First WINIR Conference -- 11-14 September 2014

Coase, cost divergences and market failures.
From "the Marginal Cost Controversy" to "The Problem of Social Cost"

Élodie Bertrand,[1]

CNRS and PHARE (University Paris Pantheon-Sorbonne and CNRS)

and

Alain Marciano[2]

University of Montpellier 1 and LAMETA-UMR 5474

(First draft)

Abstract

The purpose of this paper is to restate the importance and place of Coase's 1946 article on the marginal-cost pricing of "natural monopolies" in his intellectual trajectory. It shows that "The Problem of Social Cost" (Coase, 1960) extends the analytical and methodological claims of the earlier article. We explore several types of similarities between both articles. They analyze a similar problem: a divergence between marginal and average costs and between private and social costs. In both cases, Coase criticized the standard approaches for being instances of "blackboard economics," and specifically for promoting taxation – Pigou's taxation making social cost equal to private cost; Hotelling and Lerner's taxation as a complement of, and guarantee to, marginal-cost pricing. By contrast, both articles are instances of Coase's comparative institutional analysis and both solutions proposed by Coase rest on his confidence in the efficiency of the price system.

Keywords

Natural monopoly, externalities, social cost, Ronald H. Coase, taxation

[1] Postal address: Maison des Sciences Economiques, 106-112 bd de l'Hopital, 75013 Paris, France; e-mail address: Elodie.Bertrand@univ-paris1.fr

[2] Postal address: Université Montpellier 1, Faculté d'Économie, Avenue Raymond Dugrand, CS 79606, F-34960 Montpellier cedex 2 France; e-mail address: alain.marciano@univ-montp1.fr

1. Introduction

Non-specialists, and even some specialists, tend to reduce Ronald Coase's works to "The Nature of the Firm" (1937b) and "The Problem of Social Cost" (1960). Despite its importance, his 1946(c) article on "The Marginal Cost Controversy" is, all too often, referred to in passing. Our purpose is to restate the importance and place of this article in Coase's intellectual trajectory, revealed by the place he himself gave to this article: he reiterated its argument and stressed its methodological stakes on several occasions (e.g., Coase, 1970; 1988a; 1995). More precisely, "The Problem of Social Cost" extends and clarifies analytical and methodological arguments of "The Marginal Cost Controversy" – a claim that has almost never been made. One of the exceptions is James Buchanan's statement that Coase's "now-classic paper on social cost [Coase 1960], which reflects essentially the same cost theory held earlier [Coase, 1938][3] succeeded where the more straightforward earlier attacks on the marginal-cost pricing norm – attacks by Coase [1946c] himself, by Thirlby [1946] and by Wiseman [1957] – apparently failed" (1973, 1.18). Buchanan here assimilates the 1946 and 1960 articles as criticisms of "the marginal-cost pricing norm," i.e. of transforming the price-equals-marginal-cost result into a norm. We will argue that this similitude goes further than that, if only because both articles discuss "market failures" – although Coase does not use the expression.

In conditions of decreasing average costs for a firm (what would be identified as one cause of natural monopoly), the traditional solution consisted in setting a price equal to marginal cost and compensating the firm's loss (the difference between marginal and average cost) by a subsidy financed out of taxation (Hotelling, 1938; Lerner, 1944 and Meade and

[3] More precisely, it is the concept of opportunity cost that is used in both cases, but in 1960, it is no longer subjectivist (see Bertrand 2014b).

Fleming, 1944). In “The Marginal Cost Controversy,” Coase (1946c) criticized this solution and suggested a multi-part tariff based on marginal and total costs. This article developed the argument of a first comment on this subject published the previous year (Coase, 1945) and was followed by a third in 1947.

In a situation in which some agents’ economic activities have a negative effect on the utility or production of some other agents – an effect that is not mediated by the price system (what would be identified as a negative externality), the traditional solution consisted in taxing the emitter (Pigou, 1932). In “The Problem of Social Cost,” Coase (1960) criticized this solution and suggested a new one based on the allocation of tradable property rights. This article developed the argument employed by Coase the previous year (Coase, 1959) to justify his proposal of using the price system to allocate radio frequencies.

We will bring to light several types of similarities between both series of articles. They analyze a similar problem: a divergence between marginal and average costs and between private and social costs. In both cases, Coase criticized the standard approaches for being instances of “blackboard economics,” and specifically for promoting taxation – Pigou’s taxation making social cost equal to private cost; Hotelling and Lerner’s taxation as a complement of, and guarantee to, marginal-cost pricing. By contrast, both series are instances of Coase’s comparative institutional analysis and both solutions proposed by Coase rest on his confidence in the efficiency of the price system. The 1960 article therefore extends that of 1946 in different aspects, as each section will show: context, method, problem, and solution – criticized and proposed.

2. From 1935 to 1960: Coase's studies on public utilities

Both papers come from Coase's resolve to study empirically the provision of public utilities. Although an indubitable consistence characterizes Coase's work over the years, the questions he studied slightly changed and evolved. His publications revolve around common methodological concerns – explain how the economic system works – and common analytical ones – for example, the issue of the respective efficiency of market mechanism and of the government in the allocation of resources.[4] From the very beginning of his career, he put this into practice on monopolies and public utilities. As he himself recounted, the same year he "was appointed an assistant lecturer at LSE" (1988b, p. 23) – it was in 1935, "Hicks left for Cambridge" (Coase, 1988b, p. 23) and Coase was given Hicks's course on monopoly that he taught "along with [his] course on public utilities" (Coase, 1988b, p. 23).[5] This is why he went on publishing on imperfect competition theory, and became interested in studying the provision of public utilities. On the one hand, "[o]ut of [his] lectures in Hicks's old course came an article on monopoly price published in 1937 [Coase, 1937a] and an article entitled 'Monopoly Pricing with Interrelated Costs and Demands' which, owing to the war, did not appear until 1946 [Coase, 1946b]" (Coase, 1988b, p. 23). On the other hand, his main researches dealt with public utilities: he published on the postal system as soon as 1939 and on the BBC from 1946(a), and was also interested in the provision of water, gas and electricity.[6]

[4] For general studies on Coase's views of the nature of economics, see Medema 1994, ch 6; Medema 1995; Medema and Zerbe 1998; Mäki 1998b and Wang 2003.

[5] For a biography of Coase, see Coase 1995, Medema 1994, and Marciano 2014.

[6] "I soon found that very little was known about public utilities in Britain and to discover what the facts were, I began those historical studies which resulted in publications on broadcasting and the post office. I also studied the history of water, gas and electricity supply in Britain, but so far I have not embodied this work in any substantial publications" (Coase, 1988b, p. 21).

