

The Coase Theorem at Sixty[†]

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The Coase theorem is one of the most influential and controversial ideas to emerge from post–World War II economics. This article examines the theorem’s origins, diffusion, and the wide variety of uses to which it has been put by economists and others over the sixty years since Coase published “The Problem of Social Cost.” Along the way, we explore the ambiguity and controversy surrounding the theorem, develop a Coase theorem that is valid as a proposition in economic logic, and probe the implications of all of this for the use of the Coase theorem going forward. (JEL D23)

Harry Johnson said next day when I saw him at the Quadrangle Club at lunch-time that he understood that I had shown his colleagues that the market could operate in a sphere where they thought it could not, something which Harry Johnson added was very hard to do at Chicago.

—Ronald Coase to George Priest, January 26, 1983¹

an important test of what a man meant is what his friends and disciples believed he said ...

—George Stigler to Paul Samuelson, June 13, 1977²

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¹ Coase, Ronald. Papers. Box 31, Folder 12. Special Collections Research Center, University of Chicago Library, Chicago, IL.

² Stigler, George J. Papers, Box 12, Special Collections Research Center, University of Chicago Library.

1. *Introduction*

The Coase theorem sits at once among the most influential and the most controversial ideas in the post–World War II history of economics.³ Born out of the economic theory of externalities, its reach now extends to virtually every subfield of economics and of law and, indeed, to fields of study across the academic spectrum and literatures around the globe. Yet, its validity as a proposition in economic logic was for many years a bone of significant contention and, even today, is by no means universally accepted. The theorem’s relevance to real-world problems, too, is highly contested. Some have suggested that it should be the default for externality policy analysis (e.g., Turvey 1963), while others would restrict its applicability to a “transactions costs-free fairyland” (Randall 1975, p. 741). It was Coase’s University of Chicago colleague, Stigler, who provided the moniker by which Coase’s (1960) negotiation result has come to be known—curiously enough, in his textbook, *The Theory of Price* (1966, p. 113). As this year marks the sixtieth anniversary of Coase’s development of his negotiation result, it seems an appropriate time to take stock of its place in economic analysis.

It would be standard at this point to make a statement of *the* Coase theorem, but that is rather problematic. Though one would be hard pressed to find an economist who could not provide a statement of the theorem, assembling a collection of such statements would reveal a variety of opinions on the theorem’s contents—specifically, the assumptions underlying it and the claims made by

it. In fact, some economists subscribe to versions of the theorem that others consider to be demonstrably false. The same cannot be said of the other famous “theorems” of economics—theorems that, as it happens, feature far less prominently in the literature than does the one that bears Coase’s name (figure 1). To understand how we arrived at this position requires an exploration of the theorem’s history, which we shall undertake in some detail. This history will also point the way to a Coase theorem that is valid as a proposition in economic logic. For those impatient to know how the story turns out, we shall state that Coase theorem here before moving on to an analysis of how we have arrived at this particular delineation of it.

THEOREM: *If agents are rational and the costs of transacting are zero, resources will be allocated efficiently independent of how rights over those resources are initially distributed. Moreover, if utility functions are uniformly affine in private goods and the registration of subjective values is not wealth-constrained, this efficient allocation of resources is independent of the initial rights structure.*

When Coase, then a member of the University of Virginia economics faculty,⁴ wrote “The Problem of Social Cost” (1960), providing a critique of the received theory of externalities, he did not intend to offer the world a theorem. He did not even consider the proposition we now know as the Coase theorem to be the article’s central insight. His discussion of negotiated solutions to externalities was little more than a convenient fiction designed to show the error of the equally fictional (in his mind) Pigouvian tradition and to point the way toward a very

³The literature on the Coase theorem is voluminous. For overviews of the theorem from a variety of perspectives, see, for example, Cooter (1982), Zelder (1998), Schwab (1989), Medema and Zerbo (2000), and Parisi (2008), as well as the essays reprinted in Posner and Parisi (2013). Robson (2012, chap. 3) provides a very nice formal treatment of the subject. Coase’s own retrospective views are most expansively laid out in Coase (1988b, chap. 6).

⁴Coase did not move to Chicago, to take up a position in the Law School, until 1964.

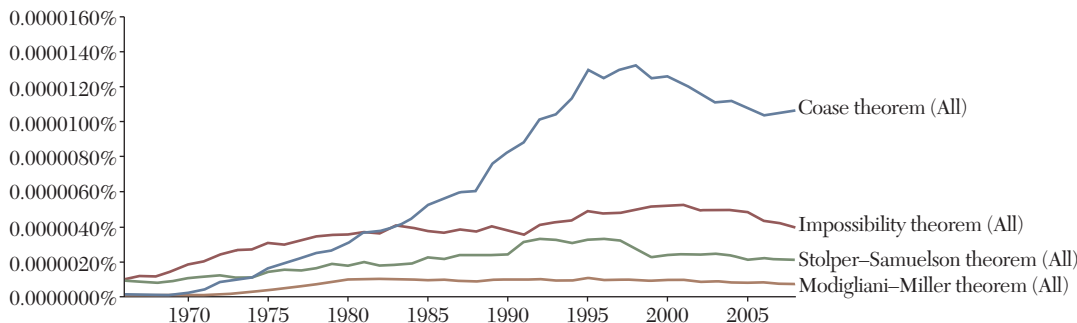


Figure 1. N-Gram of Citations to Famous Theorems in Economics, 1966–2008

Source: books.google.com/ngrams, English language, accessed January 5, 2015. See the online appendix that accompanies this paper for more about this source.

different approach to thinking about externality theory and policy—a comparative institutional approach grounded in the reciprocal nature of externalities and the costliness of coordination, to which he devoted roughly two-thirds of his article. In fact, Coase penned not another word on his negotiation result for two decades.⁵ What we now know as the “Coase theorem” is very much a creation of the community of economists and legal scholars who undertook to analyze and apply Coase’s insight.

The Coase theorem is, by any number of measures, one of the most curious results in the history of economic ideas. Its development has been shrouded in misremembrances, political controversies, and all manner of personal and communal confusions and serves as an exemplar of the

messy process by which new ideas become scientific knowledge. There is no unique statement of the Coase theorem; there are literally dozens of different statements of it, many of which are inconsistent with others and appear to mark significant departures from what Coase had argued in 1960. A small subset of these are presented in subsection 4.3.2. The theorem has never been given a generally accepted formal proof; yet it has been the subject of scores of attempts to “disprove” it in a stream of analysis and debate that continues to this day. It has been labeled a “tautology” and the “Say’s law of welfare economics” (Calabresi 1968, pp. 68, 73), an “illuminating falsehood” (Cooter 1982, p. 28), and even a “religious precept” (Posin 1993, p. 810). Halpin (2007, p. 339) calls the theorem “theoretically degenerate . . . and ideologically charged.” Usher (1998, p. 3) bundles these various charges together, claiming that the theorem is “tautological, incoherent, or wrong,” with the specific verdict resting upon to which version of the theorem one subscribes. The skepticism about its status as a “theorem” is reflected in the various alternative labels put on it in the literature: the “Coase conjecture” (Stiglitz 2000, p. 1458; Chipman and

⁵Coase (1970) did provide a summary of “The Problem of Social Cost” a decade after its publication, but his next commentary on the negotiation result came in Coase (1981), reacting to one of the many attempted refutations of the Coase theorem. It bears mentioning that Coase was the editor of the journal in which both this critique and his reaction were published—the *Journal of Law and Economics*—and, in fact, Coase published a host of articles that took up the negotiation result during his lengthy tenure as editor, thus participating indirectly in the debates over the theorem and its diffusion in the literature.

TABLE 1
AVERAGE ANNUAL CITATIONS TO THE “COASE THEOREM” IN ECONOMICS AND LAW
JOURNALS, 1960–2014

Years	Economics	Law
1960–69	0.20	0.20
1970–79	11.20	12.20
1980–89	19.80	59.40
1990–99	33.90	108.90
2000–2009	36.70	122.70
2010–14	33.40	124.40
Total citations	1,391	4,860

Notes: The economics citation count given here includes only JSTOR journals and so significantly understates the number of citations to the theorem in the economics literature during this period. The Hein database includes virtually all law journals and so provides accurate totals for that literature. It should also be noted that the data provided here include only references to the “Coase theorem.” Given that the term “Coase theorem” took some time to catch on, there are many references to Coase’s result, particularly in the 1960s and 1970s, that are not captured in this table. The analysis that follows, however, takes up the broader literature on Coase’s result.

Sources: Economics: dfr.jstor.org, accessed December 3, 2018; Law: heinonline.org, accessed August 19, 2017.

Tian 2012, p. 322),⁶ the “Coase proposition” (Samuelson 1995, p. 1), the “Coase hypothesis” (Conley and Smith 2005, p. 688), and the “Coase parable” (Ackerman 1983, p. 1104).

The nature of the theorem’s underlying assumptions is often said to make its domain of direct applicability nil; yet, it has been invoked, criticized, and applied to legal-economic policy issues in thousands of journal articles and books in economics and law (see table 1), as well as in journals spanning fields from philosophy (Hale 2008) to literature (Minda 2001) to biology (Frech 1973a). Indeed, the Coase theorem may be the only economic concept the use of which is more extensive outside of economics than within it. Though it is a positive statement

without direct normative implications, it was both used as a justification for the application of economic principles in judicial decision making and viewed as an early salvo in what many perceive as a “Chicago school”-driven neoliberal turn of economics—the last despite the fact that the theorem’s diffusion into the legal literature, at least, originated from well outside of (and, one could argue, to the left of that popularly associated with) Chicago and nearly a decade prior to the rise of “Chicago” economic analysis of law (Medema 2014d). It has been derided from one side as conservative ideology and from the other as liberal ideology.⁷ Like Adam Smith’s “invisible hand” proposition (Smith 1976 [1776], sec. 4.2.9), it was arguably a rather minor point in the author’s work

⁶The “Coase conjecture” terminology is more typically associated with Coase’s (1972) argument regarding durable goods monopoly.

⁷Contrast, for example, Samuels (1974), Kelman (1979), and Teles (2008) with Block (2003) and North (2002).

but took on a life of its own in the hands of subsequent commentators.

Understanding the place that the Coase theorem occupies within economic analysis today requires that we first train our lens on the past. We begin in section 2 with an overview of the road that led to the writing of “The Problem of Social Cost.” Section 3 presents a brief discussion of Coase’s original statement of his result and Stigler’s subsequent codification of it, as well as its early diffusion into the literatures of economics and law. A good deal of the ambiguity surrounding the theorem is the result of several major controversies over it that emerged in the late 1960s and reached a crescendo in the 1970s and 1980s, and these are taken up in section 4. Here, we will also draw on the results of these controversies to state a valid Coase theorem and assess what that means for the uses to which the theorem is put. Much of the more recent literature has focused on the theorem’s domain of applicability. One aspect of this has been a wide-ranging set of “tests” of the theorem, through experiments, case studies, and econometric analyses. These are discussed in section 5. Section 6 examines some of the most significant among the myriad ways that the theorem’s insights are being applied in the literature—applications that extend far beyond its original base in externality theory proper. The concluding section provides a brief assessment of the implications of our discussion for the place of the Coase theorem in modern economic analysis.⁸

⁸It is impossible to contemplate the Coase theorem’s history without some attention to its influence within the legal arena. While that literature is far too vast to discuss at any length here, the analysis that follows will draw on the legal literature to the extent that it is relevant to our analysis.

2. *The Road to the Coase Theorem*

“The Problem of Social Cost” was written against the backdrop of the post–WWII theory of externalities and as an attack on the “Pigouvian tradition” that this literature was said to reflect. In reality, however, the externality literature was extremely thin during the four decades following the publication of Pigou’s *The Economics of Welfare* (1920), and such discussion as took place was not targeted at the analysis of externalities per se, nor at policy measures to deal with them. Instead, the focus was on the efficiency properties of a competitive equilibrium system; externalities were simply one of the factors shown to impede the attainment of the theoretical optimum (Medema 2020b).⁹ Externalities themselves were generally considered, as Scitovsky (1954, p. 143) put it, “exceptional and unimportant.” It was only in the latter half of the 1950s that economists began to turn their attention to externality problems, and even then the support for Pigouvian remedies was mixed, at best. Tax-subsidy, single-owner, and negotiated solutions all figure in this literature, with Coase’s former student, London School of Economics and Political Science’s (LSE) Ralph Turvey (1957, p. 94–99), laying out a result remarkably similar to that which Coase would set down not long thereafter.

