

# EFFICIENCY WITHOUT OPTIMALITY: ENVIRONMENTAL POLICIES AND POLLUTION PRICING IN THE LATE 1960S

BY  
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*In the late 1960s, new environmental policies emerged that attempted to reach predetermined pollution standards in a cost-effective way: i.e., the “standard-and-tax” approach proposed by William J. Baumol and Wallace E. Oates, and the permits market approach proposed by John Dales. This paper describes the early history of the two approaches, and compares them. Although today they refer to different traditions, namely Pigovian versus Coasean, and are often contrasted in the literature, these cost-effective solutions emerged at the same time and for the same reasons. First, they both tried to promote incentives-based policies against traditional regulations; second, they criticized the optimal Pigovian tax, which raised the contentious issue of measuring pollution damage. More broadly, they emerged as a kind of pragmatic compromise, fed by a common attempt to move toward more practical policies: reaching efficiency without optimality, while relying on standards whose setting is a matter for political decision.*

## I. INTRODUCTION

The 1960s was a decade of growing awareness of environmental issues, especially concerning air and water pollution and agrochemical toxicity. At the same time, the young field of environmental economics was developing as a specific focus among economists, separate from natural resources economics. This growth was clearly related to the simultaneous dissemination of the theory of externality, since externalities, which had previously been considered as rare and unimportant phenomena, now began to be associated with real environmental issues (Medema 2020).

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It was in this rich and prolific context of increasing environmental awareness that new environmental policy proposals emerged. These new solutions attempted to minimize the total cost of achieving certain predetermined environmental standards, as follows: first, a political and technical standard of pollution is established by the public authorities; second, a pollution pricing procedure is drawn up to reach this standard. Pollution pricing is based on two different procedures, each belonging to its own theoretical tradition: a market pricing procedure that, following Ronald Coase (1960), requires the creation of tradable permits, as first suggested by John Dales (1968a, 1968b); and an administered pricing procedure that, following the Pigovian tradition and more generally the new welfare economics, requires the creation of uniform taxes, as first suggested by Allen V. Kneese and Blair T. Bower (1968), and later substantiated by William J. Baumol and Wallace E. Oates (1971). The cost-effectiveness of both solutions was quickly established, first by Baumol and Oates (1971) for the tax system, and then by W. David Montgomery (1972) for the permits market. Since every firm is expected to equalize its marginal abatement cost to price (whether market price or administrative price), it should allow for the equalization of marginal abatement costs among firms—the condition for total cost minimization.

This paper provides an early history of these two new policies, and compares Dales's and Baumol and Oates's contributions; such work is necessary since almost no contribution to date has looked at this specific issue from the perspective of the history of economic thought. Anthony C. Fisher and Frederick M. Peterson (1976) provided an important theoretical and empirical state-of-the-art review of environmental economics, but their contribution does not fall within the ambit of history of economic thought. Erhun Kula's (1998) book on the history of environmental economic thought devotes very few pages to Baumol and Oates or Dales. Spencer Banzhaf (2009, 2010, 2017) provides a rich history of natural resources economics during the 1960s and 1970s but does not focus on pollution control. Shogo Nishibayashi (2019) focuses on Kneese's decisive work on water quality management, but except for this last contribution, there is very little historiography on the economics of pollution issues at that time.<sup>1</sup>

This paper studies the reasons for the emergence of these cost-effective solutions, and details their historical and theoretical context; it studies their respective influences, Pigovian for Baumol and Oates versus Coasean for Dales; and it compares the two solutions, focusing on their similarities and showing that they emerged at exactly the same time and for the same reasons. More precisely, this paper's contribution is twofold. First, it shows that both proposals—standard-and-tax and permits market solutions—provided a means to address the dual-sided issue raised by some of the new environmental economists<sup>2</sup> at the time. On the one hand, they wanted to promote incentives-based policies as against the traditional regulation: this traditional regulation, based on standards, norms, and direct controls, was largely favored by policy makers but was

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<sup>1</sup>Several environmental economists have also provided short histories of environmental economics (Pearce 2002; Spash 1999) or histories of the idea of tradable permits (Gorman and Solomon 2002; or Tietenberg 2010). But they are all very general.

<sup>2</sup>Here, "environmental economists" designates mainstream environmental economists working within a neoclassical framework, using individual optimization and marginal analysis.

considered inefficient by economists. On the other hand, they also wanted to find alternatives to optimal solutions, like the Pigovian tax that was dominant in the economics literature, which raised the contentious issue of the measurement of marginal damage. In other words, environmental economists had to deal with the growing need to manage environmental issues at a very practical level, and in the mid-1960s they faced a tough choice: to support either traditional regulations considered as workable but inefficient or Pigovian taxes considered to be optimal but hardly workable. Given this specific historical context, both standard-and-tax and permits market solutions broke with the idealized Pareto optimality, driven by the same skepticism regarding economists' ability to measure and price the damages, especially intangible ones. These cost-efficient solutions could be seen as a third way, a kind of pragmatic compromise: reaching efficiency without optimality.<sup>3</sup> In this respect, I show that they share the same willingness to move towards more practical solutions and clearly partook of the applied turn in economics from the 1970s, as described by Roger Backhouse and Béatrice Cherrier (2017).

Second, this paper shows that Dales and Baumol and Oates were all challenging the role of economists in the policy-making process. They proposed to separate the “what to do” from the “how to do it” (Crocker 2011)—that is, the policy goal from its architecture. They claimed that the identification of a suitable level of pollution had to be a political decision, left to the government, and that “economists cannot be of any significant help in making this decision” (Dales 1968b, p. 799). In this respect, Kula's (1998) distinction, for instance, between an interventionist school (that includes Pigou and Baumol and Oates) and market environmentalism (that includes Coase and Dales) has to be moderated. I focus on the strong similarities between Dales and Baumol and Oates, showing that they all called upon the same conception of political sovereignty regarding the decision on a suitable level of pollution, which renders the State-versus-market distinction irrelevant.

The paper is organized as follows. Section II briefly presents the intellectual and theoretical context: the growing awareness of environmental problems, the growing determination among environmental economists to find price-based alternatives to the traditional regulation of pollution, and the emerging issue of pollution damage pricing raised by the application of Pigovian taxes and cost benefit analyses. Sections III and IV are respectively devoted to the standard-and-tax and the tradable permits market ideas. These two sections also show that Dales, Baumol, and Oates all share a strong skepticism regarding the workability of optimal solutions, and that their common attempt to provide practicable policies explains why they proposed their cost-efficient solutions. Section V provides some elements of comparison: it sheds light on the relation between the approaches' proponents at that time and studies the way in which they were each considering, more or less explicitly, their rival solution, providing the first elements of the comparisons that they put forward. Section VI concludes.

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<sup>3</sup>I here join Fisher and Peterson (1976), who suggest that Baumol and Oates (1971) represent a compromise between the pure Pigovian tax and policy proposals that would be politically more “palatable” (1976, p. 26). But here I substantiate the fact that this was exactly what Baumol and Oates had in mind when proposing their cost-efficient solution, and that this was also the case for Dales.

## II. THE EMERGENCE OF A NEW ENVIRONMENTAL AGENDA

In the 1960s, problems of pollution and environmental quality were increasing (such as the emergence of smog in Los Angeles), along with awareness of the new issues that these problems raised. Rachel Carson published her famous book *Silent Spring* (Carson 1962), highlighting the ecological damage caused by chemical pesticides and marking the revival of the environmentalist movement in the US—a movement that rapidly expanded in the late 1960s and accused the American lifestyle of endangering the planet. This increase in environmental concerns was obviously a factor in the simultaneous rise of environmental economics and the new economists' concern for pollution issues.