Within Arnold Plant's research group on industrial organization, with Ronald F. Fowler, Ronald S. Edwards and George F. Thirlby, they aimed to apply the theoretical developments that were taking place in the economics group (led by Robbins) to the management of firms. Plant's group shared an interest for the theoretical development of the economic analysis of prices and costs occurring in Robbin's group but they "treated them as ideas to be applied in the real world" (Coase, 1970, p. 115). Coase knew (and discussed) Abba Lerner's ideas on marginal-cost pricing for decreasing-average-costs firms from the early 1930s[7]:

> Lerner was a member of that group which consisted of Robbins, Hayek, Hicks, Allen, Kaldor and others, who, at the London School of Economics, were making great strides at that time in the development of economic theory. I was, however, associated with another group of economists who, on the commerce side, were working under the leadership of Professor Arnold Plant. The Plant group was keenly interested in cost analysis and pricing problems, the problem of the peak, and so on, and therefore we paid great attention to Lerner's work and to the other theoretical work being done on cost and pricing. But we thought of it in practical terms. (Coase, 1970, pp. 114-115)

Coase later remembered that "as a result of Plant's influence, [they] were particularly interested in multi-part pricing" (Coase, 1970, p. 115) and he referred to two articles on the subject written by other students of Plant (Paine 1937 and Lewis 1941) before his. He also explained that they missed Hotelling's (1938) publication because of the war and that this was finally the publication of Meade and Fleming (1944) that had initiated his series of articles. Certainly, between 1939 and the end of WWII, writing and publishing academic articles was not an easy task, not only because of the material difficulties but also because professors were busy with other activities. For his part, Coase was working in the Central Statistical Office.

[7] Coase enrolled in a commerce degree at the LSE in 1929 and, even if he temporarily left the school for his first appointments (1932-1935), his "association with LSE never ceased" (Coase, 1982, p. 31). On Lerners's first works on marginal-cost pricing, see Ruggles 1949-50b.

He nevertheless managed to publish in 1945 a two-page long comment on a symposium – "Price and Output Policy of State Enterprise" – published in the same *Economic Journal* one year earlier and to which had contributed James Meade and Marcus Fleming.[8] This note is the first of Coase's three contributions on the marginal-cost controversy.[9] It already referred to the possibility of using a two-part tariff (1945, p. 112) to solve the problem raised by decreasing average costs and criticized the Meade-Fleming solution based on marginal-cost pricing and subsidies/taxation. Actually, Meade and Fleming were not along in suggesting such a solution. Harold Hotelling, in "The General Welfare in Relation to Problems of Taxation and of Railway and Utility Rates" (1938) and Abba Lerner, in particular in his *Economics of Control* (1944), had also defended the same idea.[10] And Coase discussed these proposals at full length in his main article on "The Marginal Cost Controversy" (1946c). He restated his arguments in his 1947 answer to Nordin (1947) misunderstandings.

This series of articles is at the junction of Coase's centers of interest before the war: imperfect competition and public utilities on the one hand, planning on the other. Like some of his other contributions of the 1930s (Coase, 1937a; 1946b), this series relates to the question of monopoly pricing but this time for a specific one, which is necessary since it produces under decreasing-average-costs conditions – typically public utilities. But Coase's criticism of the marginal-cost-pricing norm also intervenes in the planning debate.[11] It can be

[8] The symposium consisted of three articles – a first article written by Meade, a comment by Fleming and an answer by Meade. The three pieces were gathered under a single title.

[9] That is, three contributions for the period that interests us here. One could add Coase 1970 as a fourth one, which besides reiterating the prior arguments, adds some historical context, a review of "the present state of discussion," a discussion of the notion of cost that must be used, and an illustration through the price that common carriers of frequencies should charge users (the FCC had just decided to increase competition between some categories of users of frequencies).

[10] For a review of this controversy, see Ruggles 1949-50a and 1949-50b. For a more recent account, see Frischmann and Hogendorn 2014.

[11] The marginal-cost principle was first discussed for socialist economies (see Lerner 1937 for example), and this is Hotelling (1938) who applied it to the price system.

interpreted as a "refusal to have any part of the comprehensive interventionist pricing policies then thought by some of his socialist colleagues at the LSE such as Lerner to be essential to market socialism" (Campbell and Klaes, 2005, p. 272). In this line, Coase 1946c can be seen as his first explicit rejection of socialism, making it an intermediary step between "The Nature of the Firm" and "The Problem of Social Cost."[12]

Coase went back to LSE in 1946, to teach a course on the principles of economics. He was soon promoted "reader in economics, with special reference to public utilities" and continued his research on public utilities, mainly the Post office and TV and radio broadcasting (Coase, 1995, p. 199). He focused on a specific case of monopoly – the British Broadcasting Corporation. And in 1950, he published a book on the BBC, which remains one of the most detailed studies on this firm.

Then, in 1951, and although he was offered the Tooke Chair at the London School of Economics, Coase accepted the proposal of Ralph C. Epstein, from the University of Buffalo where he settled permanently. During those first years in the USA, he naturally studied the American broadcasting system, which he had already began to study in 1948, then on a Rockfeller Fellowship. In 1957, he was invited to give a series of Volker Fund sponsored lectures on *Radio, Television and the Press*, which impressed G. Warren Nutter (Buchanan, 2006, p. 36). Nutter was then professor at the University of Virginia and co-director of the Thomas Jefferson Center with Buchanan, and he managed to have Coase hired at Virginia. There, Coase met people like Buchanan, Nutter, Gordon Tullock and Leland Yeager.

Coase did not only find a congenial environment and people with whom he shared general views on economics. He also made the acquaintance of economists who had worked

[12] See Bylund 2014 for an interpretation of "The Nature of the Firm" as an argument in the debate on planning.

on exactly the same questions as those he had himself dealt with, and who played an important role in the evolution of his work. It was the case of Buchanan who also published on marginal-cost pricing – when he was analyzing the views of the Swedish economist Knut Wicksell about this issue; at that time, he had been convinced that "Wicksell's proposal […] is similar to the multi-part pricing systems proposed by Coase and others, but differs in its essential element of voluntarism" (Buchanan, 1951, p. 178). In addition, Buchanan had also been interested in roads and how to finance them – a question that was topical in the early 1950s America. In the course of his analysis, he had emphasized the existence of spillover effects that necessarily affect other users when one individual uses a road (1952). And then, in various occasions, Buchanan discussed what he tellingly and significantly named a problem of social cost, in reference to Knight (1924) criticizing Pigou. In effect, Buchanan used the expression after his mentor and dissertation supervisor had used it in his.[13] Thus, Buchanan made the same reference not only to Knight but also to "social cost" four years before Coase's article was published and even two years before Coase moved to Virginia.

For his part, Coase became interested in the Federal Communications Commission after having read an article by Leo Herzel (1951) suggesting the use of auctions to allocate radio frequencies (Coase, 2003). Like his argument on the marginal-cost controversy emerged from the publication of Meade and Fleming's symposium, Coase's article on the FCC (1959), written during his stay at the Stanford Center for Advanced Studies in the Behavorial

[13] Interestingly, Buchanan had written an article (1956) based on Knight's 1924 article on the "Fallacies in the Interpretation of Social Cost," an article cited by Coase as a major source of inspiration of his own "Problem of Social Cost." Coase explained that he did not "think the concept of social cost [wa]s a very useful one," but that he implicitly referred to Knight's article in his title – "the title of my paper came from Frank Knight" – to "indicate the topic [he] was talking about" (Coase in Kitch, 1983, p. 215). A few years later, Coase repeated this statement and gave additional details, a more precise explanation as to what had attracted him in the reasoning developed by Knight and why he saw his own argument "as a natural extension of Knight's insight" (1993, p. 250).

