, in his pride, calling forth and braving the tempest' (Figuiet, *ca* 1870, p. 491).

²¹ Taylor confirms our interpretation of the conflict between the Crown and Trinity House: '[I]t is possible to view the case of lighthouse reform in terms of the broader struggle against "old corruption" and state patronage' (Taylor, 2001, p. 761).

²² Coase's interpretation of this quotation is different (Coase, 1974, pp. 190-1).

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