The 1960s was a very rich decade regarding environmental issues in economics, and this section does not attempt to provide a general history of the topic. Rather, it focuses on elements of the political and theoretical context that paved the way for the new cost-effective policies: first, the development of environmental economics as a specific academic field and the related growth of the concept of externality; second, the environmental economists' promotion of taxes to manage environmental issues, which contrasted with the traditional regulations based on direct controls and standards that were favored by policy makers at that time; and third, the difficulty raised by the application of the Pigovian approach as regards the contentious issue of damage measurement.

### *The Rise of Environmental Externalities*

At the beginning of the 1950s, the US government was concerned with resource scarcity due to the huge and soaring demand for non-renewable resources (coal, oil, minerals, etc.) in a postwar context of strong economic growth. This issue, raised by the Paley Report,<sup>4</sup> led to the creation of the influential research organization Resources for the Future (RFF) in Washington DC in 1952. RFF is considered to have been an influential supporter of the development of benefit-cost analyses and economic instruments in the management of environmental issues (especially in water management; see Banzhaf 2009, 2010). While it was initially created to focus on the use of scarce natural resources, in the 1960s it began to study the problem of pollution, following rising concerns about the issue. Kneese, one of the fathers of environmental economics, joined RFF in the early 1960s and became the director of the water resources and environmental quality research programs. In 1966, he organized the sixth RFF forum, entitled “Environmental Quality in a Growing Economy,” which was entirely devoted to this issue. As stressed in the introduction to the conference proceedings:

Today, in the mid-1960s, many of the worries over supply have subsided. For the next generation—and probably longer—there are few indications of widespread and persistent shortages of materials. Instead, the most troublesome questions are likely to concern the cleanliness of air and water, the effects of heavy use of pesticides upon soil and water, availability of suitable surroundings for outdoor recreation.... These make a

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<sup>4</sup>The Paley Commission was asked to review the future supply of minerals, energy, and agricultural resources, in the light of the huge demand induced by postwar reconstruction. It also looked at the United States's potential dependence on foreign sources of such resources.

mixed bag of problems, but all of them can come under the tent of a single phrase: ‘the quality of the environment.’ (Jarrett [1966] 1970, p. viii)

This new focus on quality of life and pollution was related to the renewal of the theory of externality. Compared with its growth in the 1960s and 1970s, the literature on externalities was relatively scarce during the 1950s: moreover, when it was mentioned at all, the concept of externality could refer to very different phenomena such as increasing returns and indivisibilities—mainly, all kinds of market failures—although a few contributions were aimed at providing a clear definition (for example, Meade 1952; Scitovsky 1954; Bator 1958). It was only in the 1960s that the use of the concept really took off (e.g., Coase 1960; Buchanan and Stubblebine 1962; Davis and Whinston 1962; Baumol 1964; Mishan 1965; Arrow 1969, etc.), and that a more consensual definition of “externality” emerged, mainly referring to unpriced individual interactions (see Berta 2017 for a history of this emerging definition). In addition, even if, from a theoretical point of view, the suboptimality induced by externalities was broadly recognized in the early 1960s, externalities were still regarded as “exceptional and unimportant” phenomena, pertaining to hypothetical rather than empirical issues (Medema 2020). According to Kneese (1971a, p. 2), “even that subset of economists especially interested in externalities seems to have regarded them as rather freakish anomalies in an otherwise smoothly functioning exchange system.” And, as Peter Bohm and Kneese also noted, “it is not until the last five years or so that the economic literature has begun to recognize explicitly that externalities are a pervasive element in highly developed exchange economies” (Bohm and Kneese 1971, p. xii). The growing interest in the theory of externality in the 1960s owed a lot to the growth of environmental concerns, since the concept found its main field of application in environmental issues, especially pollution.

### *Economists versus Regulators: Worlds Apart*

Although considering environmental externalities as an important source of damage was still a new idea in the early 1960s, economists had already developed a clear and fairly consensual idea of the best way to manage such market failures. According to the new welfare economics, market failures were regarded as deviations from the optimum, requiring State intervention. The Pigovian tax, set so as to be equal to the social marginal damage, was supposed to internalize the externality and achieve optimality. The Pigovian approach dominated the theoretical literature on externality until the 1950s (see Sandmo 2015 for a history), but this situation also persisted in the 1960s when externalities became a subject of environmental studies (see Oates 2000, p. 137). Kneese, for example, was a dominant figure among the early advocates of the use of taxes to manage environmental issues. He wrote two highly influential books on water quality management (Kneese 1964, reprinted and extended four years later in Kneese and Bower 1968); relying on the externality concept, he stressed the cost savings that charges<sup>5</sup> could achieve in environmental policies compared with standards and direct controls, and more generally promoted the economic valuation of pollution control (see

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<sup>5</sup>He is considered the first to have applied this analytical framework to the issue of pollution (Fisher and Peterson 1976; Oates 2000), even if, as will be stressed below, it was not only a pure Pigovian tax (Nishibayashi 2019).

also several contributions on air and water pollution at the sixth RFF forum in 1966, published later in Jarrett [1966] 1970; e.g., Gaffney [1966] 1970; and Turvey [1966] 1970).

Coase (1960) had already proposed another way to internalize externalities in a Pareto optimal way, through bargaining on the externality price and level between the receptor and the emitter. However, his influence remained relatively slight in the environmental literature of the 1960s (see Medema 2014 for a history of the reception of the Coase theorem in environmental economics). Coasean bargaining was mentioned by Kneese and Ralph Turvey at the sixth RFF forum, for instance, but was not taken seriously, mainly because it was not considered appropriate for the large number of agents involved in most pollution issues. As argued below, Coase (1960) obviously had an influence on the idea of the permits market,<sup>6</sup> but the Pigovian tradition largely remained dominant in the economics literature on pollution issues.

However, from the policy makers' point of view, things were different. As noted by Thomas H. Tietenberg (2010, p. 359), "by the late 1950s, both economists and policy-makers had formed quite well developed and deeply entrenched visions of how pollution-control policy should be constructed. Unfortunately, these two visions were worlds apart." While economists promoted the Pigovian solution, policy makers preferred traditional regulation: direct controls such as quotas, norms, or standards. In the 1960s the environmental legislation mainly relied on such instruments, as witnessed in the United States by the 1963 Clean Air Act, for instance, and this remained the case until the 1970s, as illustrated by the 1970 Clean Air Act Amendments and the 1972 Clean Water Act Amendments, which mainly relied on pollution or effluent standards imposed on polluters. As later stressed by Anthony Fisher and Frederick Peterson:

The US government sets abatements standards, enforces them, and sometimes even prescribes the technology to be used, without attempting to equate marginal costs across pollution sources or provide incentives for technical progress. ... The blame for this lies, in our judgement, partly with the Congress and executive agencies for ignoring economists, and partly with economists for recommending impractical policies and for not offering compromises. (Fisher and Peterson 1976, p. 26)

So, the first argument is that Congress and executive agencies were ignoring economists. Yet, even in the 1970s, environmental issues were still not clearly regarded as economic issues, despite economists' recommendations to use economic criteria and to estimate the costs and benefits of environmental policies. For example, the Council of Environmental Quality, created in 1970 to advise the US president on environmental issues, included only a tiny minority of economists. As a result, for environmental economists promoting the "rationalization" of policies through cost evaluation, economic analysis "has been excessively abbreviated and appears to have had no effect on the discussion of political developments on other parts of Environmental Quality [the annual report of the Council of Environmental quality]" (Mills and Peterson 1975, p. 267).