Sciences, stemmed from a reaction (this time favorable) to Herzel's idea. The story is well-known: in a passage of this article, Coase argued that, like any other private good and despite the risk of interferences, radio frequencies could be allocated through prices, thus questioning the Pigovian tradition of externality analysis (see in particular Coase, 1959, pp. 26-27). Seeing this point as erroneous, the editors of *The Journal of Law and Economics* asked Coase to abandon it, which he refused. Some members of the University of Chicago suggested that he explain his point of view at a seminar with, among others, Director, Stigler and Friedman. Coase's arguments convinced the participants and he wrote "The Problem of Social Cost" to develop them further (Coase, 1960).

His studies on public utilities thus gave what appears at first sight as two trends of analysis, regarding first "natural monopoly" and second "externalities." But, given Coase's methodological unity in his works, it is not surprising that the same approach was used in both cases.

3. The same method for designing policies

As it is well known, Coase started to express a form of dissatisfaction with the then-standard microeconomics very early in his career. And "The Nature of the Firm" was from this perspective one of his first attempts to go beyond the limits of this approach. He rejected the unrealistic definition of the firm in microeconomics and refused to take the existence of firms as given. To him, this was a means to get a more realistic picture of how the economic system – firms and markets – actually work. This was exactly the same kind of objective that motivated him in "The Marginal Cost Controversy" and "The Problem of Social Cost." More precisely, the realism Coase advocates here concerns economic policies: he rejects unrealistic policies designed on a blackboard and suggests instead a new approach – a comparative

institutional method supported by empirical studies.[14] Retrospectively, Coase will see in his 1946 article a severe criticism of what he would later call "blackboard economics," [15] and indeed his article on marginal-cost pricing echoes the methodological principles made explicit in "The Problem of Social Cost."

Coase sees standard interventionist ("blackboard") policies as elaborated by means of a comparison of the real world with an ideal world, which we do not know how to attain. This implies, in his view, that standard economists, first, do not envisage all the possibilities and, second, do not pay enough attention to the consequences in the overall system of the policies they advocate. Coase's series of articles of 1946 and 1960 illustrate these limits.

First, some possibilities were forgotten by the economists who advocated marginal-cost pricing:

> [I]t is, I think, extremely significant that none of the advocates of the Hotelling-Lerner solution should have examined the possibilities of multi-part pricing as a solution of the problem they are considering. They write as though the only possible method of pricing is to charge a single price per unit and that the problem they have to solve is what that price should be. It may be that their reason for not examining multi-part systems of pricing was that they were sure they had in fact found the optimum system of pricing. (Coase, 1946c, p. 174)

And regarding externalities, Pigovian economists did not think (this is what Coase believes[16]) about contractual solutions (Coase, 1960) and the price-system solution had not even been envisaged for the allocation of frequencies (Coase, 1959, p. 24).

---

[14] On the nature of Coase's realism, see Mäki 1998a; 1998c; Pratten 2004; Bertrand 2014a. On Coase's comparative institutional method, see Medema and Samuels 1998, p. 163; Medema 1996a; 1996b and Bertrand 2014b.

[15] For instance, in 1970, Coase wrote: "As I see it, the argument for marginal cost pricing, like many propositions in modern welfare economics, is more concerned with diagrams on a blackboard than with the real effects of such policies on the working of the economic system. I have referred to this type of economics as 'blackboard economics' because, although factors are moved around and prices are changed, and some people are taxed and others subsidized, the whole process is one which takes place on the blackboard. This is not the way in which one operates with a social system" (1970, p. 119). See also Coase 1988a, p. 19.

[16] For a reevaluation of the criticisms Coase leveled against Pigou (1932), see Aslanbeigui and Medema 1998 and Bertrand 2010, and the references therein. We will not add this kind of disclaimers for each of Coase's criticisms we will mention.

Second, standard economists did not see the total effects of the policies they suggested. Regarding those advocating marginal-cost pricing, they forgot distributive effects: "The proposal made by Mr. Meade and Mr. Fleming involves a re-distribution of income in favour of consumers of products in which fixed costs form a high proportion of total costs" (Coase, 1945, p. 113). The problem of these blackboard policies is indeed that they may create more harm than good, as made explicit in the 1960 article: "The Pigovian analysis shows us that it is possible to conceive of better worlds than the one in which we live. But the problem is to devise practical arrangements which will correct defects in one part of the system without causing more serious harm in other parts" (Coase, 1960, p. 34). In this article, Coase writes, in a passage that could also describe the main thrust of his 1946 article (it suffices to replace private/social by marginal/average): "Analysis in terms of divergencies between private and social products concentrates attention on particular deficiencies in the system and tends to nourish the belief that any measure which will remove the deficiency is necessarily desirable. It diverts attention from those other changes in the system which are inevitably associated with the corrective measure, changes which may well produce more harm than the original deficiency" (Coase, 1960, pp. 42-43).

This criticism of blackboard policies results in an alternative method for designing policies, which is best described at the end of the "social cost" article:

> [In] the usual treatment of the problems discussed in this article[, …] the analysis proceeds in terms of a comparison between a state of laissez faire and some kind of ideal world. […] But the whole discussion is largely irrelevant for questions of economic policy since whatever we may have in mind as our ideal world, it is clear that we have not yet discovered how to get to it from where we are. A better approach would seem to be to start our analysis with a situation approximating that which actually exists, to examine the effects of a proposed policy change and to attempt to decide whether the new situation would be, in total, better or worse than the original one. In this way, conclusions for policy would have some relevance to the actual situation. (Coase, 1960, p. 43)

Coase argues that policy is a matter of choice between different institutional arrangements, each of them being costly, and hence the need to compare the net values of production they yield. Since no system is optimal, there is a choice to be made among costly alternatives. Although Coase does not discuss his method in his series of articles on the decreasing-average-costs problem, this is this kind of comparison that he is applying: "We must therefore compare the results of adopting the Hotelling-Lerner solution with those of using multi-part pricing" (Coase, 1946c, p. 174); and he does the same in comparing the Hotelling-Lerner solution with the average-cost pricing (section 6). There is also in this article a comparison between the efficiencies of the price system and of the government in allocating resources (pp. 171-172), which will be extended in the 1960 article to the firm and doing nothing at all (Coase, 1960, pp. 16-18). He will then insist that it is the total (including the effects in every parties of the system) and social (including external effects) product that has to be taken into account: "When an economist is comparing alternative social arrangements, the proper procedure is to compare the total social product yielded by these different arrangements" (Coase, 1960, p. 34). More precisely, this value is net of the costs of operation of the arrangement and of the costs of moving from one arrangement to the other (Coase, 1960, p. 44).

Eventually, the choice between arrangements – the design of a policy – demands empirical detailed studies of their practical effects. This is one of the methodological points he made in discussing the redistributive consequences of the Hotelling-Lerner scheme. Coase stresses that Hotelling's conclusions implicitly assume "that there will be no significant redistribution as between consumers of different kinds of products" (Coase, 1946c, p. 177), and that this assumption is not justified: "[t]here seems, however, no reason to suppose that it would be a negligible redistribution" (1946c, p. 178). This cannot be decided in the abstract:

"[i]t would be possible to appraise the character of the redistribution only after a detailed factual enquiry" (1946c, pp. 177-178). Once again, the methodological precept is more explicit in 1960: "the problem is one of choosing the appropriate social arrangement for dealing with the harmful effects. […] Satisfactory views on policy can only come from a *patient study of how, in practice*, the market, firms and governments handle the problem of harmful effects" (Coase, 1960, p. 18, emphasis added).