The path that led Coase to his negotiation result and to writing “The Problem of Social Cost” was anything but direct. When he returned to LSE following the war, his research efforts were focused primarily on case studies of regulated industries in Britain—including the broadcasting

⁹The term “externality” did not appear in the literature until Francis Bator used it in the late 1950s (Bator 1957). Coase, for his part, never used the term, believing that it implied the need for some sort of state action—a proposition that he rejected.

industry.¹⁰ Coase continued his study of the political economy of broadcasting after emigrating to the United States in the early 1950s, eventually turning his attention to the US Federal Communications Commission (FCC) and its fiat-based method of allocating broadcast frequencies. It was out of this work that his negotiation result originally emerged.

Coase was not the first to advocate use of the market for the allocation of broadcast frequencies. Herzel (1951) had done so nearly a decade earlier, but his analysis was not dispositive of the issue, as he did not account for interference externalities and the attendant inefficiencies. Coase's contribution was to demonstrate that private property rights in frequencies would eliminate these interference problems and that the market process would place those rights/frequencies in the hands of agents who valued them most highly (Coase 1959, pp. 25–31). He recognized that large numbers problems, incomplete information, and the like may make such negotiations cost-prohibitive in many circumstances, thus strengthening the case for regulation (1959, p. 29). But even in those instances where regulation was necessary, Coase argued, “the solution to be sought is that which would have been achieved if the institution of private property and the pricing mechanism were working well”—in short, mimicking the market (1959, p. 29). His message, above all, was that the FCC should at least *consider* allocating frequencies through the marketplace, and he was convinced that his analysis had demonstrated that the market could deal efficiently with the potential conflicting-use

problems that were thought to pose a barrier to such an approach.¹¹

When Coase submitted the FCC paper to the *Journal of Law and Economics* in 1959, its editor, Aaron Director, disagreed with Coase's conclusions regarding exchange-based solutions to the interference-externality problem, a sentiment apparently echoed by other members of the Chicago faculty to whom Director showed the paper. The objection stated by Director was that if producers of harm are not made liable, costs will not be properly internalized and an inefficiently large amount of the harm-associated good will be produced.¹² Director thus urged that this section of the paper be removed. Coase flatly refused and also asked for the opportunity to defend his position to the Chicago faculty. This defense, which has been described by Stigler, took place in Director's home and converted those assembled—a group that included Director, Stigler, Milton Friedman, Arnold Harberger, Martin Bailey, H. Gregg Lewis, and a dozen others—to Coase's position. Stigler later described the evening in vivid terms:

At the beginning of the evening we took a vote and there were twenty votes for Pigou and one for Ronald, and if Ronald had not been allowed to vote it would have been even more one-sided. The discussion began. As usual, Milton did much of the talking. I think it is also fair to say that, as usual, Milton did much of the correct and deep and analytical thinking. I cannot reconstruct it. I have never really forgiven Aaron for not having brought a tape recorder that night. He should have known this was going to be a great event because he is a wise man. My recollection is that Ronald didn't

¹¹ On Coase's FCC paper and its influence, see Hazlett et al. (2011). Herzel (1998) provides a retrospective commentary on his own contribution.

¹² The objection to Coase's result has commonly been attributed to Reuben Kessel (Kitch 1983). However, correspondence between Coase and Director makes clear that the disagreement was, from the outset, more widespread and included Director himself (Director to Coase, August 2, 1959 and Coase papers, Box 21, Folder 6).

¹⁰ Coase's research trajectory is described in Medema (1994). Ménard and Bertrand (2016) have assembled an excellent collection of essays assessing Coase's work and its influence.

persuade us. But he refused to yield to all our erroneous arguments. Milton would hit him from one side, then from another, then from another. Then to our horror, Milton missed him and hit us. At the end of that evening the vote had changed. There were twenty-one votes for Ronald and no votes for Pigou. (Kitch 1983, p. 221)¹³

It was Al Harberger who first realized that Coase's argument was going to carry the day,¹⁴ but it was Stigler who, at the end of the evening "went home with what he thought was a new theorem" (McCloskey 1998, p. 367). Director then urged Coase to write up his argument in a more general and expansive form, and the article that resulted was "The Problem of Social Cost."

While it is a commonplace to make the Coase theorem the centerpiece of "The Problem of Social Cost," nothing could be further from the truth. The article makes three basic points. First, externalities are reciprocal in nature. Yes, *A*'s actions impose costs on *B*, but to restrain *A* in favor of *B* imposes costs on *A*. The *economic* problem, Coase emphasized, is to avoid the more serious harm. This, as we shall see, may actually be the most controversial aspect of the article—and of the theorem. Second, if the pricing system works costlessly and rights are assigned over the relevant resources, agents will negotiate a solution that maximizes the value of output, and this outcome will be reached irrespective of to which party those rights are assigned—the idea that came to be known as the Coase theorem. But the negotiation result was merely a means to an

end—a useful fiction to illustrate what Coase considered "the emptiness of the Pigovian analytical system" (Coase 1993, p. 252–53).¹⁵ In the frictionless world of welfare economics circa 1960, the negotiation result shows that Pigouvian remedies are completely unnecessary for an efficient resolution of externality problems. Third, in the real world of positive transaction costs, all coordination mechanisms—markets, firms, and government—are costly and imperfect, meaning that there is no route to the optimum. The best that we can do is to choose among imperfect alternatives—including doing nothing at all about the problem (Coase 1960, p. 18–19).¹⁶ Comparative institutional analysis, then, becomes the method of choice, and the goal, from an economic perspective, is to select the coordination mechanism that maximizes the value of output for the problem under consideration. As Coase (1988, 1992) took pains to emphasize later in his career, the negotiation result is the least of these points and, in fact, occupied only 14 of the article's 44 pages.¹⁷ His message, then, was a call to move away from the frictionless world that he soon thereafter labeled "blackboard economics" (Coase 1964, p. 195). But this was not the message that economists and others seized upon.

¹⁵ For a variety of perspectives on Coase versus Pigou, united in the sense of suggesting that Coase's take on Pigou's work was not wholly accurate, see Simpson (1996) and Coase's (1996) response, DeSerpa (1993), Aslanbeigui and Medema (1998), and Hovenkamp (2009).

¹⁶ Coase's emphasis on coordination costs, including "firm" or single-owner solutions to externality problems, makes "The Problem of Social Cost" of a piece with his other most well-known article, "The Nature of the Firm" (Coase 1937). These two articles share the basic thrust of contrasting a frictionless world with the real world of costly coordination and the demonstration of how economic outcomes are institution-independent in the former world and institution-dependent in the latter.

¹⁷ For discussions of the place of the negotiation result in Coase's analysis, see, for example, Coase's retrospective comments in Coase (1988, 1992), Medema (2009, chap. 5), McCloskey (1998), and Bertrand (2010).

¹³ See also Stigler (1988). In fact, there were no votes taken, but Coase has indicated that Stigler's hyperbole is an accurate representation of the flavor of the evening (Letter from Coase to Joseph A. Morris, March 3, 1993, Coase papers, Box 30, Folder 2). The debate apparently included the shuffling around of chairs to represent property rights—a form of argumentation not typical of the economics seminar room.

¹⁴ Letter from Coase to George Priest, January 26, 1983. Coase Papers, Box 31, Folder 12.

3. *Coase, Stigler, and the Creation of a Coase Theorem*

The Coase theorem derives from Coase's now-famous illustration involving a rancher whose cattle trample a neighboring farmer's crops. Coase demonstrated via a simple numerical example that the rancher and the farmer would negotiate their way to the outcome that maximizes the value of their joint output, regardless of to which of the agents the relevant property rights were assigned. When wrapping up this analysis, Coase drew the following conclusion:

It is necessary to know whether the damaging business is liable or not for damage caused since without the establishment of this initial delimitation of rights there can be no market transactions to transfer and recombine them. But the ultimate result (which maximises the value of production) is independent of the legal position if the pricing system is assumed to work without cost. (Coase 1960, p. 8)¹⁸

This is as close as Coase came to a statement of what we now call the Coase theorem.

Coase made only three explicit assumptions in arriving at his conclusion. First, the agents involved—Coase's farmer and cattle rancher—sell their outputs in perfectly competitive markets (1960, p. 6). Second, the pricing system works “without cost” (1960, p. 2) or, as he put it later in the article, there are “no costs involved in carrying out market transactions” (1960, p. 15). Finally, Coase assumed the existence of an initial assignment of legal rights over the relevant resources, on the grounds that the presence of such rights was necessary to induce negotiations.

Given these assumptions, Coase asserted two things. First, the allocation of resources that emerges will be efficient, in the sense

¹⁸This is a virtually verbatim restatement of Coase's conclusion in his 1959 article. See Coase (1959, p. 27).

of maximizing the value of output. We shall label this the “efficiency claim.” Second, the decision as to which of the parties' property rights are initially assigned will not affect the final allocation of resources. We shall label this the “invariance claim.”¹⁹

The earliest reactions to Coase's analysis came out of LSE and the Universities of Virginia and Chicago—that is, from within what was at that time the relatively small orbit of the recently founded *Journal of Law and Economics*, and the group of people who were otherwise well-acquainted with Coase and his work.²⁰ Perhaps not surprisingly, the voices were almost uniformly accepting of the negotiation result, and this early literature evidences little hint of the controversy that was to come.²¹ What might surprise, though, is the reason for this affirmation—the result's familiarity. Mishan tells us that, “To the best of my memory, this theorem was common knowledge in the London–Oxford–Cambridge graduate seminar, 1947–8 which included then, as students, Baumol, Graaf, Hahn, Turvey,

¹⁹It is sometimes asserted that Coase was referring to *equally efficient* outcomes rather than identical outcomes, but Coase (1960, p. 2–15) was very clear in his insistence on identical allocations.

²⁰These schools were, of course, Coase's past, present, and future academic homes.

²¹See, for example, Buchanan and Tullock (1962), Buchanan and Stubblebine (1962), Buchanan and Kafoglis (1963), Turvey (1963), and Davis and Whinston (1965). Samuelson (1963) and Wellisz (1964) sounded more critical notes. Samuelson took up Coase's result only in passing but made no bones about his dim view of it:

The view that R. Coase has shown that externalities—like smoke nuisances—are not a logical blow to the Invisible Hand and do not call for coercive interference with laissez-faire is not mine. I do not know that it is Coase's. But if it had not been expressed by someone, I would not be mentioning it here. Unconstrained self-interest will in such cases lead to the insoluble bilateral monopoly problem with all its indeterminacies and non-optimalties (1963b, p. 132n).

Wellisz was on the Chicago faculty when he wrote his defense of Pigou against Coase—into which Lester Telser had significant input—but had moved to Columbia by the time it was published.

and myself” (Mishan 1976, p. 288n1).²² We also find a remarkably similar proposition in Turvey’s analysis of property (1957, pp. 94–99), as noted above, and even a small hint in Graaf’s influential treatise on welfare economics (1957, p. 61).²³ Buchanan, meanwhile, found Coase’s “proposition,” as he called it, “almost self-evident” when Coase presented it at Virginia in the late 1950s and even 30 years later could recall the “surprise felt when Coase reported back to us about the controversial reaction to his presentation of the theorem at the University of Chicago” (1988b, p. 11–12). In fact, the line of thinking reflected in Coase’s negotiation result was very much in the air at Virginia during the late 1950s and early 1960s and is central to Buchanan and Tullock’s analysis in *The Calculus of Consent* (1962).

Stigler’s subsequent interpretation of Coase’s finding, which he codified as the “Coase theorem,” appeared in the third edition of his *Theory of Price* (1966). It was much more tersely stated than Coase’s original formulation, calling to mind both the discussion of externalities in the literature of the 1940s and 1950s, which Stigler had treated at some length in earlier editions of his price theory text,²⁴ and the first fundamental theorem of welfare economics:

The Coase theorem ... asserts that under perfect competition private and social costs will be equal. (Stigler 1966, p. 113)

²²A similar claim has been made by Cooper (1995, p. 30).