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<sup>6</sup>Medema stressed that the closest connection was to Coase's article "The Federal Communications Commission" (1959), which gave rise to "The Problem of Social Cost." In 1959, Coase suggested creating a market in broadcast frequencies, with rights auctioned or given to users. However, there is no reference to Coase's 1959 article in the later literature on permits markets (Medema 2014, p. 43).



The second explanation for the gap between regulators' and economists' opinions lies in the "impractical" policies recommended by the latter. Kula (1998) evoked the predilection of economists for unnecessary mathematics and jargon, as well as the lack of available information on the marginal costs and damages functions. And Oates would later argue, regarding the Pigovian approach of externality:

There existed a coherent economic view of the environmental problem and its resolution, it was just that: a view with little concrete work addressing the complex issues of program design and implementation. Economic theory calls for a fee or tax on polluting activities equal to marginal social damage. But as soon as one tries to build an actual regulatory program on this principle, all sorts of complications arise. (Oates 2000, p. 140)

And this is the point on which I want to focus here: what was at stake was the unworkability of the Pigovian solution and more largely of optimal solutions that required perfect knowledge of the marginal cost and damage functions.

### *The Issue of Damage Measurement*

Yet, from a theoretical point of view, the calculation of the optimal Pigovian tax relied on the balance—and thus on the measurement and monetary valuation—of the externality marginal cost and damage. And applying this approach to the growing pollution problems was quite new. Among the most influential works that addressed the practical issue of pricing abatement costs were Kneese (1964), and Kneese and Bower (1968). As already stressed, these authors were strong advocates of the economic rationalization of pollution controls through their cost minimization, and promoted the use of taxes in general. They tried to compare the costs of several policies, mainly relying on empirical studies, e.g., those applied in Germany's Ruhr Basin or in the Delaware estuary in the United States.<sup>7</sup> And their work was considered as a promising attempt at pricing, though imperfectly, both the abatement costs and the pollution damage (see, e.g., Falkson 1969 for a review of Kneese and Bower 1968).

It should be noted that although trying to apply the Pigovian approach to pollution issues was quite new in the 1960s, benefit-cost analysis had already been applied to public investment projects in the United States from the 1930s, and especially to water resource projects that tried to manage irrigation, navigation, and flood control (see Prest and Turvey 1965 for a state-of-the-art of that time; and Castle et al. 1981 or Hufschmidt 2000 for broader histories). In the 1950s and 1960s, several publications and reports<sup>8</sup> tried to provide new principles and procedures to estimate the benefits and costs of water resource projects, using both welfare economics and related microeconomic theory. These benefit-cost analyses raised several issues, including the valuation of benefits, especially of non-market goods like intangible goods (mainly outdoor recreation), and the incommensurability of different kinds of benefits (Banzhaf 2009, 2010). And this issue of the measurement of the benefits of water resource projects obviously echoed the

<sup>7</sup>For instance, they used the Delaware estuary example to stress that using both taxes and standards could allow abatement costs to be cut in half compared with traditional regulation (Kneese 1971b, p. 158).

<sup>8</sup>For instance, the now classic Green Book (U.S. Federal Inter-agency River Basin Committee 1950 and its revised version in 1958), Krutilla and Eckstein (1958), or the report from the Harvard Water Program (Maass et al. 1962).

issue of damage measurement in pollution control.<sup>9</sup> So it was not surprising that most of the participants at the sixth RFF forum also stressed, with more or less optimism, the difficulty of pricing abatement costs and the damage associated with pollution, and the lack of available data. “Our skill in estimating future benefits and costs in a changing world is not large and our practice of using money market rates for discounting future streams of uncertain benefits and costs may not be fully appropriate for questions concerning social regulations of environmental quality in a perpetual society” (Barnett [1966] 1970, p. 19).

At the same time, again regarding the balance between cost and benefit, Turvey noted:

Unfortunately, this test is rarely sufficient in itself to provide an answer, and often cannot be applied in practice. Nobody is going to quarrel with this criterion as a principle; it is like being against sin! But it is able to give an answer only when all gains and all losses can be satisfactorily measured and expressed in terms of a common denominator, dollars. (Turvey [1966] 1970, p. 51)

Measuring the damage—in other words, measuring the benefits of pollution control—was considered more difficult than measuring the abatement costs. And indeed, at the end of the 1960s, very few empirical studies were devoted to this issue of pollution damage measurement.<sup>10</sup>

To sum up, in the late 1960s, the growing environmental problems such as pollution were regarded as important externalities to be managed at a very practical level. From a theoretical point of view, following the new welfare economics, many environmental economists considered that such market failures should be managed by Pigovian taxes. They thus started to promote such policies, stressing the cost savings that they could achieve compared with the traditional regulations favored by policy makers. However, from a practical point of view, these policies raised the contentious issue of the estimation of the pollution damage. Therefore, this context was a fertile ground for new policies that would break with traditional regulation—regarded as workable but inefficient—and also with Pigovian taxes—regarded as optimal but hardly workable. In other words, there was a perceived need for compromise.

### III. THE STANDARD-AND-TAX APPROACH

This section shows that the standard-and-tax approach proposed by Baumol and Oates provided a response to criticisms raised against both traditional regulation and Pigovian taxes. It can be seen as an alternative: it allowed the introduction of taxes or incentives,

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<sup>9</sup>From a theoretical point of view, this literature on water resource projects that deals with the allocation of alternative uses of water was quite separate from the literature on pollution issues that strongly relied, contrary to the former, on the conceptual framework of market failures and externalities (see Fisher and Peterson 1976). But the separation was porous. For instance, RFF was very influential in both fields: John Krutilla and Otto Eckstein were working on natural resources at the RFF, besides Kneese; Kneese had already worked on water resources projects before beginning to focus on pollution issues, and he was asked by Krutilla to join the RFF (Nishibayashi 2019).

<sup>10</sup>Fisher and Peterson (1976) provided a survey of the empirical studies of pollution abatement costs and damages. They mention only four references available by the late 1960s that try to estimate the pollution damage on health or on recreational uses (1976, pp. 19–24).



being thus more efficient than traditional regulation, but it avoided the unworkability of the Pigovian solution since it rested on ‘non-optimal’ predetermined standards. As stressed by its proponents, “this alternative, which we shall call the environmental pricing and standards procedure, represents what we consider to be as close an approximation as one can generally achieve *in practice* to the spirit of the Pigovian tradition” (Baumol and Oates 1971, p. 42; emphasis added).

The idea of mixing standards and taxes had already been suggested by Kneese (1964) and Kneese and Bower (1968), who stressed, mainly relying on empirical studies, that mixing them can provide important cost savings (Nishibayashi 2019). But Baumol and Oates were the first to provide a formal and rigorous proof of the cost-efficiency of such a proposal. Their proposal was driven by a strong skepticism regarding the ability to compute optimal Pigovian taxes and a common willingness to provide more pragmatic policies for pollution control. This pragmatism led them to give up any claim to be able to reach an optimal pollution level, and instead to call upon political and technical standards rather than hypothetical optimal ones.