There is nevertheless a methodological difference between the 1946 and the 1960 articles. Even if both emerge from previous empirical studies, these are much more important in the latter text, which contains long descriptions of jurisprudence. But both arguments are mainly based on the discussion of a small and very simple example, which could even appear as exotic or bucolic: the carrier who sells to individual consumers a product available at a central market (Coase, 1946c) and the straying cattle which destroy crops (Coase, 1960).

4. The analogy between the two types of problem

The nature of the problem Coase analyzed in "The Problem of Social Cost" is known: the gap that exists between private and social costs when there are external effects.[17] The text of this article refers to Pigou's analysis of a specific case of divergence between private and social cost, which corresponds to what is today called technological externality: "One person A, in the course of rendering some service, for which payment is made, to a second person B, incidentally also renders services or disservices to other persons (not producers of like services), of such a sort that payment cannot be exacted from benefited parties or compensation enforced on behalf of the injured parties" (Pigou, 1932, p. 183; Coase quotes

[17] Coase did not use the word "externality," which existed in the late 1950s but was rarely used (see Medema 2014). He later explained that he viewed it as implying the necessity for the government to do something (see Coase, 1988a, p. 27) and therefore prefers the expression "harmful effects."

this definition in 1960, p. 28). Then, if the firm takes its decision of output based on its private cost only, too much – in the case of negative externalities – good will be produced. And the price does not cover the entire – private and social – cost of the activity. The cost imposed on the society by the production of this good is not taken into account by the firm.

The marginal-cost-pricing controversy focused on the compatibility between increasing returns and competition.[18] The source of the problem is also here identified by Coase as a divergence between marginal cost and average total cost: "The central problem relates to a divergence between average and marginal costs" (1946c, p. 170). Charging a price equal to the marginal cost in these conditions generates losses since the marginal cost is inferior to the average cost of production. And the question is of the same nature as the one risen by harmful effects: how to cover the gap between marginal and average costs? Such as in the previous case, there remains a part of the entire cost of production that is not paid by the individual who consumes the good.

These two theoretical problems – and the phenomena they describe – are different even if we can see an analogy in the then-standard ways of analyzing them, as a divergence between private and social costs in one case, and between marginal and average costs in the other. To some extent, it is not a surprise that there exists an analogy between the issues of external effects and decreasing average costs when we think that both concepts emerged from the same controversy, over the Marshallian "external economies" – a controversy that focused on the form of costs, then on interdependence. It is known that this cost controversy, once the question of the forms of costs and pecuniary externalities were set out, ended in specifying the

[18] This controversy did not use the expression "natural monopoly," although its history is part of the history of this concept, as argued by Mosca (2008) in her discussion of the origins of this concept. The definition of natural monopoly would later be based on the subadditivity of costs and contestability of markets, see Baumol *et al.* 1982.

concept of externality (Mishan, 1971). But as Ruggles (1949-50b) argues, and despite Hotelling (1938) not referring to it, the marginal-cost-pricing controversy also falls within the continuity of this previous one.

Marshall's (1890) concept of "external economies" (external to the firm but internal to the industry) was reinterpreted by Pigou (1912) in his *Wealth and Welfare* as a divergence between private and social costs. This led to a controversy between, among others, Young (1913; 1928), Clapham (1922), Knight (1924), Sraffa (1926) and Viner (1931), which was summed up by Ellis and Fellner (1943). Viner in particular helped to distinguish the issue of decreasing costs in the industry (interpreted as "pecuniary economies," which prove the good functioning of the price system) from "technological economies" (proper external effects, external to the price system).[19] The fourth edition of *The Economics of Welfare* (Pigou, 1932), to which Coase 1960 refers, integrates the criticisms,[20] and suggests a typology of three kinds of divergences between private and social costs. In the second case, the firm makes an investment and the social product of this investment is greater than its private product because other producers of the same good benefit from a part of it – this is Viner's pecuniary economies or Marshall's external economies. The third case is the one quoted by Coase, external effects proper between producers of different goods.[21] The controversy helped clarifying the form of the long-period supply curve of competitive industry and, once this problem solved, led to focus attention on the difference between general equilibrium and

[19] Coase had read Viner 1931 in 1932, while in the US, on the advices of Ronald Fowler, "an article that, after [he] had read it, [he] described as a 'magnificent achievement'" (Coase, 1988b, p. 9).

[20] See Aslanbeigui 1996 for a discussion of how Pigou reacted (or not) to the criticisms.

[21] In the first case, an agent who is owner of factors of production rented by A benefits from a part of the product of the investment made by A (typically, land tenancy) and the problem may be solved by a modification of the contract.

Pareto-optimum caused by externalities. Post-war,[22] the controversy focused on external effects between firms and consumers, as direct interactions, external to the price system, with Meade 1952, Scitovsky 1954 and Bator 1958.

But the pre-war controversy also led to another discussion. Knight (1924) and Sraffa (1926) were the first to fully state the incompatibility between scale economies and competition (Mosca, 2008, pp. 335-336). As Ruggles argues, the controversy on Marshallian external economies gave a discussion on the form of industry costs, then a discussion on internal increasing returns: at the turning of the 1920s-1930s, "the major writers in the field gradually began to turn away from the increasing cost case, and to focus on internal rather than external decreasing costs. Thus the basic elements of the marginal cost pricing thesis started to appear in recognisable form" (Ruggles, 1949-50b, p. 43). After 1933, this problem could be linked with monopoly and imperfect competition theory (another result of the cost controversy).

The analogy between the problems posed by externalities and decreasing average costs is made explicit by Bator's (1958) typology. Bator reinterprets "market failure" as a sign of "externality," and distinguishes three types of externalities. The first ("ownership externality") is due to problems of appropriation and corresponds to what we now call externalities – the problem studied in "The problem of Social Cost." The second ("technical externality") is due to indivisibility or increasing returns to scale – the case studied in "The Marginal Cost Controversy."[23] It is an externality "[i]n the (generalized) sense that some social costs and benefits remain external to decentralized profitability calculations" (Bator, 1958, p. 368). The

[22] The distinction between the pre- and post-war periods became classic after Mishan 1971.

[23] However, non-convex sets of production are excluded from market failures by Arrow 1969, see Berta and Bertrand 2014.

difference with type 1 externalities is that in this latter case, optimal prices can be found, with profits "at their maxima," while in the second case, if prices equal marginal costs, firms will not produce while it would be preferable they do.[24] The third type is "public good externalities," a case that is, interestingly enough, explicitly excluded from the problem dealt with in Coase's 1946 article. Coase chose a simple example – simpler and different from Hotelling's[25] – to isolate the problem of divergence between marginal and average costs from the problem arising from the fact that some costs are common to many consumers. He therefore "confined [him]self to one particular case" (1946c, p. 182), in which "all costs are attributable to individual consumers" (1946c, p. 182). In other words, he chose the example of a private good produced by a monopolist. At a time where the difference between the problems posed by a public good and by an externality were not settled, we can say that Coase chose to exclude from the problem of decreasing average costs a problem that was close to external effects.