²³Turvey (1957, p. 95n.2) attributed this insight to Arnold Plant, who was also Coase’s mentor during his student days at LSE. Unfortunately, Plant’s published work and archives yield no further clues.

²⁴Given the lack of attention to externalities in the literature prior to the 1960s, Stigler’s text was unusual in this regard.

In Stigler’s hands, no explicit assumptions save that of perfect competition were necessary.²⁵

The reason(s) behind Stigler’s decision to codify Coase’s result as the “Coase theorem” and to state it as he did are unknown, and even Stigler’s extensive archive at the University of Chicago offers up no clues. But two possibilities suggest themselves. Stigler obviously was enamored of Coase’s result, as he made clear in multiple subsequent commentaries (e.g., Kitch 1983, pp. 220–21; Stigler 1988, chap. 5)—going so far as to label Coase a modern-day Archimedes. His decision to apply the “theorem” label may thus be nothing more than a Stiglerian provocative rhetorical flourish—one of many in the Stigler corpus. But there was more likely a method to Stigler’s madness—a desire to elevate Coase’s result to the level of a corollary to the first fundamental theorem of welfare economics, which explicitly assumed away external effects.²⁶ The Coase theorem, so read, was not so much a prescription for dealing with externalities as a rationale for not worrying about them, since the forces of competition would often eliminate this impediment to efficiency.

These early discussions of Coase’s result had the effect of exposing it to a much wider audience, as a result of which it received far more attention in the literature during the second half of the decade.²⁷ Some concerns regarding the validity of Coase’s argument

²⁵It may be that Stigler interpreted perfect competition to include zero costs of transacting and an assignment of relevant property rights, but he is not explicit on this point. For in-depth analyses of Stigler’s several discussions of the Coase theorem, see Medema (2011) and Bertrand (2018).

²⁶We shall return to the relationship between the Coase theorem and the first fundamental theorem in section 4, below.

²⁷It is difficult to discern the extent of Stigler’s influence on the theorem’s diffusion. His textbook treatment was not regularly cited in the Coase theorem literature, but citations to textbooks are themselves extremely rare in scholarly articles.

began to emerge during this time, but the attitude was largely one of acceptance—though generally with an acknowledgment that it was largely irrelevant to the problems the authors were considering, owing to the prevalence of transaction costs (Medema 2014a).

The appearance of Coase's result in the *legal* literature dates to the mid-1960s, well before the modern economic analysis of law had entered the larger legal consciousness. It is noteworthy, though, that this entry point came not at the hands of economists, but of two of Coase's new colleagues at the University of Chicago Law School—Walter Blum and Harry Kalven (1964)—who were critical of Coase's result and its utility for legal analysis. Yale law professor Guido Calabresi, who in 1961 had suggested that the competitive market process could efficiently internalize externality-related harms associated with accidents and spent the middle third of the decade engaged in a debate with Blum and Kalven over the insights that economics could offer the analysis of accident law (Marciano and Medema 2019), had a much more positive view of Coase's result, however. The use made of it by Calabresi and by his students played a significant role—well beyond that of Chicago—in the early diffusion of the theorem into legal analysis (Medema 2014d).²⁸

The bit part played by the Coase theorem in economic and legal analysis during the 1960s provided little indication of the controversy just over the horizon or the central place that

the theorem would come to occupy in these literatures over the ensuing decades. In fact, the theorem might well have had very little impact on either economic or legal reasoning were it not for the larger forces within which it became enmeshed.

4. Refining a “Theorem”: The Coase Theorem Controversy

Though a few voices questioning the Coase theorem were heard during the 1960s (Medema 2014a), it was the 1970s that brought an explosion of controversy over the theorem—one that continues, albeit somewhat abated, to this day. The early years of the controversy featured a series of debates, played out over some two decades in the profession's leading journals, regarding the theorem's validity as a proposition in economic logic. The typical progression in the literature was that of “disproof” by opponents of the theorem, often with an accompanying defense of Pigouvian approaches, followed by attempts by theorem supporters to defend it against the supposed disproof—usually by claiming to show the error of the disproof in question, though at times by modifying the theorem itself. Indeed, one of the defining features of the Coase theorem literature is the tremendous amount of effort that has been expended attempting to prove that it is *not* valid. To understand how we arrived at the present position, then, it is necessary to wade into this series of punches and counterpunches. This is anything but a merely antiquarian exercise, as these debates went a long way toward making explicit the assumptions necessary for a valid Coase theorem. As we shall see, much of this has to do with the definition of transaction costs and the nature of life in a world in which they are absent.

The respective statements by Coase and Stigler were both the launching point for subsequent restatements of the theorem and suggestive of one of the fundamental

²⁸Calabresi had significant formal training in economics as an undergraduate at Yale and a graduate student at Oxford. Some would say that his 1961 article, “Some Thoughts on Risk Distribution and the Law of Torts” (Calabresi 1961), states a version of the Coase theorem. See also Calabresi (1965a; 1965b), as well as Medema (2014e). Benjamin Klein reports that, while visiting the University of Chicago Law School in the mid-1970s, he encountered a group of students “who had never heard of the Coase theorem,” which came as a shock to him because at that time there was “no way you [could] go through the University of California, Los Angeles, law school and take a course in torts without hearing about the Coase theorem” (Kitch 1983, p. 223).

contrasts found in the Coase theorem literature—the larger framework within which the theorem is situated. Coase posited a scenario of small-numbers bargaining—each of his illustrations deals with only two agents—while Stigler’s formulation, if not his actual textbook illustration,²⁹ suggested to some a proposition in the theory of competitive markets. Thus, we find the Coase theorem’s prospective scope extending from the farmer and the rancher through a large-scale system of pollution permits within a Walrasian setting.³⁰ The potentially very different implications of these two frameworks for the modeling strategies employed and for the conclusions reached have factored heavily into the debates over the theorem’s validity.

We shall begin our analysis of the Coase theorem controversy by discussing the challenges to the theorem’s efficiency claim and then address those leveled against the claim of invariance—recognizing, of course, that these arguments are at times intertwined in this literature and that if the efficiency claim fails, the invariance claim falls with it.

4.1 *The “Efficiency Claim”*

To understand the challenges raised against the Coase theorem’s twin claims, it is important to bear in mind that the theorem’s critics and defenders were typically reacting to Coase’s 1960 formulation of his result. With this in mind, it is helpful to restate Coase’s efficiency claim as follows:

If the costs of transacting are zero, resources will be allocated efficiently independent of how rights over those resources are initially distributed.

²⁹Stigler (1966, pp. 110–14) followed Coase in positing a two-agent (farmer–rancher) bargaining process, but two-agent competitive models were a staple of the (thin) externality literature of the 1940s and 1950s.

³⁰On the latter, Cooter (1982, pp. 9–12) is particularly instructive. Bramhall and Mills (1966) provide the first explicit analysis of Coase’s result in a competitive markets context.

We will consider the various objections raised against the efficiency claim in turn, beginning with those assessing the Coase theorem in a competitive environment and then turning our attention to those locating it in a strategic, or game-theoretic, context.

4.1.1 *The Competitive Environment*

Much of the earliest discussion of the Coase theorem located it in a competitive markets context. In some instances, the two parties to the externality are situated within competitive goods markets, consistent with Coase’s farmer–rancher analysis. In others, the externality is said to flow from one competitive industry (e.g., ranchers) to another (e.g., farmers). Though the latter might seem at odds with Coase’s 1960 treatment of the problem, it reflects the standard method of modeling externalities and analyzing Pigouvian instruments during this period. When negotiation is contemplated here, the strategic considerations that feature prominently in much of the later literature are absent, reflecting the limited inroads into economics made by game theory to that point.

4.1.1.1 *Entry and Exit in the Long Run*

One of the first, and most basic, challenges to the efficiency claim draws on the implications of the differential long-run entry and exit effects associated with alternative specifications of rights (Calabresi 1965b; Bramhall and Mills 1966). In a zero-profit competitive equilibrium, Coasean bribes flowing from firms in industry *A* to firms in industry *B* will increase profits in *B*, leading to the entry of new firms, and reduce profits in *A*, resulting in exit from that industry. An initial assignment of rights in the other direction (or a rights reversal) would have the opposite entry/exit effects. In either case, we have overproduction of one good and underproduction of the other, relative to the optimum, meaning that efficiency cannot be guaranteed if entry and exit are possible.

The debate over the entry/exit critique went on for some two decades.³¹ The initial rebuttals claimed that any resultant inefficiencies would be corrected through bargaining (Calabresi 1968) or the emergence of a single owner (Nutter 1968), the latter involving a twist on Coase's analysis in "The Nature of the Firm" (1937).³² The underlying assumption here was that agents could, and would, avail themselves of any potential gains from exchange, ensuring efficiency. The more telling counter, though, pointed out that the entry issue turns on the nature of property rights—in particular whether rights are assigned to closed classes of agents, where individuals can obtain a right only by purchasing it from a current class member, or to open classes, where entry is unrestricted (Frech 1979, Holderness 1985, Smith 2002). Land-use conflicts are an excellent illustration of a closed class. If all of the land around an airport or feedlot is owned by someone, the benefits associated with any bribes paid to allow the nuisance to persist will be reflected in land values, providing no incentive for entry. A common pool situation (Gordon 1954), in contrast, illustrates the problems that attend open classes, where entry is unrestricted, and the suboptimal outcomes that result. Efficiency, then, cannot

be guaranteed if the conflict involves one or more open classes.

The entry issue brings to the fore the importance of fully specified private property rights for the theorem's efficiency claim. Open classes exist because these rights—including the right of exclusion—cannot be or have not been fully delineated over the resources in question. As Henry Smith has noted, however, "If transaction costs were truly zero . . . bargaining could costlessly close all classes."³³ This suggests that the existence of open classes violates the theorem's zero transaction costs assumption, which obviates the entry problem.³⁴

4.1.1.2 *Rents*

The competitive context within which Coase situated his analysis gave rise to a second, and related challenge: that Coase's result presumes the existence of rents sufficient to pay the bribes/compensation, in apparent violation of the long-run zero-profit condition (Wellisz 1964). As Nutter (1968) pointed out, however, this argument holds no sway against the Coase theorem, since the externality would exist in the first place only if the value of output rose by enough to compensate for it. The argument here was later elaborated nicely by Zerbe (1980, p. 89) and, as Starrett (1972) and Starrett and Zeckhauser (1974) demonstrated, sufficient rents exist so long as production/profit sets are convex. The rents argument was revived by Shapiro (1974) and more recently by Halpin (2007), but both challenges were effectively refuted.³⁵ The Starrett and Shapiro articles, though, factored into a third

³¹The online appendix provides a wealth of references on this subject beyond those cited below.

³²Stigler's (1988, pp. 212–13) description of the genesis of Nutter's article is worth retelling here. Nutter was on his way to Rochester to present a paper that would show that the Coase theorem was wrong. On the first leg of his flight, he was seated next to Friedman, and they discussed Nutter's argument. By the time the plane landed, Friedman had convinced Nutter of his error, and Nutter continued on to Rochester to give a talk demonstrating that the theorem was correct—the argument underlying which appears in his 1968 article. Demsetz (2003, pp. 286–89) provides a recent extension of this line of thinking. Coase (1960, p. 17) had previously argued the efficiency possibilities of a single owner, and Davis and Whinston (1962) provided a formal demonstration of the incentive to merge and the resulting efficiencies. The merger argument is reflected in Greenwood and Ingene's (1978, p. 300) specification of the Coase theorem.

³³Henry E. Smith, "Two Dimensions of Property Rights" (Mar. 31, 2001), quoted in Merrill and Smith (2001, p. 368n45).

³⁴The relationship between transaction costs and property rights is taken up in subsection 4.3, below.

³⁵On Shapiro, see Endres (1975) and Crain, Saurman, and Tollison (1978). On Halpin, see Kuechle and Rios

debate over the theorem, this one going to the effects of nonconvexities.