### *The Pigovian Tax and Its “Fairly Esoteric Marginal Net Damage”<sup>11</sup>*

Baumol and Oates were both at Princeton University in 1971. Baumol had already worked on several topics linked to new welfare or public economics, especially on the theory of State intervention and the related concept of externality.<sup>12</sup> Oates was younger; he joined Princeton just after having received his PhD from Stanford in 1965, and had mainly worked on fiscal policy and public economics.<sup>13</sup> Their 1971 paper marked for both the beginning of a series of contributions in environmental economics—including their later seminal book *The Theory of Environmental Policy* (1975).

Influenced by public economics, they strictly followed the Pigovian approach. First, as usual among new environmental economists, they considered that it would be more efficient than traditional regulation. They did not even discuss the relevance of the latter, and rather sweepingly affirmed instead that “the inefficiencies of a system of direct controls, including the high real enforcement costs that generally accompany it, have been discussed often enough; they require no repetition here” (Baumol and Oates 1971, p. 44).<sup>14</sup> But at the same time they acknowledged the unworkability of the Pigovian approach: “in practice, such an approach has rarely proved feasible because of our inability to measure marginal social damage” (Baumol and Oates 1971, p. 42). They recognized that Kneese and Bower (1968) “report some extremely promising work constituting a first step toward the estimation of the damage caused by pollution of waterways including even some quantitative evaluation of the loss in recreational benefits” (*ibid.*, p. 43). But they remained relatively pessimistic, first, because of the large number of agents involved in most pollution issues—since both considered that most environmental issues require a general equilibrium approach; second, because of

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<sup>11</sup> Baumol and Oates (1971, p. 44).

<sup>12</sup> See, e.g., his PhD from the London School of Economics in 1949 (Baumol [1952] 1965 or Baumol 1964). See Noci (2019) for his conception of welfare economics and the way he turned to more applied economics.

<sup>13</sup> His first book was *Fiscal Federalism* (Oates 1972). He had published very few papers before 1971 and none in environmental economics.

<sup>14</sup> They would be less preemptory in Baumol and Oates (1979) where they recognized that direct controls could be favored in specific circumstances, and that no solution can be considered as always the best.

the intangible nature of widespread damage (esthetic or health damages, for instance),<sup>15</sup> and, third, because in order to find the optimal tax level, we need to know not only the total amount of damage associated with pollution but also the marginal damage. Furthermore:

The optimal tax level on an externality generating activity is not equal to the marginal net damage it generates *initially*, but rather to the damage it would cause if the level of the activity had been adjusted to its *optimal* level ... if there is little hope of estimating the damage that is currently generated, how much less likely it is that we can evaluate the damage that would occur in an optimal world which we have never experienced or even described in quantitative terms. (Baumol and Oates 1971, p. 43)

What they imply here is that we need to know not only the marginal damage associated with a specific pollution level but also the whole marginal damage function. For all these reasons, they considered that this optimal level is impossible to compute—an argument they maintained a few years later, in the same terms, in *The Theory of Environmental Policy*: “It is not easy to obtain a reasonable estimate of the money value of this marginal damage,” so that “it is hard to be sanguine about the availability, in the foreseeable future, of a comprehensive body of statistics reporting the marginal net damage” (Baumol and Oates 1975a, p. 135).

#### *The Trade-Off between Practicability and Theoretical Purity*

As a consequence, Baumol and Oates considered that we should give up any claim to Pareto optimality. But at the same time, they considered that “the economist’s prediction for the use of the price mechanism makes him reluctant to give up the Pigovian solution without struggle” (Baumol and Oates 1971, p. 44). Thus, they proposed that the tax system be selected so as to achieve “specific acceptability standards rather than attempting to base them on the unknown value of marginal net damages” (*ibid.*, p. 45). These acceptability standards then represent “the decision-makers’ subjective evaluation of the minimum standards that must be met in order to achieve what may be described in persuasive terms as ‘a reasonable quality of life’” (*ibid.*, pp. 44–45). This approach reflects Baumol and Oates’s pragmatism, their common willingness to provide practical policies for decision makers who had to face growing concerns about pollution issues. In later presentations of their 1971 standard-and-tax approach, they stressed that it “recommends itself more for its promise of effectiveness than its theoretical nicety” (Baumol 1972, p. 307) and that rejecting it “on the grounds that they will probably violate the requirements of optimality may well be considered a kind of perverse perfectionism” (Baumol and Oates 1975a, p. 151).<sup>16</sup>

Baumol later provided comments on his method in general that help us to understand this choice (Baumol 1984; Krueger 2001; see also Noci 2019). He stressed that he has

<sup>15</sup>Baumol (1972) would add the psychic cost of pollution, widely diffused through the population, and thus hardly measurable.

<sup>16</sup>In quite similar terms, Baumol (1972, p. 320) stressed that their approach “does not dispose of the difficulties involved in finding a true optimum—rather it sweeps those difficulties under the rug.... There will remain the possibility that the (undiscovered) global optimum offers us far better than what we have managed to achieve—if only we knew how to attain it. But if we permit ourselves to be paralyzed by councils of perfection we may have still greater cause for regret.”

always been oriented towards applied theory and never interested in the construction of models for their own sake. “Optimality in model construction must be based on the tradeoff between these two desiderata—accuracy of representation of reality and usability in analysis” (Baumol 1984, p. 7). This is why the standard-and-tax approach can be seen as the result of such a trade-off between pure theory and its related optimality criterion and policy-oriented theory that agrees to set aside optimality for better feasibility. In the introduction of their 1975 textbook, Baumol and Oates clearly announced: “This volume is primarily theoretical and is consequently addressed to our fellow economists. However, it is not meant to be theory for theory’s sake. Here our prime concern is policy; we are interested in the theory as a means of understanding the complexities of environmental programs” (Baumol and Oates 1975a, p. xi).

Oates, contrary to Baumol, did not write any papers on his own method in economics. But in a later survey of environmental economics, written with Maureen L. Cropper, he would reassert his interest in policy-oriented and applied economics in similar terms: “[T]here is a real opportunity for environmental economists to make valuable contributions in the policy arena—if, as we shall argue, they are willing to move from ‘purist’ solutions to a realistic consideration of the design and implementation of policy measures” (Cropper and Oates 1992, p. 676). And all his work focused mainly on the economics of environmental policy issues, with a number of journal publications aimed at operationalizing and evaluating pollution-control schemes (McGartland 2015).

### *Baumol and Oates’s Least-Cost Theorem*

Baumol and Oates showed that a uniform tax system would allow the predetermined acceptability standards to be realized at least-cost. As is widely acknowledged today, in response to a tax, a firm is assumed to reduce its pollution until the point of the equalization of its marginal abatement cost to the tax. This would lead to the equalization of the firm’s marginal costs, the condition for total cost minimization. The last requirement is then to adjust the tax level so as to reach, in response, the given pollution standard. However, according to Baumol and Oates, the authorities’ experience allows them to set appropriate tax levels so that less information is needed for an iterative adjustment tax in order to reach the given standards.

Yet, this idea was fairly intuitive and, as the authors acknowledged, it was not totally new: “it or a very similar proposition has been suggested in a number of places” (Baumol and Oates 1971, p. 46), and they referred to Kneese and Bower (1968) and also to a paper from Larry E. Ruff (1970).<sup>17</sup> However, they continued: “we have been unable to find an explicit statement of this result anywhere in the literature” (Baumol and Oates 1971, p. 46).