5. The solutions proposed: the importance of the price system

Not only was the nature of the problem similar, but Coase's criticisms of the then-standard solutions and his own solutions were also analogue. Pigou's solutions to externalities, as interpreted by Coase, were taxation, liability of the polluter and regulation. Their aim was to restore the equality between private and social costs. All three were criticized in the "Problem of Social Cost." Taxation is also used in what Coase calls "the Hotelling-Lerner solution." But here the divergence between marginal and average costs is maintained, the difference being

[24] "The private totals in terms of which producers in an (idealized) market calculate – total revenue minus total cost – will not reliably signal the social costs and benefits implied by the relevant social indifference curves" (Bator, 1958, p. 368).

[25] Coase noted that "the example used by Professor Hotelling, the problem of pricing in the case of a bridge, is in fact an extremely complex case rather than the simple one it appears to be on the surface" (1946c, p. 171). He meant that this example included too many issues, at least more issues than the one he just wanted to deal with.

covered by a system of taxation (on all the consumers) and subventions (to decreasing-average-costs firms). Coase was as opposed to taxation – that is to the kind of solutions Pigou, Hotelling, Lerner, Meade and Fleming favored – in the mid-1940s as he was in the late 1950s (and even later).

Coase levels three criticisms at the Hotelling-Lerner solution: it creates "a maldistribution of the factors of production between different uses" (1946c, p. 174) – that is a problem of efficiency, "leads to a redistribution of income" (1946c, p. 174) – a problem of justice – and also "will tend to produce other harmful effects" (1946c, p. 174) – where "harmful" was used with its common sense and without any reference to the "harmful effects"-externalities of 1960.

The first criticism comes from the fact that a solution that requires the intervention of the government to decide what to produce, in which quantity and for whom should be rejected because *only* the individuals themselves know their preferences. The only way to know what individual preferences are is to let consumers pay for the good they want to consume – in other words, Coase concluded, "without a pricing system, a most useful guide to what consumers' preferences really are would be lacking" (1946c, p. 172). By contrast, the government has limited information on individual preferences (if individuals are not asked to pay the total cost incurred by their consumption) and therefore lacks the information that would be necessary to establish an optimal system of tariff based on marginal-cost pricing (and taxation): "[n]o Government could distinguish in any detail between the varying tastes of individual consumers" (1946c, p. 172) or "no Government could estimate individual demands accurately" (Coase, 1947, p. 150).

The government's lack of information is also a problem for the taxation of harmful effects: "to do so would require a detailed knowledge of individual preferences and I am unable to imagine how the data needed for such a taxation system could be assembled" (Coase, 1960, pp. 41-42).

Second, the Hotelling-Lerner solution modifies the distribution of resources. Although Coase insisted that distribution and allocation were two distinct sets of problems, and that he was interested only in the optimality of the allocation brought by the price system, he nonetheless stressed that marginal-cost pricing plus taxation could generate distributional problems.[26] The problem is mentioned as soon as 1945 and developed in 1946: "[t]here is a redistribution of income in favour of consumers of goods produced under conditions of decreasing average costs" (1946c, p. 176). This happens because the individuals who consume the goods that are produced under decreasing-average-costs conditions are not the only one who pay for the difference between marginal and average costs. They consume the good but the total cost is spread over all consumers, including those who do not consume that good. As a consequence, the part of the total cost they do not pay is money "then available for these consumers to spend on some other commodity" (Coase, 1946c, p. 176) – which means that these consumers indeed benefit from a redistribution of income. And there is no reason to favor one group of consumers over another one – this could be not "socially desirable" wrote Coase (1945, p. 113). Consumers of the good produced under decreasing-average-costs

[26] He wrote: "If it is decided to use a pricing system, there are two main problems that have to be solved. The first is how much money each individual consumer shall have–the problem of the optimum distribution of income and wealth. The second is, what is to be the system of prices in accordance with which goods and services are to be made available to consumers – the problem of the optimum system of prices. It is with the second of these problems that I am concerned in this article. The first is partly, though not entirely, a question of ethics. But it is important to realize that there are these two problems and that both have to be solved if a pricing system is to produce satisfactory results. I shall assume that the distribution of income and wealth can be taken to the optimum" (1946c, p. 172). With this assumption, redistributive effects such as those mentioned move us away from the optimal distribution, which explains why Coase develops this problem.

conditions benefit from the subsidies given by the government to the firms that produce those goods, at the expense of the individuals who do not consume them. Or, in other words, they do not bear the costs imposed to the rest of the society by their consumption of this good. The problem posed is similar to an external effect: consumers of the good in question do not take into account the external costs of their consumption imposed to the rest of the consumers.

Like there is no reason to favor the consumers of goods produced under conditions of decreasing average cost, at the expense of consumers of other goods; there is also no reason to make the emitter the sole bearer of external costs that are created *both* by the emitter and the receiver. This is one of the criticisms that Coase levels at the Pigovian solutions of taxing or making liable the polluter. These solutions make some agents pay and others benefit without any justification; the problem of harmful effects being indeed "reciprocal" (Coase, 1960, p. 2). Even more, these solutions may be inefficient. For example, in the case of a smoke nuisance, taxing the emitting factory will not be optimal if the costs of the neighbors' moving is inferior to the abatement cost of the factory, it "would tend to lead to unduly high costs being incurred for the prevention of damage" (Coase, 1960, p. 41).

The third criticism to the Hotelling-Lerner solution refers to these effects on individual choices created by taxation in other parts of the economy, effects neglected by standard economics: "income taxes are usually so framed that marginal units of income are taxed and therefore an income tax will have the same unfortunate effect on consumers' choice as a tax on goods and will produce results similar in character to those which follow from charging an amount for additional units of output greater than marginal cost" (Coase, 1946c, pp. 178-179). Regarding Hotelling's proposal to tax land, scarce resources or inheritance, Coase argues that "it assumes that the disturbance to the distribution of income and wealth due to the additional taxation on those who derive their incomes in these ways is better than the loss which would

occur if the additional taxation was spread more evenly over people in the country" (Coase, 1946c, p 179).

Here again, "The Problem of Social Cost" extends the criticism started with the marginal-cost controversy. We reminded that Coase (1960) criticizes Pigou (1932) for comparing private cost and social cost within a given institutional arrangement, and choosing the arrangement in which they are equal – for example, one in which there is liability for damage – without paying attention to the other effects produced by the liability in the system. In the case of crops destroyed by sparks from railway engines, Coase uses an example where the value of the production is higher if the victim is liable compared with the case in which the harm producer is liable. The change of law would indeed change the decisions (the farmer diminishes his crops if he is liable), and that is why Coase insisted earlier on the necessity to compare the *total* values yielded by each arrangement. This is another effect in the system causing more harm than good.