4.1.1.3 *Nonconvexities*

Arrow (1969) has demonstrated that, if there exists a universality of markets, including one for the activity of A that confers harm on B , efficiency is assured. And, with convex indifference curves and production sets, any given Pareto optimal result can be attained as a competitive equilibrium through an appropriate initial redistribution of resources. The implication, then, is that the Coase theorem's efficiency claim is valid in a perfectly competitive system.

In 1972, however, Arrow's student, Starrett (1972), demonstrated that externalities generate nonconvexities which give rise to existence problems, and Starrett and Zeckhauser (1974) explicitly probed the implications of this for the Coase theorem. Suppose that the victim firms have the right to be free from harm but can offer for sale rights to inflict that harm. At any positive price, the victim will supply an infinite number of rights, as this would provide her with maximum profits, while the emitter's profit-maximizing demand at that price will only be infinite if $P = 0$. As such, there is no equilibrium here and efficiency does not obtain. Laffont (1978) later provided reinforcement for this conclusion.

Starrett's argument led to perhaps the most remarkable moment in the Coase theorem's history. The publication of Shapiro's 1974 article on rents, noted above, in the *Journal of Economic Theory* (*JET*) prompted several responses,³⁶ all of which the editors declined to publish. Instead, they published, in 1977, an "Editorial Addendum" to Shapiro's article

suggesting (correctly) that his rents argument turned on the introduction of a nonconvexity into the system and so had been anticipated by Starrett (1972). The rebuttals to Shapiro's argument, the editors concluded, were neither here nor there since effect of Starrett's 1972 analysis was to "destroy the validity of the Coase Theorem" (Editors 1977, p. 222). In February 1977, then, the editors of *JET* wrote the Coase theorem's obituary.

While this claim of the theorem's demise was obviously premature, the editors' conclusion, like Starrett's analysis, had effectively assumed away—or at least ignored—the possibility of negotiation.³⁷ There is a Pareto-better point available, but the market will not function in a way that allows for its attainment. As Gifford (1978) was the first to note, however, in a world of zero transaction costs, including full information, the fact that, in the presence of a nonconvexity, there is no incentive to make the marginal move from externality level x to $x - \varepsilon$ is irrelevant. Knowing that a Pareto-better point exists, agents will negotiate their way to the optimal outcome. Moreover, as Cooter (1980) later demonstrated, the placement of legal liability on the polluter (with compensation restricted to minimum profit loss) will *not*, contrary to Starrett's assertion, lead to an infinite supply of pollution rights since, at the point of nonconvexity, the marginal benefit from offering additional pollution rights for sale is zero.³⁸ At this point, the question of marginal versus non-marginal trades becomes moot, and the theorem survives the nonconvexities challenge.

(2012). For Coase's take on the rents debate, see Coase (1988b, p. 163–70).

³⁶In addition to Crain, Saurman, and Tollison (1978), responses were submitted by Alfred Endres and Brian Horrigan. Neither of the latter was subsequently published.

³⁷Starrett himself has acknowledged this in correspondence with the author, November 11, 2014.

³⁸See also Boyd and Conley (1997), DeSerpa (1994), Vogel (1987), and Hurwicz (1995, pp. 60–62; 1999). Of course, the merger argument is also relevant here.

4.1.1.4 *Non-separable Cost Functions*

A further objection raised against the theorem, this from Marchand and Russell (1973), is that efficiency does not obtain if the harm done to the victim firm is a function of its level of output as well as of the output of the emitting firm—that is, if the victim’s cost function is non-separable.³⁹ Suppose that B ’s costs of production are given by $C_B = f(q_B) + D(q_A, q_B)$, where the q s are the outputs of firms A and B , respectively, and D reflects the damage-related effects of A ’s output on B ’s costs. A given level of output by A causes B more harm (that is, causes a greater increase in B ’s costs) the more output B produces. If A is liable for harm caused, B has no incentive to mitigate damages, since it will be fully compensated for its externality-related costs. Thus, B ’s output will be inefficiently high and A ’s inefficiently low (Marchand and Russell 1973, pp. 613–15). As such, Marchand and Russell concluded, Coase’s result holds only when cost functions are additively separable, a condition that makes the harm to B independent of B ’s output. And given that, as Baumol (1976) and Endres (1977) pointed out, it would be unusual to encounter a production externality that is separable, this critique, if valid, would put very tight restrictions on the theorem’s domain.

Marchand and Russell’s argument was quickly picked up on in the literature by opponents of the Coase theorem, but it also attracted significant opposition. Coelho (1975, p. 723) and Zerbe (1980, pp. 87–88) argued that, absent transaction costs, agents will negotiate away this inefficiency—to which Zerbe also added the merger argument for good measure. More formal responses came from Gifford and Stone (1975) and

Greenwood, Ingene, and Horsfield (1975), asserting that Marchand and Russell had failed to properly account for costs and the effects of a competitive environment—the corrections for which confirmed the theorem’s claims.

The nonseparabilities debate was in many ways a microcosm of the entire Coase theorem controversy. Sophisticated formalisms were met with intuitive counters that did not pass muster with those more formally inclined, and competing modeling strategies yielded wildly divergent results. Marchand and Russell summed up the general flavor of things very nicely when responding to their critics: “Our critics’ theme seems to be that models are misspecified when they do not yield the right conclusions.” They charged, in turn, that the models employed by their critics, “while interesting, are based on specifications and behavioral postulates which are either logically and internally inconsistent or not fully and properly developed”—the critics having failed to formally specify how small-numbers bargaining would lead to a successful negotiated outcome—and were “not in the spirit of the original situation envisioned by Coase” (all three quotes from Marchand and Russell 1975, pp. 730, 732, and 730, respectively). The problem, of course, is that it has never been entirely clear—or at least agreed upon—exactly what *is* in the spirit of Coase. This problem only intensified when the game theorists entered the fray.

4.1.2 *Strategic Behavior*

Defenses of the Coase theorem grounded in the theory of competitive markets did not sit well in some quarters. Joseph Farrell got to the heart of the concern here when he pointed out that the message of Coase’s result was that “complete competitive markets are *not* necessary for efficiency;” if inefficiencies arise, “people will get together and negotiate their way to efficiency” (Farrell 1987,

³⁹Gifford and Stone (1973) and Marchand and Russell (1973) demonstrate that efficiency and invariance are assured with separable cost functions.

p. 113, emphasis added). But supporters of the theorem were silent on the details of how we get from *A* to *B*. It was simply assumed that, with gains available, agents would bargain their way to the optimum. It seems, said Whitcomb (1972, p. 17) that theorem proponents “are not at all fazed by the difficulties of bargaining.” Though Samuelson, never a fan of the Coase theorem, hinted at this tension already in 1963, emphasizing “the insoluble bilateral monopoly problem with all its indeterminacies and non-optimality” (Samuelson 1963b, p. 132n*),⁴⁰ the implications took some two decades to manifest themselves in the literature.

It bears emphasizing that, even as late as 1980, game theory occupied a very small place in economic analysis. When Regan (1972, p. 428) called the Coase theorem “a proposition in the theory of games” and, along with Daly (1974), attempted to nudge the literature in that direction, the response was minimal. But with time the growth in the use of game-theoretic modeling tools gave rise to a new breed of theorem critics who leveled two (related) charges at the theorem and its supporters. The fundamental problem, they said, is that small-numbers bargaining inevitably raises the specter of strategic behavior—a possibility all but ignored in the literature to that point. And then there was the issue of modeling—or the lack thereof. Those positing that agents would work their way to the optimum did so sans a formal game structure, a solution concept, or precise assumptions about preferences and information.⁴¹ The whole process, said Usher, “is, for the economist, fundamentally mysterious” (Usher 1998,

p. 8) and a claim for the theorem made on this basis “amounts to little more than faith” (Schwab 1989, p. 1176). Interestingly, Davis and Whinston (1965, p. 113–15) had considered, and rejected, both cooperative and noncooperative approaches to modeling Coase’s result, finding each in its own way inadequate to the task. In the decades that followed, however, each of these frameworks came to play a prominent role in the Coase theorem literature as scholars recognized that Coasean bargaining may play out in either cooperative or noncooperative scenarios, each with important implications for the conclusion of efficient bargains.

4.1.2.1 *The Coase Theorem as a Cooperative Game*

Much of the literature claiming efficiency for the Coase theorem in a bargaining context gets there by implicitly or explicitly utilizing solution concepts from cooperative game theory—even if the environment contemplated is characterized in competitive terms by the authors.⁴² And, as Aivazian and Callen (1981) demonstrated, the Coase theorem does indeed hold true in a two-person cooperative game context. The problem is that efficiency is a given in such situations, meaning the Coase theorem, so conceptualized, is not so much a theorem as “a mere hypothesis on the solution concept” (Schweizer 1988, p. 246)—or, some might say, a tautology. So conceived, the Coase theorem is only interesting to the extent that it includes the invariance proposition (Hurwicz 1995, p. 50–51).

A more serious problem arises in externality scenarios involving three or more persons. Here, as Shapley and Shubik (1969) first showed and Aivazian and Callen (1981, 1987) subsequently reinforced in the context of the Coase theorem, the core may

⁴⁰See Coase (1988b, pp. 157–63) for Coase’s rebuttal. Samuelson (1995) later provided a more extensive commentary on the theorem, with critical flourishes that rival Stigler’s laudatory ones.

⁴¹See Samuelson (1985, p. 322), Schweizer (1988, p. 263), Varian (1994, p. 1279), and McKelvey and Page (1999, p. 238).

⁴²On this point, see Arrow (1979, p. 24), Samuelson (1985, p. 321), and Schweizer (1988, p. 263–64).

be empty, owing to the absence of a stable coalition, which precludes any broad claims for efficiency. Their argument is, on the face of it, straightforward. Assume A and B emit pollution that damages C , and that profit possibilities take the following form:

$$V(A) = \$3,000; \quad V(B) = \$8,000;$$

$$V(C) = \$24,000; \quad V(A, B) = \$15,000;$$

$$V(A, C) = \$31,000; \quad V(B, C) = \$36,000;$$

$$V(A, B, C) = \$40,000.$$

The grand coalition, $V(A, B, C)$, is Pareto optimal and will be achieved if C is in possession of the relevant property rights. But suppose instead that A and B have the right to pollute. The grand coalition, achieved with C offering A \$3,000 and B \$8,000 to shut down, could be blocked by a coalition between A and B , where A offers B \$8,300 out of $V(A, B)$. But this coalition can be blocked by one between C and B , where C offers B \$8,400 out of $V(B, C)$, The result is endless recontracting. In fact, the Coase theorem's zero transaction costs assumption facilitates this instability by making endless recontracting costless. The explanation for the failure of the Coase theorem here, as can be shown directly, is that the grand coalition does not lie within the core when A and B have the right to pollute.⁴³

Robson (2013) has recently refined Aivazian and Callen's analysis, demonstrating that bargaining failure is the *exception* here rather than the rule, and that if all payoffs are equally likely the Coase theorem holds 5/6 of the time. This, however, is less than

fully satisfying. Coase's (1981) own attempt to defend his result against this challenge—his first new statement on the subject since 1960—was also met with skepticism.⁴⁴ He contended that repeated recontracting would make clear to each agent that the grand coalition was superior to other attainable outcomes and the agents thus would elect to adopt that solution. Individual rationality would, in essence, eventually reflect collective rationality. Alternatively, Coase said, the parties would adopt binding contracts with penalty clauses, a solution developed further by Bernholz (1997, 1999), who proved that a system of binding contracts ensures Pareto optimality under separable individual preferences and, under certain conditions, with non-separable preferences.⁴⁵

But the central problem with the empty core argument, as Magnan De Bornier (1986) demonstrated, is that it is predicated not on the existence of three or more parties, but on *two or more separate external effects* (e.g., firm C is polluted by firm A and by firm B). The absence of a stable coalition relies upon merger possibilities between A and B , which would occur only if there exist economies of scale—a phenomenon allowed for in Aivazian and Callen's model. Absent these economies, C would conclude separate bargains with A and B , as Aivazian and Callen (2003) subsequently acknowledged. And if such economies *did* exist, said merger would already have taken place, per Nutter (1968),

⁴⁴See Telser (1994), Magnan De Bornier (1986), and Aivazian and Callen (1987, 2003).