Their mathematical proof of cost-efficiency relied on the individual production functions of price-taker firms. First, a program of total cost minimization, set for a given

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<sup>17</sup>Nishibayashi (2019) stresses that Kneese did not necessarily suggest using pure Pigovian taxes but rather effluent charges set in order to reach “ecologically and hydrologically desirable standards” (p. 13)—which was indeed a similar proposal. Next, Ruff (1970) actually argued that the tax “should be chosen on the basis of some estimate of its effects but need not be the optimal one” (p. 81), and concluded that the equalization of marginal costs that these taxes could achieve, which he called the “equimarginal” principle, could bring cost minimization.

level of output and a given pollution standard, was solved by a Lagrangian function, which gave the first-order conditions. The second step consisted of introducing a uniform tax instead of the imposition of a fixed standard. The first-order conditions for the individual cost minimizations under such a tax are the same as the previous condition for total cost minimization: the Lagrange multiplier of the emissions constraint, the shadow price of emissions, being interpreted as a tax.

Baumol and Oates did not recognize that the same cost-efficiency could be achieved with a permits market. Furthermore, and quite remarkably, they did not refer to the idea of a permits market at all. They did mention Coase (1960) but just in passing, in a footnote, since they did not take the Coase theorem seriously into account. While they acknowledged that the latter “may in some instance” be optimal, they immediately stressed that “one can hardly imagine, for example, a voluntary bargaining process involving all the persons in a metropolitan area” (Baumol and Oates 1971, p. 47; and also Baumol and Oates 1975a, 1975b). In other words, they considered it was not suitable for the large number of agents usually involved in pollution issues—a traditional criticism of Coase’s theorem at that time; so that the Coasean solution was, like the Pigovian one, rejected for its unfeasibility and not on theoretical grounds.<sup>18</sup>

#### IV. THE IDEA OF A PERMITS MARKET

At the same time, Dales (1968a, 1968b) proposed the idea of creating a permits market to manage pollution issues. Thomas D. Crocker (1966) is sometimes credited with having first introduced this idea with Dales, and their contributions are usually not distinguished in the literature. In fact, however, they did not propose the same kind of market (see Berta forthcoming). Crocker’s market involved trading between emitters and polluters, both constrained by pollution standards (a minimum one and maximum one). His proposal was relatively close to Coase’s bargaining, while involving a large number of agents. It did not provide the clear separation between the political goals (the standards) and the means to achieve them (trading between emitters) that characterizes the permits market. Thus, given these differences, it is not presented here. Furthermore, Dales did not even mention Crocker, and the permits market idea put forward by Dales was totally independent of Crocker’s proposal.<sup>19</sup>

Dales looked for the same kind of solution as Baumol and Oates: on the one hand, he favored incentives-based policies instead of the traditional regulation, which he regarded as too costly; on the other hand, he looked for workable policies and considered optimal solutions as impracticable, mainly because of the marginal damage being impossible to

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<sup>18</sup>Kula (1998) suggested that in the 1960s and 1970s, some economists who were disillusioned with the proposed property rights approach began to focus more tightly on Pigovian taxes. But Baumol and Oates did not seem to have had any illusions regarding the property rights approach: they strictly followed the new welfare and public economics on which they had worked before 1971, and they wanted to adapt the Pigovian tax. In 1971 they were clearly rejecting the Coase theorem, devoting only a footnote to it, and they did not even mention Dales’s permits market. So there is no clear evidence that they were writing against such a property rights approach.

<sup>19</sup>Crocker’s proposal was published in a book and not in a widely distributed journal. Furthermore, the book was entirely devoted to air pollution, whereas Dales was focusing on water pollution. This is probably why Crocker’s proposal is not mentioned by Dales.

compute. Consequently, he also proposed giving up any claim to optimality and establishing political and technical standards instead. The strong influence of Coase and the property rights school led him to propose the creation of a permits market to achieve these standards, instead of a tax system—even if Dales’s proposal was not an adaptation or an extension of Coase bargaining.

### *The Lack of Property Rights*

Dales was a Canadian professor in economics at the University of Toronto, working on the pollution of the Great Lakes. He presented his idea of a permits market in a book entitled *Pollution, Property and Prices: An Essay in Policy Making and Economics* (1968a), which was summarized the same year in an article published in the *Canadian Journal of Economics* (Dales 1968b). At that time, Dales had already published a few papers on industrial development—especially on the Canadian manufacturing industry, stressing its impacts on energy resources or the effect of protectionism on its development. But he had never before published any contribution on environmental issues—and neither would he do so afterwards. Dales’s book on pollution was mostly an applied study and, contrary to Baumol and Oates (1971), was not underpinned by any formal basis. It provided a broad reflection on property rights, applied to environmental issues. In the preface, Dales affirmed that studying social problems as pollution issues had led him to focus on the link between law and economics, and more precisely between prices—“the stuff of economics”—and property rights (Dales 1968b, p. xi). And indeed, two chapters were entirely devoted to property rights, which seemed to be one of his main topics. This focus on property rights led him to associate environmental issues, especially water pollution, with lack of ownership, and to stress “the enormous social friction and economic waste that result from not applying an ownership-rental system to water” (Dales 1968b, p. 795).

On this issue of property rights, he referred mainly to Coase (1960), but also to H. Scott Gordon’s (1954) seminal paper.<sup>20</sup> He considered that Gordon (1954) had shown “the wastefulness of common-property arrangements” (Dales 1968a, p. 111). And claiming that “common property,” which he understood as a free good, simply means “no property,” Dales rejected it. Dales did mention Coase regarding the relationship between law and economics and the definition of property rights,<sup>21</sup> but it is interesting to notice that he never discussed or even referred to Coasean bargaining. The Coase theorem had just been established by George Stigler (1966), and, as already mentioned, its influence on the environmental economics literature was still limited (Medema 2014). Contrary to Baumol and Oates, who would reject it on the grounds that it is not suitable to a large number of agents, Dales did not evoke the idea at all. Thus his idea of a permits market was not presented as a development or an adaptation of the Coase theorem to situations involving a large number of agents. In other words, contrary to what we might

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<sup>20</sup>Dales also mentioned a paper from the jurist Charles A. Reich (1964) that illustrated different kinds of imperfectly transferable rights, like driver licences or tobacco licences. It is surprising that he did not mention Harold Demsetz: he would mention him in a later paper (Dales 1975) that did not deal with environmental issues at all.

<sup>21</sup>More precisely, he briefly refers to Coase (1960) at the end of his book. In his article (Dales 1968b), he refers twice to Coase but, again, only on the issue of the definition of property rights, and especially on the distinction between the ownership of a good and ownership on the right to use the good (pp. 792, 795).

have expected retrospectively, the idea of a permits market was not a way to address the unworkability of the Coasean solution.<sup>22</sup> As stressed below, it was mainly presented as a way to address the unworkability of optimal solutions, especially the optimal taxes and their shadow prices, which were impossible to compute.

Economists tend to assume implicitly that it is impossible to own water and therefore seek to devise artificial price systems that are identical to what prices “would be” if ownership were possible. The alternative strategy is to devise an ownership system and then let a price system develop. The purpose of this article is to suggest that there are very considerable advantages to attacking our water problems by means of a system of explicit ownership rather than by a system of shadow prices. (Dales 1968b, p. 792)

Obviously, though, this does not mean that Dales favored the private ownership of natural resources like air or water or more broadly the privatization of nature. Following Coase, he drew a distinction between property rights on an asset and property rights on the use of an asset. And, more importantly, he drew a distinction between private property and property rights, considering that property rights can be vested in individual groups, firms, or governments, and do not necessarily imply private property.