What about the solutions proposed by Coase? In both cases, they rely on the efficiency of the pricing system working without cost. The features of an optimal price system open the 1945 comment (p. 112) and are repeated at the beginning of the 1946c argument. Coase's contention that the price system is efficient rests on the standard view that, at general equilibrium, prices reflect objective opportunity costs. In an optimal system of prices,

> the price should be the one which equates supply and demand and it should be the same for all consumers and in all uses. This implies that the amount paid for a product should be equal to the value of the factors used in its production in another use or to another user. But the value of the factors used in the production of a product in another use or to another user is the cost of the product. We thus arrive at the familiar but important conclusion that the amount paid for a product should be equal to its cost. (Coase, 1946c, pp. 172-173)

Coase is here restating the usual definition of objective opportunity cost as the value of the alternative product – a value that, at general equilibrium, is reflected in the price of the

resources used to produce it, which allows measuring this cost by money outlays.[27] He therefore argues that the price system is efficient because, in a competitive system, and if transaction costs are nil, the price reflects the objective opportunity cost of resources.[28] In the same line, that price should equal opportunity cost explains Coase's criticism to the free allocation of frequencies by the FCC. Public agencies should pay a price equal to opportunity cost to make the best use of frequencies (Coase, 1959, p. 21).

The optimality condition of equality between price and opportunity cost implies Coase's proposal of a multi-part tariff since, if price is different from marginal cost, it will not reflect opportunity cost, but if it is different from total cost, the same is true:

> It is clear that if the consumer is not allowed to obtain at the marginal cost additional units of products, produced under conditions of decreasing average costs, he is not being allowed to choose in a rational manner between spending his money on consuming additional units of the product and spending his money in some other way, since the amount which he would be called upon to spend to obtain additional units of the product would not reflect the value of the factors in another use or to another user. But for the same reason it can be argued that the consumer should pay the total cost of the product. A consumer does not only have to decide whether to consume additional units of a product; he has also to decide whether it is worth his while to consume the product at all rather than spend his money in some other direction. This can be discovered if the consumer is asked to pay an amount equal to the total costs of supplying him, that is, an amount equal to the total value of the factors used in providing him with the product. (Coase, 1946c, p. 173)

This reasoning led Coase to defend the idea of a multi-part tariff to solve the problem of pricing in the case of firms with decreasing average costs. This is a two-part tariff in his example: "the consumer should be charged one sum to cover the cost of carriage while for additional units he should be charged the cost of the goods at the central market" (1946c, p.

[27] These arguments are developed in Bertrand 2014b.

[28] Buchanan insists on this opportunity-cost aspect of Coase's argument: "In his later, and more widely known, paper on marginal-cost pricing, Coase's argument for the multi-part tariff was informed throughout by the conception of opportunity cost developed in his earlier papers. His emphasis, as it has been interpreted by later writers, was, however, on the familiar conflict between marginal-cost and profitability criteria. His opportunity-cost defense of multi-part pricing has been largely overlooked" (Buchanan, 1969, ch 2, fn 36).

173; see also 1945, p. 112). There is no taxation involved and no subsidies in this type of tariff.[29]

We find again in "The Problem of Social Cost" the necessity of internalizing all the costs: "If we are to attain an optimum allocation of resources, it is therefore desirable that both parties should take the harmful effect (the nuisance) into account in deciding on their course of action. It is one of the beauties of a smoothly operating pricing system that […] the fall in the value of production due to the harmful effect would be a cost for both parties" (Coase, 1960, p. 13). Like in 1946, the full possibilities of the price system must be exploited. And a property right whose use implies external effects will, like any other factor of production, and if transaction costs are nil, have a price equal to its opportunity cost, this one including potential external effects. This is what Coase indicates with his examples suggesting the "Coase theorem"[30]: the price of the right includes the external effect, hence reflects the social opportunity cost, and this explains the efficiency of the price system, if its operation costs are nil, in solving the problem of externalities. This argument is the same as that of the 1946(b) article on the efficiency of the price system, but adapted to factors of production whose use creates external effects. In both cases, price should be based on total and social costs, not only on marginal and private costs. In this line, Coase's 1960 solution may be interpreted as a form of multi-part tariff, in which to the private cost of the good, is added the external cost.

[29] Coase's solution is amenable to some of the criticisms he leveled at the Hotelling-Lerner solution, in particular an information problem (Medema, 1994, pp. 49-50).

[30] As is well known, Coase did not formulate any "theorem" in his "Problem of Social Cost" and focused on the positive-transaction-costs world (see Coase, 1988a). For a review of the debate on the "theorem," see Medema and Zerbe 2000, and for a study of its roles in Coase's works, see Bertrand 2010.

Certainly, and this could be a major difference between the two articles, in 1946, when presenting his views on the marginal-cost controversy, Coase was mostly analyzing an ideal price system, that is a system in which there are no transaction costs. Transaction costs are less an issue for the 1946 solution, which consists in a price imposed to a regulated monopoly. On the contrary, the 1960 article, centered on the exchange solution, develops the consequences of taking its costs into account. However, Coase's conclusion is that, even if the price system is costly, it may remain preferable to governmental solutions: "The main advantage of a pricing system is that it leads to the employment of factors in places where the value of the product yielded is greatest and does so *at less cost than alternative systems*" (Coase, 1960, p. 40, emphasis added). It was already mentioned in the previous article: "although a pricing system puts additional marketing costs on to consumers and firms, these may in fact be less than the organising costs which would otherwise have to be incurred by the Government" (Coase, 1946c, p. 172).[31]

6. Conclusion

In numerous ways, the argument of "The Problem of Social Cost" extends that of "The Marginal Cost Controversy." The problems involved in these two controversies are analogous. Their traditional solutions were elaborated along the same lines and led to the same greater governmental intervention. Coase blames these traditional solutions for similar methodological and analytical reasons. For him, the solutions he proposed were also analogous: both consist in making consumers/producers pay for all the costs (total and social) incurred by their activity. Some fundamental elements of Coase's 1960 article are already

[31] When Coase mentions the government's organizing costs, he refers to "The Nature of the Firm" (Coase, 1946c, p. 172, fn 2), which means he implicitly draws the parallel between firm and government that he will make explicit in "The Problem of Social Cost" (Coase, 1960, p. 17).

present in 1946, such as the thesis of the efficiency of a costless price system and the view of public intervention as suffering from organization costs and lack of information.

There remains, however, a significant difference, specifically in the respective roles of the price system and of regulation in the solutions suggested by Coase. In 1946, he advocates a certain form of regulated price – the multi-part tariff must in some way be imposed to the monopolist; and Coase does not call into question the justification of monopoly.[32] The 1960 article more or less advocates a decentralized solution.[33] This difference can be interpreted as an illustration of Coase's evolution from the Socialism of his youth to a much more liberal orientation, documented elsewhere.[34] This evolution indeed also concerned the problem of "natural monopoly," as proven by two elements. First, in his 1970 article that comes back on the marginal-cost controversy, Coase added one new argument, precisely about the dangers of an excessive governmental intervention: "I believe that some financial autonomy is a necessary aspect of efficient administration, and this again seems to me an argument which indicates that a general policy of marginal cost pricing would be very bad because it would lead in the end to complete centralization of the administration of public utility industries" (Coase, 1970, p. 119).[35] Second, in his famous article on lighthouses (Coase, 1974), a typical case of natural monopoly, Coase does not refer to any of his articles on the marginal-cost controversy. His implicit argument is indeed much closer to "The Problem of Social Cost" (the possibility of private contracting) than to those (see Bertrand, 2006).