⁴⁵Aivazian and Callen (2003, p. 292) countered that the "penalty clauses, time limits and other contractual features" pointed to by Coase are "simply irrelevant" in a world of zero transaction costs, meaning that Coase's objection "contradicts the Coase Theorem." But one could argue against Aivazian and Callen that prolonged recontracting problems also become irrelevant in such a world, where "eternity can be experienced in a split second" (Coase 1988b, p. 15). All of this illustrates the difficulties with the zero transaction costs assumption in a game-theoretic environment—about which more below.

⁴³Mueller (2003, pp. 30–32) and Robson (2012, pp. 71–86) provide excellent summaries. The equivalence of this result to the problem of cyclical social preferences in political decision making is discussed by Hovenkamp (1992, p. 331) and Bernholz (1997, p. 422).

in a world of zero transaction costs. This means that *C* would have only the merged *A-B* with which to bargain—obviating the problem entirely. Indeed, Versaavel (2006) shows that a Coasean firm *will* emerge here, resolving the empty core problem and inducing efficiency.

4.1.2.2 *The Noncooperative Environment*

While the cooperative environment is relatively congenial to the Coase theorem, it deftly avoids the processes through which agents arrive at a solution. Discomfort with this has led many commentators to turn to noncooperative models, which dig more deeply into agent incentives within the bargaining process, revealing possibilities of strategic behavior and associated inefficiencies that appear to be deadly to the theorem.⁴⁶ The earliest suggestions as to how strategic behavior might impede efficient negotiated settlements, dealing with the incentives present for extortion and free riding, did not evolve out of game theory models per se, but they have been absorbed within this literature and the links will be evident to the reader. As game-theoretic critiques of the theorem became more commonplace, the effects of these strategic moves were formally elaborated and the more general problems associated with informational asymmetries came to the fore.

4.1.2.2.1 *Extortion*

One of the most frequent charges leveled against Coase's result, dating to the early 1960s, concerns the incentives for extortion, or blackmail. A debate over the implications of these activities played out across several journals during the 1970s, and objections to

the theorem on these grounds continue even today.⁴⁷ The problems for the Coase theorem here come from two directions. First, under a system of victim liability, agents may threaten to emit (or increase emissions of) harm in order to secure a (larger) bribe. As Wellisz (1964, p. 353) quipped, Coase's analysis "opens up magnificent business prospects," as "any activity can be turned to profit as long as it is sufficiently annoying to someone else." Rothenberg (1970, p. 115) went so far as to predict the establishment of a "highly profitable" industry selling protection against harmful effects in such situations. Second, agents may threaten to come to the harm, thereby increasing emitter liability, with the goal of securing a bribe to refrain from entering. Alternatively, victims may fail to take steps to efficiently mitigate damages if polluters are known to be liable.⁴⁸

The extortion argument is a permutation of the entry critique, discussed above, and both are, at their heart, manifestations of incentives for rent seeking—as are the related problems of hold-ups arising from relationship-specific *ex ante* investments (Pitchford and Snyder 2007, Rosenkranz and Schmitz 2007) and attempts to influence the initial distribution of rights (Jung et al. 1995). Inefficiencies resulting from (wasteful) resource expenditures toward these ends obviously negate the theorem's efficiency claim, and the zero transaction costs

⁴⁷For extensive discussions of the extortion debates, which played out primarily in the *Economic Record* (Australia) and *Western Economics Journal* (now, *Economic Inquiry*), but also in the *American Economic Review* and the *Quarterly Journal of Economics*, see Medema (2014b; 2015a). It is indicative of the more provincial nature of scholarship in this era that the Australian and American debates took place simultaneously, but completely independently, and with the participants in each demonstrating no recognition of the other.

⁴⁸See, for example, Shoup (1971), Mumey (1971), Ng (1971), Tybout (1972), Harris (1990), Schlicht (1996), Vahabi (2011), and Usher (1998). Coase (1960, pp. 32–33) made an inefficient mitigation argument, but not in the context of his negotiation solution.

⁴⁶Despite the pessimism found below, it should be noted that the noncooperative context is not inevitably fatal for the Coase theorem. One of the earliest illustrations of this is Nash's (1953) demand-game analysis, which Crawford (1985, p. 824) suggests "can be viewed as a formalization of the Coase Theorem."

environment contemplated by the theorem compounds the problem by facilitating these activities.

As the critics of the theorem allowed, and its defenders were quick to stress, however, extortionary activity is of consequence only if resources are used in the process of seeking these rents. As it happens, Coase himself had ruled out expenditures made “solely to establish a claim” in his initial presentation of the negotiation result, recognizing that they would invalidate his efficiency argument (Coase 1959, p. 27n54; Medema 1997).⁴⁹ Why he did not repeat this qualification in 1960 is a mystery, but defenders of the theorem contend that the assumption of zero transaction costs effectively rules out the need to expend resources within these rent-seeking processes.⁵⁰ Perhaps more telling in favor of the theorem, though, is that the closed-classes/fully specified private property rights assumption that insulates the theorem from the entry critique also precludes extortion.

4.1.2.2.2 *Free Riding*

The free-rider problem is the flip side of the extortion issue and becomes relevant when we move beyond Coase’s two-agent negotiation framework. This possibility, also first introduced by Wellisz (1964,

pp. 353–54), was raised repeatedly in the ensuing years and has recently been taken up in more formal fashion by, for example, Dixit and Olson (2000) and Ellingsen and Paltseva (2016). If those affected by pollution (B, C, D, \dots) must pay the polluter (A) to reduce emissions, a payment by individual B to the polluter results in reduced emissions that benefit individual C, D, \dots as well as individual B . It is in C ’s interest to refuse to participate in the bargain and instead free ride off the payments of B, D, \dots —thereby benefitting from the clean air without having to pay for it. But as each agent faces this same incentive, total bribe payments to the polluter will fall short of the level needed to generate the optimal amount of pollution and polluting outputs, negating the theorem’s efficiency claim. Parisi (1995, p. 164) considers these free-riding situations “most recidivous to the Coasian antidote,” and Baliga and Maskin (2003, p. 308) tell us that “even a diehard Coasian” should agree that the Coase theorem fails to hold in these circumstances.

Baliga and Maskin (2003, p. 307) rightly conclude that the Coase theorem requires excludability—specifically, the ability to exclude nonparticipants from bargain-related benefits—lest free riding obtain. This brings us back to the open/closed-classes distinction, discussed above. As with the entry and extortion issues, closed classes are necessary for efficiency,⁵¹ and zero transaction costs ensures this. But there is another transaction-cost-related line of defense against the free-riding argument,

⁴⁹Coase attributes the original extortion objection to David Cavers of Harvard Law School, who was a fellow with Coase at the Center for Advanced Study in the Behavioral Sciences at Stanford University in 1958–59 (Coase 1988a, pp. 656–57). Coase (1988a) contains a much larger elaboration of the general subject of blackmail, including its relationship to his argument in “The Problem of Social Cost.”

⁵⁰See, for instance, Demsetz (1971, pp. 444–45) and Daly and Giertz (1975, p. 1000). Demsetz added the further counter that competition between extortionists would drive the price of extortion to zero. This makes extortion a manifestation of monopoly power, which conflicts with the assumed competitive environment. Critics (e.g., Shoup 1971, p. 312), on the other hand, contended that rent-seeking inevitably utilizes resources and so impacts efficiency. But this argument goes to relevance, not to theoretical validity, and so leaves the theorem untouched.

⁵¹If property rights are fully specified, the class is closed, meaning that A ’s purchase from B of the right to be free from harm includes the ability to exclude others from its benefits. Knight’s (1924) classic analysis of social cost may be considered one manifestation of this point, as may Coase’s (1974) analysis of the lighthouse. That said, subsequent scholarship has called into question Coase’s conclusions regarding the “private” nature of the British lighthouse system. See, for example, van Zandt (1993) and Bertrand (2006).

first launched, ironically, by two of the theorem's most strident critics—Mishan (1967b, p. 64) and Dick (1974, p. 88)—during the earliest stages of the debate and recently resurrected by Barry, Hatfield, and Kominers (2014). In the language of Barry, Hatfield, and Kominers, free riding involves the creation of “voluntary transaction costs” by those involved in the bargaining process, in violation of the zero transaction costs assumption. At the root of the problem here is costly information, which makes possible the incomplete preference revelation associated with free riding. This, then, brings us to what is perhaps the most contentious issue in the entire Coase theorem literature—the implications of incomplete and private (or asymmetric) information for the theorem's validity.

4.1.2.2.3 *The Information Problem*

Extortion and free riding are manifestations of incomplete or private information, and advances in the analysis of resource allocation under these conditions (e.g., Myerson 1979, Harris and Townsend 1981) raised a new round of questions about the theorem as the influence of game theory in economics surged beginning in the 1980s.⁵²

The problems posed by uncertainty are nicely illustrated by Cooter (1982, pp. 20–24), who points out that the expected utility-maximizing strategy that is optimal against the distribution of an opponent's strategies may not be optimal against the strategy actually played—giving rise to inefficient negotiated settlements when expectations and reality diverge.⁵³ An additional set of concerns results from demonstration that, with two-sided private information, one should not generally expect efficiency

to result. The implications of the Myerson–Satterthwaite (1983) theorem for the Coase theorem's efficiency claims are of particular import here. What Myerson and Satterthwaite demonstrated, in a nutshell, is that, for an indivisible good, there is no efficient Bayes–Nash equilibrium when rational agents have private information. The difficulties that this presents for the Coase theorem have been noted by Samuelson (1985, p. 323) and by Fudenberg and Tirole (1991, p. 279), and expanded upon by McKelvey and Page (1999, 2002). McKelvey and Page's generalization of Myerson–Satterthwaite reveals that the ability of agents to strategically employ private information will bias the negotiated solution in the direction of the holder of the property rights, meaning that there will be an inefficiently high level of pollution when polluters are assigned the relevant rights and an inefficiently high level of abatement when victims are in possession of the rights. Based upon this, McKelvey and Page (1999, p. 246) offer a “private information” Coase theorem:

Coase Theorem (Private Information): For two players with quasi linear preferences [and] private information . . . , in any non-cooperative game where property rights are defined and enforced, there does not exist any Bayes–Nash equilibrium which is fully efficient and the most efficient Bayes–Nash equilibrium exhibits a bias in outcomes in favor of the party who is assigned the property rights.⁵⁴

It would be difficult to formulate a version of the theorem more at odds with Coase's original.

It bears noting that the existence of private information does not inevitably entail the failure of Coase-theorem-type bargains,⁵⁵

⁵²See, in addition to the references cited below, Holmström and Myerson (1983), Schweizer (1988), Harris (1990), Mailath and Postlewaite (1990), and Lewis (1996).

⁵³See also Arrow (1979, p. 31).

⁵⁴See McKelvey and Page (2002) for a proof. Empirical support for this conclusion is found in a separate experimental paper (McKelvey and Page 2000), discussed in section 5, below.

⁵⁵See, for example, Maskin (1994), Gomes and Jehiel (2005), and Schmitz (2001). Schmitz demonstrates that the

and the inefficiencies resulting from private information ultimately owe to strategic behavior in the scramble over surpluses from bargaining. Coase (1988b, p. 161), for his part, considered strategic behavior unimportant, and much of the early literature on the theorem followed this lead. In Coase's world, agents are amenable to a reasonable division of the gains from exchange; no one is going to threaten to tear apart the \$100 bill that the group found laying on the sidewalk.⁵⁶ Cooter, on the other hand, considers these strategic concerns an almost insuperable obstacle to efficiency-enhancing negotiated outcomes, making the case for a "Hobbes theorem"—that agents will *never* agree to a distribution of the surplus—that is perhaps as strong as that for the Coase theorem (Cooter 1982, pp. 17–18). Hirshleifer similarly contrasts the Coase theorem ("people will never pass up an opportunity to cooperate by means of mutually advantageous exchange") with what he calls "Machiavelli's Theorem" ("no one will ever pass up an opportunity to gain a one-sided advantage by exploiting another party"). Both, he says, are "partial truths" and in reality agents will work out some optimal position between these two (Hirshleifer 1994, p. 3).⁵⁷

Coase theorem may hold with private information *when property rights have not been assigned* over the relevant resources—a finding at odds with Coase's assertion that an assignment of property rights is a precondition for efficiency-enhancing negotiations.