*“Simple Problems, Simple Solutions”*<sup>23</sup>

Dales favored incentives-based policies as against traditional regulation. However, he also rejected solutions that attempted to reach optimality. He set out two conflicting uses of water: amenity use and waste disposal. The social optimum involves ensuring that these two uses are allocated in such a way that the marginal benefit of one use is equal to the marginal cost of the other. However, this social optimum cannot be measured because we lack the relevant information. So Dales did not reject such an idealized optimal solution on theoretical grounds; rather, his arguments were pragmatic. In a chapter entitled “Simple Problems, Simple Solutions,” he gives an enlightening example of the pollution of an imaginary lake, which leads to health issues, to reduced recreational uses of water, and to losses of esthetic value. He then summarizes all the benefits and costs of the several available policies in a table and concludes that such a table “provided us with an orderly way of thinking, ... a guide to straight thinking” (Dales 1968a, p. 29) that helped to solve the problems. But, he added ironically, “the problems are not solved by the benefit-cost machine, it is solved because we took great pains to adopt assumptions that made them solvable” (ibid., p. 36). In particular, such an approach assumed that all the benefits and damages are known and measurable, and furthermore that they are measurable in terms of dollars.

Like Baumol and Oates, Dales acknowledged Kneese’s work and the progress made in pricing damage and the cost of water pollution.<sup>24</sup> He also referred to a survey of benefit-cost analysis by Alan R. Prest and Ralph Turvey (1965), which mainly provided

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<sup>22</sup>And the several recensions of Dales’s book (Fox 1971; Mackintosh 1971; Sewell 1969; Willis 1969; Winch 1969) did not even mention Coase.

<sup>23</sup>Title of Dales’s (1968a) chapter III.

<sup>24</sup>Dales acknowledged Kneese’s influence at the end of his book. He also referred to Kneese’s work in his article when arguing: “the contention that there exists no economically optimum division between amenity and pollution uses of water will be resisted by exponents of damage cost pricing” (Dales 1968b, p. 798).



favorable arguments regarding the use of such analysis.<sup>25</sup> But, again like Baumol and Oates, he remained far more pessimistic and focused mainly on the difficulties associated with measuring pollution damage, adducing very similar arguments. First, he underlined that environmental issues usually involve many agents and require a general equilibrium approach (Dales 1968b, p. 799); second, he stressed the intangible nature of pollution damage, especially regarding recreational uses of water, health damage, or esthetic value.

He therefore rejected every attempt to reach an optimal solution. And, regarding the principle of Pigovian taxes, he noted: “the administrative problem of approximating optimum shadow prices by actual user charges promises to be a nightmare” (Dales 1968b, p. 791). Or, in other words, “in principle” the values of marginal benefit and damage should be equal, but “in practice” the optimal amount cannot be computed (p. 797). Therefore, the suitable level of pollution has to be a political decision: economics cannot be of any significant help in making this decision (Dales 1968b, p. 799). This does not mean that economists have nothing to say on the matter, it just means that “if economics has nothing useful to say about the ownership decision of how water should be used, it has a great deal to say about how the decision, once made, should be implemented” (Dales 1968b, p. 799). And hence Dales proposes his permits market solution.

His proposal is well known, and is close to what are today usually named “cap-and-trade” schemes. It does not require a long explanation here. Like the standard-and-tax approach, it involved a clear separation between the predetermined standards and the pricing procedure, which is left to the market. So once the pollution level is politically chosen, an equivalent number of pollution rights are issued, put up for sale, and made tradable.

Dales reviewed several policies—regulations, taxes, subsidies, etc.—that could be implemented to achieve these standards, and then compared their relative economic efficiency and their administrative costs. The trading of emissions rights is expected to equalize the polluters’ marginal abatement costs—the condition for total cost minimization. Dales did not straightforwardly or formally establish this property of cost minimization. A few years later, W. David Montgomery (1972) established a rigorous proof of the cost-efficiency of the permits market.

### *Montgomery’s Proof of Cost-Efficiency*

Montgomery’s contribution was part of his PhD submitted at Harvard University in 1971, and supported by the Environmental Protection Agency (EPA). Unlike Dales, Montgomery was not writing against the Pigovian tradition and did not even mention it. He plainly adhered to the Arrow-Debreu competitive equilibrium tradition.<sup>26</sup>

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<sup>25</sup>Even if this survey also acknowledged that some costs and benefits cannot be quantified or valued in any market sense, so that “they have to be presented to the decision maker in the prose which accompanies the cost-benefit arithmetic, since they cannot be incorporated in the arithmetic itself” (Prest and Turvey 1965, pp. 696–697). On this issue of benefit-cost analysis, Dales also referred to an article by B. R. Williams (1965). These are the only references that he provided.

<sup>26</sup>He had already published an article on Walras (Montgomery 1971).

More precisely, his work was deeply inspired by Dales and Kenneth Arrow. Montgomery was Arrow's student, and he clearly acknowledged the influence of Arrow's 1969 paper on the market internalization of externalities. At the very end of the 1960s, two different modes of market internalization were suggested, each, under specific assumptions, allowing the achievement of Pareto optimality: Coase's bilateral bargaining in an Edgeworthian framework with price-maker agents; and Arrow's (1969) competitive market in a Walrasian framework with price-taker agents (see Berta and Bertrand 2014 for a detailed comparison of the two kinds of internalization). Montgomery clearly followed the Arrowian approach. This is probably why he did not even mention Coase (1960)—whom he probably knew at the time.<sup>27</sup>

Arrow (1969) proposed an internalization mode that expanded the complete system of markets to include externalities in a general equilibrium framework (see Berta 2017). More precisely, Arrow established the conditions for Pareto optimality in a general equilibrium framework with competitive markets for externalities. He provided an example of widespread externalities in consumption. Reaching Pareto optimality required broadening the markets system to all externalities characterized as "missing markets." New commodities were created, one for each personalized externality, each being characterized by two agents: the producer and the recipient. Arrow then showed that the new competitive equilibrium, with personalized prices, exists and is Pareto optimal. Nevertheless, as underlined by Arrow himself, the price-taking assumption, which is usually justified by "atomistic competition," is not relevant in such a market that involves only two agents. Given this lack of realism, Arrow did not regard his own theoretical solution as empirically relevant.

Montgomery's paper started precisely by underscoring the same issue—in other words, the unworkability of Arrowian markets:

Arrow [1969] has demonstrated that when externalities are present in a general equilibrium system, a suitable expansion of the commodity space would lead to Pareto Optimality by bringing externalities under the control of the price system. Since its procedure is to define new commodities, each of which is identified by the type of externality, the person who produces it and the person who suffers from it, his conclusion is pessimistic. Each market in the newly defined commodities involves but one buyer and one seller, and no forces exist to compel the behavior which would bring about a competitive equilibrium. (Montgomery 1972, p. 395)

Montgomery rightly stressed that, contrary to Arrowian personalized externalities, in many forms of pollution the receptor does not care who precisely the emitter is. Thus, referring then to Dales, he proposed the creation of competitive markets that would "bring together many buyers and sellers" (1972, p. 395). While Pareto optimality cannot be reached with such markets, Montgomery proved that the competitive market equilibrium, today called the "least-cost allocation," can achieve specific standards at least cost for the regulated firms. The structure of mathematical proof was similar to that of Baumol and Oates because the cost-minimization program under specific pollution standards required solving a Lagrangian function whose multiplier, the shadow price for pollution, can be associated with a market price. Tietenberg stressed that "because the mathematics is

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<sup>27</sup>Since Coase (1960) was mentioned by Dales (1968a) but also by Arrow (1969).

perfectly equivalent for the two cases, the result derived for a charge system immediately was recognized as relevant for emissions trading” (Tietenberg 2010, p. 360). However, Montgomery mentioned Kneese and Bower (1968), but not Baumol and Oates (1971). He seemed to have followed two different ideas, those of Arrow and Dales, whose influences were clearly acknowledged in the introduction. Hence the similarity of the mathematical proofs is not sufficient evidence that Baumol and Oates’s proof, even if it came slightly earlier, was recognized as relevant for emissions trading.