[32] But Harold Demsetz, in his criticism of the concept of natural monopoly acknowledges his indebtedness to Coase, "who was unconvinced by the natural monopoly argument long before [Demsetz's] paper was written" (Demsetz, 1968, p. 55, fn).

[33] The necessity of governmental solutions is evoked, but they are also harshly criticized (see Bertrand 2010).

[34] Medema and Samuels 1997; 1998; Pratten 2001; Campbell and Klaes 2005; Bertrand 2010; Bylund 2014.

[35] This argument was developed by Tom Wilson (1945), one of his colleagues during the war.

References

Arrow, Kenneth J. 1969. The Organization of Economic Activity: Issues Pertinent to the Choice of Market Versus Non Market Allocation. In Joint Economic Committee (ed.), *The Analysis and Evaluation of Public Expenditures: The PPB System*, vol. 1, Washington, DC: Government Printing Office, pp. 47-64. Repr. in *Collected Papers of Kenneth J. Arrow*, vol. 2: *General Equilibrium*, Oxford: Basil Blackwell, 1983, pp. 133-155.

Aslanbeigui, Nahid. 1996. The Cost Controversy: Pigovian Economics in Disequilibrium. *The European Journal of the History of Economic Thought*, 3(2), pp. 275-295.

Aslanbeigui, Nahid and Steven G. Medema. 1998. Beyond the Dark Clouds: Pigou and Coase on Social Cost. *History of Political Economy*, 30(4), pp. 601-625.

Baumol, William, John C. Panzar and Robert D. Willig. 1982. *Contestable Markets and the Theory of Industry Structure*. New York: Harcourt Brace Jovanovich.

Berta, Nathalie. 2014. On the Definition of Externality as a Missing Market. Mimeo.

Berta, Nathalie and Elodie Bertrand. 2014. Market Internalization of Externalities: What is Failing? *Journal of the History of Economic Thought*, 36(3), pp. 331-357.

Bertrand, Elodie. 2006. The Coasean Analysis of Lighthouse Financing: Myths and Realities. *Cambridge Journal of Economics*, 30, pp. 389-402.

Bertrand, Elodie. 2010. The Three Roles of the "Coase Theorem" in Coase's Works. *The European Journal of History of Economic Thought*, 17(4), pp. 975-1000.

Bertrand, Elodie. 2014a. Coase's Choice of Methodology. Mimeo.

Bertrand, Elodie. 2014b. From the Firm to Economic Policy: The Problem of Coase's Cost. Mimeo.

Bator, Francis M. 1958. The Anatomy of Market Failure. *The Quarterly Journal of Economics*, 72(3), pp. 351-379.

Buchanan, James M. 1956. Private Ownership and Common Usage: The Road Case Re-Examined. *Southern Economic Journal*, 22(3), pp. 305-316.

Buchanan, James M. 1969. *Cost and Choice: An Inquiry in Economic Theory*. Chicago: Markham Publishing Co (http://www.econlib.org/library/Buchanan/buchCv6c0.html).

Buchanan, James M. 1973. Introduction: LSE Cost Theory in Retrospect. In Buchanan, James M. and George F. Thirlby (eds) (1973), *LSE Essays on Cost*, London: London School of Economics and Political Science.

Buchanan, James M. 2006. The Virginia Renaissance in Political Economy. The 1960s Revisited. In Koppl, Roger (ed.), *Money and Markets. Essays in Honor of Leland B. Yeager*, London, Routledge, pp. 34-44.

Bylund, Per L. 2014. Ronald Coase's "Nature of the Firm" and the Argument for Economic Planning. *Journal of the History of Economic Thought*, 36(3), pp. 305-329.

Campbell, David and Matthias Klaes. 2005. The Principle of Institutional Direction: Coase's Regulatory Critique of Intervention. *Cambridge Journal of Economics*, 29(2), pp. 263-288.

Clapham, John H. 1922. Of Empty Economic Boxes. *The Economic Journal*, 32, pp. 305-314.

Coase, Ronald H. 1937a. Some Notes on Monopoly Price. *The Review of Economic Studies*, 5(1), pp. 17-31.

Coase, Ronald H. 1937b. The Nature of the Firm. *Economica*, 4(16), pp. 386-405.

Coase, Ronald H. 1938. Business Organization and the Accountant (a series of 12 articles). *The Accountant*, 13, October-December, pp. 470-472, 505-507, 537-538, 559-560, 607-608, 631-632, 665-666, 705-706, 737-739, 775-777, 814-815, 834-835.

Coase, Ronald H. 1939. Rowland Hill and the Penny Post. *Economica*, 6, pp. 423-435.

Coase, Ronald H. 1945. Price and Output Policy of State Enterprise: A Comment. *The Economic Journal*, 55(217), pp. 112-113.

Coase, Ronald H. 1946a. B.B.C. Enquiry? *Spectator*, 176, pp. 446-447.

Coase, Ronald H. 1946b. Monopoly Pricing with Interrelated Costs and Demands. *Economica*, 13(52), pp. 278-294

Coase, Ronald H. 1946c. The Marginal Cost Controversy. *Economica*, 13(51), pp. 169-182.

Coase, Ronald H. 1947. The Marginal Cost Controversy: Some Further Comments. *Economica*, 14(54), pp. 150-153.

Coase, Ronald H. 1950. *British Broadcasting: A Study in Monopoly*. London: Longmans Green and Cambridge MA: Harvard University Press.

Coase, Ronald H. 1959. The Federal Communication Commission. *Journal of Law and Economics*, 2, pp. 1-40.

Coase, Ronald H. 1960. The Problem of Social Cost. *Journal of Law and Economics*, 3, pp. 1-44.

Coase, Ronald H. 1970. The Theory of Public Utility Pricing and Its Application. *The Bell Journal of Economics and Management Science*, 1(1), pp. 113-128.

Coase, Ronald H. 1974. The Lighthouse in Economics. *Journal of Law and Economics*, 17(2), pp. 357-376.

Coase, Ronald H. 1982. Economics at LSE in the 1930's: A Personal View. *Atlantic Economic Journal*, 10(1), pp. 31-34.

Coase, Ronald H. 1988a. *The Firm, the Market and the Law*. Chicago: The University of Chicago Press.

Coase, Ronald H. 1988b. The Nature of the Firm: Origin, Meaning, Influence. *Journal of Law, Economics, and Organization*, 4(1), pp. 3-47.

Coase, Ronald H. 1993. Law and Economics at Chicago. *Journal of Law and Economics*, 36(1), pp. 239-254.

Coase, Ronald H. 1995. Ronald H. Coase. In Breit, William and Roger W. Spencer (eds), *Lives of the Laureates. Thirteen Nobel Economists*, 3rd ed., Cambridge: MIT Press, pp. 227-249. Repr. in Breit, William and Barry T. Hirsch (eds), *Lives of the laureates, Twenty-three Nobel Economists*, 5th ed., 2009, Cambridge: MIT Press, pp. 189-207.

Coase, Ronald H. 2003. The Present and Future of Law and Economics. Coase centennial speech at the University of Chicago Law School, http://www.law.uchicago.edu/node/65

Demsetz, Harold. 1968. Why Regulate Utilities? *Journal of Law and Economics*, 11(1), pp. 55-65.