⁵⁶Farber (1997, p. 424) finds it "startling . . . that the person with this benign view of human nature is a member of the notoriously hard-boiled University of Chicago Department of Economics." The fact that Chicago price theory has traditionally eschewed game theory notwithstanding, Coase's aversion to rational choice theory is but one of many indications that he did not fit the modern "Chicago School" stereotype. See Coase (1978), Medema (1994), and Medema (2020a).

⁵⁷The Coasean–Hobbesian behavioral contrast is nicely modeled in Eastman's (1996a) comparison of the Coase theorem with the prisoner's dilemma. The experimental literature, treated in section 5, below, provides more

All in all, it is difficult to avoid the conclusion that the presence of private information and the forms of strategic behavior it facilitates are deadly for the Coase theorem, a reality acknowledged even by some of the theorem's staunchest defenders.⁵⁸ The possibility that zero transaction (=communication) costs may actually *decrease* the probability of reaching an agreement by facilitating the transmission of threats and other strategic communications only strengthens this conclusion.⁵⁹ While the mechanism design literature offers possibilities for eliciting information and thus eliminating these inefficiencies,⁶⁰ such solutions also, as Farrell (1987) and Baliga and Maskin (2003) have pointed out, involve a measure of centralization that flies in the face of the decentralized nature of Coase's result.

The lesson that emerges here, then is that the Coase theorem *requires perfect information*—that is, "everyone must know what everybody else knows" and "each agent must know the preferences and characteristics of others" (Starrett 2003, p. 118).⁶¹ If this condition is satisfied, strategic behavior,

optimistic insights into the prospects raised by Cooter and Hirshleifer.

⁵⁸See, for example, Zerbe (1976), Veljanovski (1977), Allen (1999), and Luppi and Parisi (2012).

⁵⁹Our discussion here has focused on the implications of less-than-full information for strategic behavior. A number of results point to similar problems for the Coase theorem in a competitive environment. For example, Greenwald and Stiglitz (1986) and Shapiro and Stiglitz (1984) show that the separation of efficiency and equity does not hold when information is imperfect, which, as Stiglitz (2000, p. 1458) later emphasized, poses a challenge to both the second fundamental theorem of welfare economics and the Coase theorem's invariance proposition. See also Klibanoff and Morduch (1995).

⁶⁰See, for example, Arrow (1979) and Varian (1994, 1995). Starrett (2003, p. 119) contends that, with private information, efficiency *requires* appropriate mechanism design.

⁶¹See also, for instance, Arrow (1986, p. S392), who contends, rightly, that the informational requirements of the Coase theorem are more stringent than those required for the competitive price system.

including the ability to manipulate the behavior of other agents via threats, is effectively ruled out—along with the resulting inefficiencies (Farrell 1987, p. 115; Jackson and Wilkie 2005).

4.2 *The “Invariance Claim”*

Before examining the challenges to Coase’s invariance claim, it is useful to restate it in updated language, as we did with the efficiency claim:

If the costs of transacting are zero, the ultimate allocation of resources is independent of how rights over those resources are initially distributed.

It should be clear that the aforementioned criticisms of the theorem’s efficiency claim also pose difficulties for the invariance proposition, but we need not rehearse those here. The same counters that support efficiency also resolve any associated invariance issues. Instead, we will focus our attention on a different set of criticisms going directly to the question of invariance—those that arise when we bring consumers into the picture. This is the source of some of the trickiest challenges confronting the Coase theorem, and the potential complications introduced here are several.

First, if consumers bargain over utility rather than wealth, the nonobservability and noncomparability of utility functions precludes any strong claims regarding invariance (e.g., Buchanan and Stubblebine 1962, pp. 383–84; Hovenkamp 1990). A second set of issues arises because of the differential income effects that may attend alternative assignments of rights under either bargaining (Dolbear 1967) or competitive (Hurwicz 1995) conditions. Coase (1988b, p. 174), for his part, later waved aside these objections on the grounds that income effects “will normally be so insignificant that they can be safely neglected,” but “normally” is not sufficient to rescue a

“theorem.”⁶² What assumptions would be necessary to validate the invariance claim here and thus salvage the Coase theorem in this context? Dolbear (1967, p. 97) suggested that indifference curves that are parallel with respect to a numeraire good (quasi-linear utility) would preclude these problems, a result later formalized by Hurwicz (1995) and further refined by, for example, Chipman and Tian (2012). The presence of public goods within the relationship—say, children in a marriage/divorce context—introduces a still further complication (Zelder 1993). If utility is not transferable, divorces that would occur under a unilateral divorce rule may not occur under a rule mandating mutual consent, as the spouse seeking a divorce could not appropriately compensate the resistant spouse for, say, a reduction in access to the children. Differently put, the legal rule governing divorce may alter the joint surplus from marriage/divorce and so impact the incentives to remain married. Here, as Chiappori (2010) and Chiappori, Iyigun, and Weiss (2015) have shown, transferrable utility in all relevant institutional environments is required to ensure invariance.⁶³ Bergstrom (2017) has recently generalized several of the aforementioned results in his examination of when the set of efficient outcomes is invariant to the distribution of income. He demonstrates that invariance obtains so long as utility possibility frontiers are parallel, which will be the case if utility functions are “uniformly affine” in private goods.⁶⁴ The rather restrictive nature of these conditions suggests a significant

⁶²Coase’s response here is illustrative of Melvin Reder’s (1982, p. 22) quip that the potential significance of income effects for the Coase theorem “is not always appreciated at Chicago. Not a few Chicago economists like to argue as though the efficiency locus of an economy were invariant to the distribution of wealth within it.”

⁶³On the related efficiency issues, see also Chiappori, Iyigun, and Weiss (2009) and Iyigun and Walsh (2007).

⁶⁴Bergstrom (2017) also illustrates conditions under which the invariance proposition holds even in the presence of income effects.

limitation in the scope of the invariance proposition, though this is mitigated somewhat by Russell's (1995) finding that an assumption of heterogeneous preferences salvages invariance in a competitive environment, independent of the shape of individual preferences—at least where large numbers assure sufficient diversity (and thus heterogeneity).

Defenders of the theorem have emphasized that the income effects critique does not apply to *alterations in the existing structure of rights*.⁶⁵ The arguments here are two. First, with fully specified property rights, an alteration of liability cannot take place without full compensation; otherwise, the rights were not fully specified in the first place, in violation of what some regard as a core (if often implicit) assumption of the theorem. With that compensation being paid, the distribution of wealth is unaffected. This also obviates the criticism that the theorem fails to account for the interests of future generations (Bromley 1989, p. 181; Rangel 2003, p. 814). Second, in a world of zero transaction costs, the potential impact of a redistribution of rights will be fully accounted for in contracts and/or capitalized into resource values, leaving the distribution of wealth unaffected and providing no scope for income effects.⁶⁶ As a practical matter, the increasing tendency to make the Coase theorem the basis for assessing the effects of alterations in legal rules renders this conclusion nontrivial, as we shall see in sections 5 and 6, below.

The third challenge to the Coase theorem on this front, first leveled by Mishan (1965,

p. 29n45),⁶⁷ goes to the concern that the value that individuals place on rights may be a function of ownership—as when the amount that a pollution victim is willing to accept (WTA) in payment for allowing the polluter to foul her air is greater than the amount that she is willing to pay (WTP) to induce an emissions reduction. The price at which a bargain is made likely will vary with the assignment of rights, giving rise to *different* (Pareto-optimal) equilibrium output and externality levels and negating invariance. These WTA/WTP divergences can occur for a variety of reasons, including diminishing marginal utility of income where agents bargain over utility rather than wealth per se (Hovenkamp 1990), minimal substitution possibilities (Hanemann 1991), and the endogeneity of consumer tastes and preferences (Kahneman and Tversky 1979, Samuelson and Zeckhauser 1988, Thaler 1980). Of particular concern here are endowment effects, which may generate less trading of rights than posited by the Coase theorem and, in the limit, the failure to consummate any bargain at all.⁶⁸ While the Paretian cannot look askance at such outcomes, the invariance claim clearly loses all of its force in the presence of such divergences. The extent of these divergences is the subject of no small amount of controversy, some aspects of which will be explored in section 5, below.

A fourth problem arises from situations in which one or more agents have insufficient income/wealth to pay an efficiency-generating bribe. This does not pose a problem when agents bargain over wealth, rather than utility, since wealth will increase by more than the bribe and

⁶⁵See, for example, Coase (1988b, p. 171), Stigler (1989, p. 632–33), DeSerpa (1992), and Allen (1998, pp. 110–11).

⁶⁶Parisi (1995, p. 157) contends that this result would not hold under “sudden and recurrent changes in the assignment of property rights,” but as will become clear, the staunchest defenders of invariance would disagree.

⁶⁷See also Mishan (1967a, pp. 256–57, pp. 269–75; 1971, pp. 42–43).

⁶⁸Korobkin (2014) provides a useful survey of this literature. The related experimental literature is discussed in section 5.

agents would borrow if necessary to finance the bribe in a world of zero transaction costs. Subjective values, though, present a greater difficulty, and Shavell's (2004, pp. 103–04) contention that invariance “is likely to hold, or at least approximately so” if the subjective value of the right is not large relative to the parties' assets, again moves us some distance from the realm of “theorems.”

What, then, are we to make of the implications of all of this for the invariance claim? One approach would be to impose additional assumptions—for instance, rationality and appropriate restrictions on preferences so as to rule out these effects. Another approach is to insert an income effects qualification, a solution found in several of the statements of the theorem that appear in the literature. A third response has been to state (or insist upon) the theorem sans the invariance thesis. This solution, though, robs the theorem of what many consider its core insight—that the initial assignment of rights does not impact ultimate resource allocation.

4.3 *Discussion and Implications*

4.3.1 *Wrestling with Transaction Costs*

The analysis to this point has largely glossed over what is perhaps the largest of the gorillas in the room—the ambiguity surrounding the concept of transaction costs and thus the precise nature of the zero transaction costs environment.⁶⁹ This ambiguity has been much remarked upon in the Coase theorem literature and likely explains why (i) nearly all discussions of the theorem neatly bypass any serious attempt to rigorously define the concept and (ii) the content given to the term tends to serve the special

purposes of the author whether in support or criticism of the theorem (Zerbe 1980, p. 84; Williamson 1989, p. 229).

Much of the responsibility for this confusion has, with some justice, been laid at the feet of Coase himself.⁷⁰ Indeed, Coase's description of transaction costs in “The Problem of Social Cost” goes no farther than this:

In order to carry out a market transaction it is necessary to discover who it is that one wishes to deal with, to inform people that one wishes to deal and on what terms, to conduct negotiations leading up to a bargain, to draw up the contract, to undertake the inspection needed to make sure that the terms of the contract are being observed, and so on. (1960, p. 15)

Coase left a good deal of room for interpretation, and subsequent commentators have done little to further the cause, let alone give the term the sort of “precise, mathematically definable, content” that is typical in contemporary economic analysis (Parisi 1995, p. 160). While a handful of efforts have been made, stabilization of meaning remains elusive here, just as it does for the theorem itself. Because transaction costs are, as Lee and Smith (2012, p. 147) put it, the “linchpin” of the Coase theorem and most of the controversies over it boil down to “different conceptions of what is implied by zero transaction costs” (Zerbe 1980, p. 85), it is important that we devote some attention to this topic.

⁶⁹ Klaes (2000, 2008) provides illuminating discussions of the history of and ambiguity surrounding the concept of transaction costs within economics generally.

⁷⁰ See, for example, Zerbe (1980, p. 84), Schwab (1989, p. 1193), Williamson (1989, p. 229), and Hart (2008, p. 405). Hart, for example, says that “Coase has made life hard for his followers by never attempting to write down a formal model. Interestingly, as far as I know Coase has also never shown any indication that he thinks that such an activity is in the least bit worth while!” This last part is certainly true. See note 108, below.