## V. SOME ELEMENTS OF COMPARISON

As stressed above, each solution followed on from its own tradition, and while they were addressing the same issue, Kneese’s work was the only influence they really had in common.<sup>28</sup> Furthermore, their proponents never mentioned each other in their respective contributions. On the one hand, Dales’s work was prior to Baumol and Oates’s, and on the other hand, Baumol and Oates deliberately ignored Dales’s proposal. Nevertheless, it is possible to find some elements of comparison, and this section is devoted to this issue. It studies the way each author was considering, more or less explicitly, the rival solution—whether in his work at the time or in later contributions. Yet this section does not examine the intensive discussion that would compare the two pricing systems from a theoretical and normative viewpoint—within the later “price versus quantity” debate.<sup>29</sup> This large issue warrants an entire paper.

### *Dales’s Focus on the Administrative Costs Issue*

Dales was aware that the standard-and-tax approach could also minimize the total abatement cost through the equalization of the polluters’ marginal costs. As already stressed, the idea that mixing standard and tax could achieve important cost savings was first suggested by Kneese (1964)—a source to which Dales often referred. But he stressed that, given the uncertainty on the firms’ marginal abatement costs, a uniform tax would require costly *ex post* adjustments of the tax level by public authorities to achieve the predetermined standards. This is why he called the standard-and-tax approach the “trial-and-error procedure” (Dales 1968a, p. 91). This today is a common argument in favor of a market instead of a tax, since the former obviously guarantees the achievement of the standard. It should be noted that Baumol and Oates (1971) acknowledged that their solution required such *ex post* adjustments, but they did not see it as a problem:

<sup>28</sup>They also both mentioned Coase, but, contrary to Kneese, this can hardly be considered a common influence, since it is acknowledged by one, but the other clearly rejected it in a footnote.

<sup>29</sup>Given the uncertainty regarding the abatement cost functions, the public authorities cannot know the amount of pollution that emitters will choose in response to a certain tax level. So the tax level requires *ex post* adjustments in order to achieve the standard. With a permits market, the standard is guaranteed since an equivalent number of permits will be issued, but uncertainty affects market price (but no longer quantity). The tax is called a “price instrument” (the price is administered) and the market a “quantity instrument” (the quantity is administered). This debate regarding the different uncertainties generated by each approach is in the spirit of Martin Weitzman’s (1974) paper in which he compared standards on quantity to price-based regulation.

[I]f necessary, the information needed for iterative adjustments in tax rates would be easy to obtain; if the initial tax rates did not reduce the pollution ... sufficiently to satisfy the present acceptability standards, one would simply raise the tax rates. Experience would soon permit the authorities to estimate the tax levels appropriate for the achievement of a target reduction in pollution. (1971, p. 45)

More precisely, Dales's main argument was that, compared with these tax adjustments, a permits market would reduce administrative costs since "the virtues of the market mechanism are that no person, or agency, has to set the price—it is set by the competition among buyers and sellers of rights" (Dales 1968b, p. 801). So, finally, Dales compared not only the abatement costs—on this issue, both solutions were equivalent and considered as superior to regulation—but also their administrative costs, that is, mainly the costs involved by their enforcement and implementation.<sup>30</sup> His main aim was always to find the less costly solution—comparing both the abatement costs for polluters and the administrative costs for public authorities, in a very Coasean way.<sup>31</sup> This led him to conclude that "the administrative simplicity of the [permits market] scheme is certainly one of its main attractions" (Dales 1968a, p. 97).

Montgomery used very similar arguments: even if he did not refer to Baumol and Oates (1971), he was also aware that a tax system would lead to exactly the same outcome as the market solution. And he also stressed the administrative cost savings allowed by his solution, compared with the "iterative process by varying the tax ..., a cumbersome and politically unattractive procedure," while "the market makes the necessary calculations independently in the course of reaching equilibrium" (Montgomery 1972, p. 411).

It should be noted that neither Dales nor Montgomery provided an explanation of how the competitive equilibrium prices would be reached. Specifically, they always implicitly assumed that the competitive equilibrium—that is, the least-cost allocation that is expected to equalize polluters' marginal costs—would be reached at no cost. Thus both Dales and Montgomery pointed out the costly adjustments that a tax system would require, but at the same time both implicitly assumed the costless achievement of the competitive allocation, the costless market price adjustments—calling upon the "virtues of the price mechanism" or the market's "course of reaching equilibrium." Indeed, it is only under such a hefty assumption that a tax system can be regarded as costly compared with a permits market: actually, the standard-and-tax approach could have significant administrative costs in its enforcement by public authorities, due to the *ex post* administrative adjustments it requires; but the market solution could also bring significant costs, not only in its administrative enforcement, which both Dales and Montgomery considered lower than those costs of a tax, but also in its process of price adjustments.<sup>32</sup>

<sup>30</sup>Dales used the term "administrative costs" and not, with rare exceptions, "transaction costs." I have found one mention of transaction costs, when he stressed that the optimal solutions ignored "the administrative costs and other transaction costs—notably the costs of acquiring information to administer an optimal pricing system" (Dales 1968b, p. 802).

<sup>31</sup>This kind of institutional comparison of policies, based on costs, was also provided by Kneese (1964). Nishibayashi (2019) and Medema (2014) both stressed Coase's influence on Kneese regarding this issue. Even if Dales did not acknowledge it, it could have played a part.

<sup>32</sup>The costs of reaching a market equilibrium, or the costs of price adjustments, are not administrative costs—here, the public authorities administer only the quantity issued. They are closer to intrinsic transaction costs.

*Baumol and Oates's Skepticism Regarding the Permits Market*

On the side of the standard-and-tax proponents, things are different. Baumol and Oates did not discuss or evoke the permits market idea in their 1971 paper, and they did not even mention Dales's work. It is possible that they did not know about it in 1971, but this was no longer the case after 1972 when Baumol (1972) briefly referred to it, for the first time, as "an earlier proposal which is very similar in spirit" (p. 313). But this was only in a single phrase, relegated to a footnote. A few years later, in Baumol and Oates's (1975a) textbook, the idea of permits market still was mentioned only in passing, in two footnotes,<sup>33</sup> and not set out, despite the publication in the meantime of Montgomery's (1972) contribution (which was also not mentioned). So they knew that Dales's proposal could, from a theoretical point of view, achieve the same cost-effectiveness as their tax system, but they neither discussed nor criticized it. Given the comprehensiveness of Baumol and Oates's 1975 book, this omission seems quite strange.