Ellis, Howard S. and William Fellner. 1943. External Economies and Diseconomies. *The American Economic Review*, 33(3), pp. 493-511.

Frischmann, Brett and Christiaan Hogendorn. 2014. Revisiting the Marginal Cost Controversy. *Journal of Economic Perspectives* (forthcoming).

Herzel, Leo. 1951. ‘‘Public Interest’’ and the Market in Color Television Regulation. *University of Chicago Law Review*, 18, pp. 802-816.

Hotelling, Harold. 1938. The General Welfare in Relation to Problems of Taxation and of Railway and Utility Rates. *Econometrica*, 6(3), pp. 242-269.

Kitch, Edmund E. 1983. The Fire of Truth: A Remembrance of Law and Economics at Chicago, 1932-1970. *Journal of Law and Economics*, 26(1), pp. 163-234.

Knight, Frank H. 1924. Some Fallacies in the Interpretation of Social Cost. *The Quaterly Journal of Economics*, 38(4), pp. 582–606.

Lerner, Abba P. 1937. Statics and Dynamics in Socialist Economics. *The Economic Journal*, 47, pp. 253-270.

Lerner, Abba P. 1944. *The Economics of Control*, New-York: Macmillan.

Lewis, W. Arthur. 1941. The Two-Part Tariff. *Economica*, 8, pp. 249-270.

Mäki, Uskali. 1998a. Against Posner against Coase against Theory. *Cambridge Journal of Economics*, 22(5), pp. 587-595.

Mäki, Uskali. 1998b. Coase, R. H. In Davis, John B, D. Wade Hands and Uskali Mäki (eds), *The Handbook of Economic Methodology*, Cheltenham: Edward Elgar, pp. 64-67.

Mäki, Uskali. 1998c. Is Coase a Realist? *Philosophy of the Social Sciences*, 28(1), pp. 5-31.

Marciano, Alain. 2014. Ronald Coase: An Obituary. *History of Economic Ideas*, 21(2), pp. 11-27.

Marshall, Alfred. 1890. *Principles of Economics*. London: Macmillan

Meade, James E. 1952. External Economies and Diseconomies in a Competitive Situation. *Economic Journal*, 62(245), pp. 54-67.

Meade, James E. and J. Marcus Fleming. 1944. Price and Output Policy of State Enterprise. *Economic Journal*, 54 (215/216), pp. 321-339.

Medema, Steven G. 1994. *Ronald H. Coase*. London: Macmillan.

Medema, Steven G. 1995. Ronald Coase on Economics and Economic Method. *History of Economics Review*, 24, pp. 1-22.

Medema, Steven G. 1996a. Coase, Costs, and Coordination. *Journal of Economic Issues*, 30(2), pp. 571-578.

Medema, Steven G. 1996b. Of Pangloss, Pigouvians and Pragmatism: Ronald Coase and Social Cost Analysis. *Journal of the History of Economic Thought*, 18(1), pp. 96-114.

Medema, Steven G. 2014. "Exceptional and Unimportant"? Externalities in Economic Analysis, 1940-1959. Mimeo.

Medema, Steven G. and Warren J. Samuels. 1997. Ronald Coase and Coasean Economics: Some Questions, Conjectures and Implications. In Samuels, Warren J., Steven G. Medema and A. Allan Schmid (eds), *The Economy as a Process of Valuation*, Aldershot: Edward Elgar, pp. 72-128.

Medema, Steven G. and Warren J. Samuels. 1998. Ronald Coase on Economic Policy Analysis: Framework and Implications. In Medema, Steven G. (ed.), *Coasean Economics: Law and Economics and the New Institutional Economics*, Boston: Kluwer, pp. 161-183.

Medema, Steven G. and Richard O. Zerbe Jr. 1998. Ronald Coase, the British Tradition, and the Future of Economic Method. In Medema, Steven G. (ed.), *Coasean Economics: Law and Economics and the New Institutional Economics*, Boston: Kluwer, pp. 209-238.

Medema, Steven G. and Richard O. Zerbe Jr. 2000. The Coase Theorem. In Bouckaert, Boudewijn and Gerrit De Geest, *The Encyclopedia of Law and Economics*, vol. I: *The History and Methodology of Law and Economics*, Aldershot: Edward Elgar, pp. 836-892.

Mishan, Ezra J. 1971. The Postwar Literature on Externalities: An Interpretative Essay. *Journal of Economic Literature*, 9(1), pp. 1-28.

Mosca, Manuela. 2008. On the Origins of the Concept of Natural Monopoly: Economies of Scale and Competition. *The European Journal of the History of Economic Thought*, 15(2), pp. 317-353.

Nordin, J. A. 1947. The Marginal Cost Controversy: A Reply. *Economica*, 14, pp. 134-149.

Paine, C. L. 1937. Some Aspects of Discrimination by Public Utilities, *Economica*, 4, pp. 425-439.

Pigou, Arthur C. 1912. *Wealth and Welfare*. London: Macmillan.

Pigou, Arthur C. [1932] 1948. *The Economics of Welfare*, 4th ed. London: Macmillan.

Pratten, Steven. 2001. Coase on Broadcasting, Advertising and Policy. *Cambridge Journal of Economics*, 25(5), pp. 617-638.

Pratten, Steven. 2004. The Conflict Between Formalism and Realisticness in Modern Economics: The Case of the New Institutional Economics. In Davis, John B., Alain Marciano and Jochen Runde (eds), *The Elgar Companion to Economics and Philosophy*, Cheltenham: Edward Elgar, pp. 339-363.

Ruggles, Nancy. 1949-50a. Recent Developments in the Theory of Marginal Cost Pricing. *The Review of Economic Studies*, 17(2), pp. 107-126.

Ruggles, Nancy. 1949-50b. The Welfare Basis of the Marginal Cost Pricing Principle. *Review of Economic Studies*, 17(1), pp. 29-46.

Scitovsky, Tibor. 1954. Two Concepts of External Economies. *Journal of Political Economy*, 62(2), pp. 143-151.

Sraffa, Piero 1926. The Laws of Returns Under Competitive Conditions. *The Economic Journal*, 36(144), pp. 535-550.

Thirlby, George F. 1946. The Ruler. *The South African Journal of Economics*, 14, pp. 253-276.

Viner, Jacob. 1931. Cost Curves and Supply Curves. *Zeitschrift für Nationalökonomie*, 3, pp. 23-46.

Wang, Ning. 2003. Coase on the Nature of Economics. *Cambridge Journal of Economics*, 27(6), pp. 807-829.

Wilson, Tom. 1945. Price and Output Policy of State Enterprise: A Comment. *The Economic Journal*, 55, pp. 254-256.

Wiseman, Jack. 1957. The Theory of Public Utility Price – An Empty Box. *Oxford Economic Papers*, 9(1), pp. 56-74.

Young, Allyn A. 1913. Pigou's Wealth and Welfare. *Quaterly Journal of Economics*, 27, pp. 672-686.

Young, Allyn A. 1928. Increasing Returns and Economic Progress. *The Economic Journal*, 38 (152), pp. 527-542.