4.3.1.1 *Conceptualizations of Transaction Costs*

Transaction costs are often conceptualized as the costs of getting together, paperwork, etc., and modeled in a manner similar to taxes on a transaction.⁷¹ This is particularly true in textbook treatments of the Coase theorem. Cooter's widely referenced *New Palgrave* entry on the theorem broadens things a bit by breaking down transaction costs into two groups: the costs of "the time and effort required to carry out a transaction" and bargaining-related costs, where the latter include "the cost of information needed to formulate a bargaining strategy, the time spent haggling, and the cost of preventing cheating by parties to a bargain" (Cooter 1987, p. 457). Ellickson (1989, p. 615) extends this still further with a tripartite conception that includes "get-together costs," "decision and execution costs," and "information costs"—categories that he acknowledges involve a measure of overlap. Barry, Hatfield, and Kominers's (2014) suggestion of a class of "voluntary transaction costs," thrown up by the parties themselves to prevent a bargain that would harm them or allow them to free ride on a beneficial outcome, adds yet another category. The most expansive (and general) definition, though, comes from Allen, who defines transaction costs as "the resources used to establish and maintain property rights" (1991, p. 3).⁷² Each of these conceptions of transaction costs has different implications for the Coase theorem, due largely, but not exclusively, to the role of information that is implied.

⁷¹ Allen (1991, p. 11) provides a critical commentary on this approach.

⁷² Allen continues, "They include resources used to protect and capture (appropriate without permission) property rights, plus any deadweight costs that result from any potential or real protecting and capturing" (1991, p. 3). See also, for example, Cheung (1969, p. 16) and Barzel (1985).

Eastman (1996b, p. 777) has called the relationship between information and transaction costs a "somewhat theological question," and positions on this relationship do not fall into neat categories. Some commentators argue that information costs belong in a category separate from transaction costs.⁷³ This viewpoint is standard, if often only implicitly, in the game theory literature on the Coase theorem, where the zero transaction costs assumption is not considered sufficient to rule out efficiency-negating information problems. Others, though, believe that information costs are properly subsumed within transaction costs, as in Ellickson's definition, cited above, and Ayres and Talley's (1995b, p. 1030) assessment that private information is "a particularly pernicious form of transaction cost."⁷⁴ Dahlman (1979, p. 148) represents the extreme version of this approach, making information costs the *essence* of transaction costs, which he defines as "resource losses incurred due to imperfect information."

If all information-related costs are part of transaction costs, three implications for the Coase theorem and its world of zero transaction costs follow directly. First, we eliminate the possibility of strategic behavior and the associated inefficiencies.⁷⁵ Second, risk and

⁷³ See, for instance, Allen (1999) and McKelvey and Page (1999), as well as the statements of the theorem by Regan (1972, p. 427) and Hoffman and Spitzer (1982, p. 73) found in table 2 in subsection 4.3.2. Allen suggests that some information problems can be efficiently managed through appropriately structured contracts, including insurance contracts, when transaction costs, so defined, are zero. See also Allen (1998) and the references cited therein, as well as Aivazian and Callen (1980a).

⁷⁴ See also, for example, Polinsky (1974, p. 1672), Zerbe (1980, p. 86), Hurwicz (1995, p. 65), Myerson (2008, p. 596), Krutilla and Krause (2011, p. 271), and Fischel (2015, p. 230), as well as the online appendix.

⁷⁵ This does not involve treating strategic behavior as a cost, as some have done (e.g., Katz 1990, p. 226–27; Farnsworth 1999, p. 408; Parisi 2008, p. 7)—a practice that Cooter (1995, p. 53) has brought in for strong criticism. Defining transaction costs to include information costs sidesteps Cooter's objection, making strategic behavior the

uncertainty cannot exist in a Coase theorem world, obviating claims that their existence invalidates the theorem.⁷⁶ Finally, the non-convexities associated with external effects are not a barrier to the attainment of efficient solutions, reinforcing Gifford's (1978) finding noted in subsection 4.1.1.3. This, however, is only the beginning of what is implied by the broadest conceptions of transaction costs.

4.3.1.2 *The Mythical World of Zero Transaction Costs*

The broadest definitions of transaction costs locate the Coase theorem in what amounts to a world absent all frictions. Life within such a world is very difficult to conceptualize, suggesting that Coase (e.g., 1988b, 1992) was only partially correct in his regular chastising of economists for neglecting the analysis of transaction costs. They have also spent very little time contemplating the implications of the absence of such costs. And perhaps for good reason. The implications of the broadest conceptions of zero transaction costs are enough to make one's head hurt. And, as one might expect, they tend only to buttress the Coase theorem against the challenges to it discussed above.

One of the more significant features of such a world is that no assumption regarding property rights is necessary for the Coase theorem to hold, since zero transaction costs implies complete property rights, per Allen's definition of transaction costs, quoted above.⁷⁷ Here, all goods and the rights over them are also infinitely divisible. As such, any

arguments against the theorem derived from incomplete property rights—for example, entry, extortion, and free riding—disappear under this definition.

A second consequence of the absence of transaction costs is that utility is always transferable. This obviates concerns, such as those raised by Zelder (1993) and Chiappori, Iyigun, and Weiss (2015) and discussed in subsection 4.2, above, regarding the presence of public goods in the relationship, as the utility associated with those goods can always be transferred through appropriate compensation payments.

A third feature of zero transaction costs, broadly conceived, is that the institutional structure of exchange—bilateral negotiation, competitive markets, the firm relationship—is irrelevant.⁷⁸ This, of course, is an extension of Coase's argument in "The Nature of the Firm" (1937) and is one of the links uniting that article and "The Problem of Social Cost" (1960). In a formal sense, then, any demonstration of the Coase theorem in one of these contexts necessarily applies to all of the others.

But all of this merely scratches the surface. The world of zero transaction costs, Stigler (1972, p. 12) tells us, "turns out to be as strange as the physical world would be with zero friction. Monopolies would be compensated to act like competitors, and insurance companies and banks would not exist." But it is not only insurance companies and banks that would not exist. It has been argued that, absent transaction costs, there is no need for the state (Vahabi 2011, p. 244), for a legal structure to enforce property rights (Sobel 2005, p. 36), or even for bargaining (Zerbe 1980, p. 85). And then there is the "violence that it does to our ordinary understanding of the importance of time" (Epstein 1997,

result of costs—of information—the effects of which make such behavior possible.

⁷⁶See, for example, Greenwood and Ingene (1978), Cooter (1982, pp. 20–24), Posin (1993), and Graff Zivin and Small (2003). This definition of transaction costs also removes the need to appeal to contracting and insurance processes, as in Allen (1991) and others, to salvage the theorem.

⁷⁷See also Allen (1999, p. 897), Barzel (1985), and Coase (1988b, p. 15), as well as Smith (2002) and Lee and Smith (2012).

⁷⁸Arrow (1986, p. S392) pushed this logic still further, suggesting that, under these conditions, "the superiority of the market over centralized planning disappears."

p. 2092) given that “eternity can be experienced in a split second” (Coase 1988b, p. 15). A zero transaction cost world, so conceived, is one without a time dimension, where all inefficiencies are resolved instantaneously, regardless of the number of agents involved—a feature which resolves the intergenerational critique referred to in subsection 4.2, above, as well as other dynamic problems.⁷⁹

But it gets worse—or better, depending on one’s perspective. D’Arge (1973, p. 558) neatly pointed out during the very early stages of the Coase theorem debates that, if transaction costs were zero, *there would be no externalities or other forms of market failure* to which to apply the Coase theorem, since they would have been internalized through bargaining before manifesting themselves. Coase’s cattle would never have trampled an inefficiently large amount of crops in the first place. So conceived, the Coase theorem becomes, in the words of one critic, “incoherent” (Usher 1998, p. 3).⁸⁰

4.3.1.3 *Between Scylla and Charybdis?*

We are left, then, in what many would consider a decidedly unsatisfactory position. If we adopt a narrow view of transaction costs, the Coase theorem is unambiguously invalid. The absence of transaction costs, so conceived, still leaves room for a good deal of interference with the theorem’s laws of motion, particularly via strategic behavior. On the other hand, friends and foes alike tell us that invoking the sort of broad definition

of transaction costs suggested by many of the theorem’s proponents renders the Coase theorem little more than a tautology. Allen’s (1999, p. 905) insistence that transaction costs “must be those costs that cause the Coase theorem to not apply” does nothing to assuage the critics.⁸¹ The modern theorist, with her penchant for tightly drawn axioms, can only wince.⁸² We are caught, it would seem, “Between the Scylla of tautology and the Charybdis of invalidity” (Schlag 1989, p. 1675).

On the face of it, there would seem to be good reason to sympathize with the critics of the most broad definitions of transaction costs. Defenders of the theorem appear all too quick to swoop in and brush aside rigorous mathematical formalisms with invocations of a “transactions costs-free fairyland” (Randall 1975, p. 741) or, as Samuelson (1995, p. 6) liked to call them, “Santa Claus situations”—defenses that strain, and perhaps shatter, the bounds of credulity. Cooter (1982) and Farrell (1987), to cite just two examples, argue that to locate the Coase theorem in such a world is to gut the theorem of any real meaning. In Freeman and Evan’s (1990, p. 352) view it does even worse, relegating economics “to the realm of theology rather than science.”

For the casual observer in particular, there is little basis here for choosing among the competing claims, and any decision to support or oppose the theorem’s validity based on the arguments put forward in the debates discussed above would be grounded in little more than which version of the theorem,

⁷⁹ See, for example, Burness and Cummings (1986, p. 324), Bromley (1989, p. 181), and Endres and Rundshagen (2008). One could even argue that it overcomes Hansmann’s (1990, pp. 33–34) assertion that the Coase theorem cannot apply when the relevant rights belong to a dead person (as, for example, in the rule against perpetuities), since any relevant contingencies would have been known and negotiated in advance.

⁸⁰ Allen (2015) provides a rebuttal to Usher’s wide-ranging criticisms of the theorem as, indirectly, do subsections 4.3.2 and 4.3.4.

⁸¹ Reder (1982, p. 22) says that, “In a sense, the Coase theorem is simply a convoluted definition of transaction cost.”

⁸² But this may be what Stigler was getting at when he argued that “Transactions do not have a natural definition” and that “the contrast between a transaction cost and a non-transaction cost is an empirical rather than a purely formal classification” (in Manne 1970, pp. 128–29). So conceived, their magnitude can only be determined by the success or failure of the invariance proposition (Chelius 1976, p. 306).

what definition of transaction costs, and which of the various arguments pro and con resonates with the reader. For those wishing to see economic analysis put on a more “scientific” footing, the entire exercise is maddening. The long and the short of it is that there are a whole host of arguments that can be raised against the notions that competitive markets or bargaining processes will generate efficient and/or invariant allocations in response to inefficiency-generating interdependencies. The question, then, is whether these go to the theorem’s validity as a proposition in economic theory, or merely to its direct relevance to the world in which we live.

4.3.2 *Is There a Coase Theorem?*³

Some twenty years ago, McKelvey and Page (1999, p. 236) concluded that the Coase theorem “remains elusive,” largely because it has been stated in “shifting versions” and with “ill-defined terms.” The intervening period has done little to alter this perception. Margo (1992, p. 466), meanwhile, tells us that “Stating the theorem correctly is like interpreting a work of modern art—a great deal is in the eye of the beholder.” All of this is reflected in the numerous versions of the Coase theorem—differing both in the explicit assumptions made and results claimed—that appear in the literature. The multiplicity of “Coase theorems” has fed the controversy over the theorem’s correctness as a proposition in economic logic as well as disputes over the domain of its real-world applicability.