That same year they published a paper entirely devoted to the spectrum of available policies for pollution control (Baumol and Oates 1975b). The permits market proposal was again consigned to a footnote, with Dales not even mentioned. But the footnote was more enlightening regarding the reasons why they treated this idea so cavalierly: "The auctioning of pollution rights could be added here. However, considering the major environmental problems before us, the practicality of the proposal seems to us rather limited" (p. 97). And indeed, this is the more plausible explanation of their systematic relegation of Dales: they simply did not consider the idea seriously, regarding it as unworkable. Oates would later, at several times, suggest: "my first reaction to the appearance of Dales' work was one of skepticism" (Oates 2000, p. 142); and in his foreword to the re-edition of Dales's book in 2002, "I must admit that when I first read the Dales' essay, although I found the basic economics of the argument quite sound, I simply shook my head when thinking about the political feasibility of the proposal" (Oates 2002, p. viii). It is interesting to notice that Oates was not skeptical regarding its technical workability but rather that his argument was mostly political: the environmentalists were strongly opposed to the use of taxes at that time, considering it immoral, and Dales's proposal in such a context seemed to him politically unacceptable.<sup>34</sup>

It was only in 1979, more than a decade after its publication, that Dales's contribution was really discussed by Baumol and Oates. In their second book, *Economics, Environmental Policies and the Quality of Life* (1979), they stressed that in principle, both tax and market solutions are equivalent, and they provided some elements of comparison, all very pragmatic.<sup>35</sup> But contrary to Dales or Montgomery, they did not engage in a

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This may be why Dales did not mention them. Besides, he clearly shows a strong faith in market efficiency and its smooth functioning.

<sup>33</sup>The first footnote refers to Dales (1968a) and his "auction of pollution 'rights' as an alternative to taxes" (Baumol and Oates 1975a, p. 137), and the second stresses that a permits market "offers the same advantages in cost minimization" (ibid., p. 137).

<sup>34</sup>"I had found myself subjected to harsh criticism in various forums for proposing a pricing approach to environmental regulation. As I mentioned earlier, some critics regarded the whole idea as basically immoral. And here comes Dales pushing the point yet harder—he was advocating that we effectively put the environment up for sale!" (Oates 2000, p. 142).

<sup>35</sup>First they stressed that besides also being cost-efficient, the permits market is, like the standard-and-tax approach, "dependable, because it is relatively automatic and routine. ... It is permanent: so long as it is not explicitly repealed, discharges will continue to be illegal without a permit. It is equitable in the sense that it

comparison of the administrative or transaction costs involved. Like Martin Weitzman (1974), they focused rather on the two different kinds of uncertainty involved (uncertainty on the quantity with a tax, or on the price—that is, on the cost that will finally bear on society—with a market). Finally, for policy makers, the choice “may then be a matter of which risk constitutes the greater danger” (Baumol and Oates 1979, p. 253).

So compared with 1971 or 1975, they had changed their minds<sup>36</sup> but did not have a well-entrenched opinion, and rather sought a balance between the two solutions or, more precisely, between all the available policies. Even if they favored the use of taxes, they always remained pragmatic, since “there is no one approach or one technique that is best suited to deal with all problems in all circumstances. There is no panacea, no one simple method, that is always best (or even always workable)” (Baumol and Oates 1979, p. 229). It is pertinent to stress that they again raised the issue of the political attractiveness of the market solution, a point that echoes Oates’s later acknowledgment of his early skepticism about the proposal: “In sum, if the public and government officials can ever be weaned from the idea that auctioning pollution permits is a wild, ivory scheme, they may find that the device has a good deal to recommend it” (Baumol and Oates 1979, p. 251). But they immediately balanced this opinion: “it does not seem to have a high degree of political appeal. Noneconomists usually regard it as an impractical and cumbersome product of the convoluted minds of academia” (*ibid.*, p. 252).

Dales, Baumol, and Oates thus all stressed the theoretical equivalence of their solutions, and all favored their own proposals on pragmatic grounds. But they did not focus on the same issues: Dales focused on the administrative costs involved in each solution, in a very Coasean institutional comparison, even if he singularly did not take into account all the transaction costs involved by his permits market; Baumol and Oates focused on the kind of uncertainty (on price versus quantity) involved in the real world where marginal abatement costs are not perfectly known, an argument that would become a standard element of comparison between the two instruments.

## VI. CONCLUDING REMARKS

The two policy proposals belong to what today are regarded as two different traditions. Baumol and Oates followed the Pigovian tradition, or more broadly the new welfare economics; Dales followed the Coasean tradition, or more precisely the property rights school, since, as stressed above, the permits market idea did not owe a lot to Coasean bargaining. They are sometimes contrasted regarding State intervention, the use of taxes being associated with government intervention, and the permits market with free-market environmentalism. And from a theoretical point of view, the two policies are nowadays contrasted within the “price versus quantity” debate. Nevertheless, there are important

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requires polluters to pay for their waste emissions. ... It is potentially (but is not now in fact) attractive politically because, like fees, it brings money into the treasury” (Baumol and Oates 1979, p. 251). They also underlined some advantages of the permits market, e.g., its invulnerability to inflation and the easy adaptation of market prices to economic and emissions growth.

<sup>36</sup>This change was probably due to the diffusion of Dales’s proposal in the literature in the meantime, and to the first use of emissions offsets in the 1977 Clean Air Act Amendments (Oates 1990), which allowed the transfers of permits among existing and new sources.



similarities between the approaches, which emerged at the same time in order to address the same issues, and this paper thus offers a more nuanced analysis.

First, they expressed a common determination to “rationalize,” through the introduction of prices—whether administrative or market prices—traditional regulation, which was regarded as inefficient. Baumol and Oates’s affirmation when they presented their solution was unequivocal: “there is a fairly obvious way, however, in which one can avoid recourse to direct controls and retain the use of the price system as a means to control externalities” (Baumol and Oates 1971, p. 44); and exactly the same could have been asserted by Dales. Second, these solutions were presented by their advocates as a means to avoid the information problem of the Pigovian approach that dominated the economic literature at the time and, more largely, optimal solutions. Dales, Baumol, and Oates were all skeptical regarding the possibility of pricing pollution damage, especially the “intangible” costs, and criticized the “fairly esoteric marginal net damage calculation” (Baumol and Oates 1971, p. 44) or “optimal solutions laid in Heaven” (Dales 1968b, p. 802). Their common search for a compromise between traditional regulations and optimal taxes had an important implication. It led them to give up any claim to Pareto-optimal schemes and to accept a trade-off between “theoretical nicety” and workability. As a consequence, this led them to accept the level of externality—here, the pollution levels or standards—as being a political decision, left to the public authorities. So they chose to rely on political rather than on individual sovereignty.

Finally, this choice was made on practical grounds. Their contributions were applied, not only in the sense of adapting an existing framework to specific issues—here, pollution issues—but also in the sense of providing a practical guide for policy makers.<sup>37</sup> More broadly, their pragmatic solutions partook of the move towards applied economics since the end of the 1960s (Backhouse and Cherrier 2017). As stressed by Banzhaf (2017), regarding the early debates on contingent valuation, there were different reactions to the lack of data, and different ways to manage the difficulties raised by quantification and the monetization of costs or benefits: trying to provide the missing data—i.e., to price the unpriced—or trying to get along without it. Contributions on new methods of valuation would increase from the 1970s (see Cropper and Oates 1992 for a survey of the early progress made on contingent valuation, willingness to pay, etc.). Dales, Baumol, and Oates suggested another way: they did not choose to work on new methods or to improve existing methods to price the damage but rather chose a circuitous path. And in so doing, they posed a more wide-ranging challenge to the role of economists in the making of social choices.

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<sup>37</sup>Roger E. Backhouse and Jeff Biddle (2000) underlined the polysemy of the term “applied economics” that can refer to the tailoring of theory to specific issues, to the use of theory to explain specific data, or to the design of public policies or business strategies. The last meaning is the most relevant here.

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