Several of the post-Coase/Stigler restatements of the theorem can be seen as attempts to tighten up or make explicit the assumptions necessary for a valid Coase theorem in light of the challenges to it, or to better flesh out what Coase must have had in mind (in the commentator’s view) when laying out his result. As table 2 illustrates, assumptions including agent

rationality,⁸³ convex production/utility sets, fully specified property rights, perfect information, and the absence of income/wealth effects came to feature in statements of the theorem, typically as a result of demonstrations that the efficiency and/or invariance claims do not hold in their absence. But there has been no consistency here, and there remains no consensus regarding the conditions necessary for the theorem’s validity—or even whether there is a valid Coase theorem.

The Coase theorems extant in the literature provide no more agreement on claimed outcomes or on the theorem’s real message than on assumptions. Coase made both efficiency (maximization of the value of output) and allocative invariance claims. Though many statements of the theorem replicate Coase’s twin claims—sometimes referred to as the “strong” version of the Coase theorem—others, such as Calabresi (1968, p. 68) and Dixit and Olson (2000, pp. 310–11), contain only the efficiency proposition (the “weak” Coase theorem).⁸⁴ This distinction is due in part to the widely held belief that the income effects associated with alternative specifications of rights negate the invariance claim. But it is also, at times, a function of the interests of those utilizing the theorem. In economists’ debates over the relative merits of negotiated and Pigouvian solutions, efficiency has typically been at the heart of the

⁸³Contrary to what is sometimes asserted (e.g., (Ellickson 1989, p. 612), Coase himself had made no specific behavioral assumption, and all that is implicit in his analysis is the idea that people will take advantage of (in the sense of doing what is necessary to realize) opportunities for gain. In fact, Coase was quite critical of the rationality assumption and a number of the results to which it gave rise, as well as its use by Gary Becker and others to extend the boundaries of economics (Coase 1978).

⁸⁴See also, for example, Acemoglu (2003, p. 621). A number of commentators have substituted the Paretian conception of efficiency for the more Pigouvian value of output maximization standard, which has important implications for judgments as to the theorem’s validity and scope, as discussed in subsection 4.3.3, below.

discussion, which may account for the lack of an invariance claim in certain instances. For many legal scholars, in contrast, and particularly before economic analysis came to occupy a prominent place within legal thinking, the invariant effects of legal rules, rather than the efficiency claim, was the truly revolutionary insight.⁸⁵

All that said, the lessons gleaned from our discussion to this point allow us to state a valid Coase theorem—one that conforms with Coase’s twin claims of efficiency and invariance, is demonstrably correct as a proposition in economic logic, and the claims of which are no longer guaranteed when its assumptions are loosened.

This theorem rests on four assumptions, all necessary conditions which, taken together, are sufficient for the theorem’s validity. First, agents must be rational, obviating problems such as those associated with endowment effects. Second, the registration of agents’ subjective values is not wealth constrained. Third, utility functions are uniformly affine, precluding income effects, etc. Finally, transaction costs must be zero. Given the theorem’s history, the last assumption requires some elaboration. If transaction costs are to be what their name indicates, they must include *all* costs related to the transacting process. A world of zero transaction costs, then, is characterized by fully specified property rights, transferable utility, and costless information—the last of these requiring that *all information relevant to the transacting process and its effects can be acquired costlessly by all individuals affected by the transaction*. And given that information is costless, *everyone possesses*

*all relevant information, including knowing everything about everyone else.*⁸⁶

Utilizing these assumptions, we can state a Coase theorem that passes muster as a proposition in economic logic:

THEOREM: *If agents are rational and the costs of transacting are zero, resources will be allocated efficiently independent of how rights over those resources are initially distributed. Moreover, if utility functions are uniformly affine and the registration of subjective values is not wealth-constrained, this efficient allocation of resources is independent of the initial rights structure.*

PROOF:

For efficiency, see, for example, Robson (2012) and Mas-Colell, Whinston, and Green (1995, p. 356–59).⁸⁷ For invariance, see Bergstrom (2017). ■

The efficiency proposition is unambiguously true under our definition of zero transaction costs and the assumption of agent rationality. Any potential inefficiency would be instantaneously corrected by affected agents. The combined assumptions of agent rationality, uniformly affine utility functions, and the absence of wealth constraints rule out income effects and the WTA/WTP disparities that could negate invariance.

LEMMA: *If agents are rational and the costs of transacting are zero, alterations in the existing structure of rights will have no effect on the allocation of resources.*

⁸⁵This diversity of views extends even to what one might call the “Chicago school,” one prominent member of which suggested to this author that the invariance claim is the central piece of the Coase theorem and another member of which suggested that invariance is a “red herring.”

⁸⁶In short, incomplete information and asymmetric information are manifestations of transaction costs.

⁸⁷Nash’s (1953) demonstration of efficiency in a demand game and Crawford’s (1985) extension of this logic to the Coase theorem is also germane here, though Nash’s assumptions and framework differ slightly from those posited here.

With zero transaction costs, all rights are fully specified. Given this, agents must be fully compensated for any alteration in those rights (Allen 1998, pp. 110–11). The absence of any effects on income and wealth negate the need to assume uniformly affine utility functions and the absence of wealth constraints.

Some will no doubt claim that this reduces the Coase theorem to a tautology. But the reality is that all provable theorems are tautologies and, as such, the Coase theorem is no more or less a tautology than any of the other well-known theorems in economics. The question then becomes whether this theorem is of any utility for economists and others. But we must postpone that discussion until we have dealt with the all-too-common tendency to invoke Coase theorems that allow for positive transaction costs.

4.3.3 *Is There a Positive Transaction Costs Coase Theorem?*

Numerous statements of the Coase theorem found in the literature allow for positive—but low, or less than the gains from exchange—transaction costs. Though Coase's claims for efficient and invariant negotiated solutions were predicated on the absence of such costs—suggesting that positive transaction costs statements of the theorem misapprehend Coase⁸⁸—the frequency with which these statements appear in the scholarly and textbook literatures suggests that we should not dismiss them out of hand.

It is almost trivial to demonstrate, in the cooperative spirit of Coase,⁸⁹ the *possibility* of achieving efficient and invariant negotiated outcomes in the presence of simple transaction costs, so long as these costs are

less than the gains from exchange. But if the externality is continuous and transaction costs are not lump sum, both the efficiency and invariance claims are demonstrably false: negotiation will cease at a point $q > q^*$ or $q < q^*$, depending on the initial allocation of rights (Medema and Samuels 2000, Robson 2012). The additional complications introduced by information-related transaction costs and the associated possibilities of strategic behavior only reinforce this conclusion (e.g., Anderlini and Felli 2001, 2006; Lee and Sabourian 2007; Robson and Skaperdas 2008).

It would appear, then, that the Coase theorem can be dispensed with in short order if transaction costs are positive. But there is one school of thought that argues differently. Demsetz (1964, 1968), drawing in part on Coase's (1960) insights, has argued that transaction costs are just like any other costs and should be treated as such when making welfare assessments. The implication of this, as respects the Coase theorem, are straightforward, as emphasized by Buchanan (1986) and Calabresi (1991), as well as in Dixit and Olson's (2000, p. 311) "super Coase Theorem," which states that "rational parties will necessarily achieve a Pareto-efficient allocation through voluntary transactions or bargaining, no matter how high transaction costs might be." Agents will negotiate movements away from the status quo to the extent that the gains from doing so are greater than the associated costs of transacting. Thus, the point at which negotiation ceases must be Pareto optimal, since the expected benefit from further negotiation is outweighed by the cost. As such, *all* outcomes satisfy the Coase theorem in its weak (efficiency only) form, regardless of the magnitude of transaction costs.⁹⁰ While negotiation here generates

⁸⁸Zelder (1998) offers a defense of the position that Coase intended for his result to apply to a world of positive transaction costs. While this author believes that such a claim cannot be sustained, Zelder's view speaks to the variety of interpretations laid onto Coase's result.

⁸⁹That is, we are ruling out strategic behavior here.

⁹⁰Coase has indicated that he agrees with this conclusion (Letter from Coase to Calabresi, May 8, 1991, Coase papers, Box 19, Folder 9).

an efficient result no matter how rights are initially assigned, it does not guarantee an invariant allocation of resources and so lacks the generality of Coase's original result and our Coase theorem set out above. But for those concerned with efficiency, this Paretian take on the theorem makes it a powerful weapon for assessing private solutions.⁹¹

4.3.4 *Why It Matters: The Coase Theorem as Benchmark*

It may be tempting to conclude at this point that, having generated a provable Coase theorem, we are left with nothing more than a cute intellectual curiosity and that the road to this point amounts to little other than “more heat than light” puzzle solving. But that is far from the case. To see why the Coase theorem matters, it is important to be clear on what it is, and what it is not.

Some believe that the theorem matters because they see it as an empirical proposition or a “prediction.”⁹² While it is certainly possible to create an empirical proposition that has some of the basic flavor of the Coase theorem—as in Miller's tendency statement version of the theorem found in table 2 or Posner (2014, p. 52)—the Coase theorem is a *theorem*, and theorems, by definition, are not empirical propositions.⁹³ Others see the Coase theorem as a policy tool—one that indicates that we can rely on agents to work out efficient agreements, that legal rules and

other institutions do not affect the allocation of resources, or that judges should assign rights based on efficiency principles (a version of the so-called “normative Coase theorem”). But the theorem is not that, either, for there are no policy situations that conform to the theorem's assumptions, and any loosening of those assumptions causes the theorem to fall apart.⁹⁴

A more accurate and fruitful approach is to understand that the Coase theorem is a “benchmark,” and nothing more than this. So conceived, the theorem serves a role no different from the first fundamental theorem of welfare economics, telling us that, under certain idealized conditions, a particular set of results will follow.⁹⁵ The first fundamental theorem is not, and is not treated by economists as, an empirical proposition or a policy tool. Nor should the Coase theorem be.⁹⁶ This benchmark perspective is true both to the “theoremness” of the Coase theorem and to Coase's original crafting of his result. Though this view finds some support in the literature,⁹⁷ others question whether “something that is so patently impractical” (Blaug 2007, p. 200) and “depends for its validity on such an insane view of economic events” (Posin 1993, p. 852) can serve this purpose. This is a fair question, to which at least three (interrelated) responses can be offered. Taken together, they show not only why the

⁹¹ See Milgrom and Roberts (1992, pp. 302–03) for a strenuous objection to this line of thinking, as well as Calabresi's (1991, p. 1224) rebuttal, which involves an application of Coase's analysis in “The Nature of the Firm” (1937).

⁹² See, for example, Hoffman and Spitzer (1993, p. 63), Hsiung (1999, p. 154), and Stevenson and Wolfers (2006, p. 270).

⁹³ Coase certainly did not see his result as an empirical proposition when he formulated it, nor do his retrospective comments on it—whether in his unpublished talks on the topic from the late 1960s and early 1970s or in his much later published work (e.g., Coase 1988b)—suggest this.

⁹⁴ This then implies that one cannot use the Coase theorem to ground the efficiency criterion in legal decision making, as there is no invariant outcome to label “the” efficient one. This version of the “normative Coase theorem” is discussed further in subsection 6.1.

⁹⁵ There are variety of perspectives on the relationship between the Coase theorem and the first fundamental theorem—some stressing commonalities and others differences. References can be found in the online appendix.

⁹⁶ An answer to why people have viewed the Coase theorem differently emerges from our discussion in subsection 4.3.5.

⁹⁷ See, for example, Acemoglu (2003, p. 622), Rochet and Tirole (2006, p. 649), and Monnet and Roberds (2008, p. 1429).

TABLE 2
STATEMENTS OF THE COASE THEOREM

Author	Theorem Statement
Calabresi (1968, p. 68)	... if one assumes rationality, no transaction costs, and no legal impediments to bargaining, <i>all</i> misallocations of resources would be fully cured in the market by bargains.
Buchanan (1972, p. 77)	... in the absence of transactions costs and income effects, the assignment of property rights or claims does not affect resource allocation.
Regan (1972, p. 427)	... in a world of perfect competition, perfect information, and zero transaction costs, the allocation of resources in the economy will be efficient and will be unaffected by legal rules regarding the initial impact of costs resulting from externalities.
Miller (1978, p. 461)	Whenever contracting and enforcement of property rights are relatively costless, social costs and private costs will tend to be one and the same.
Hoffman and Spitzer (1982, p. 73)	... a change in a liability rule will leave the agents' production and consumption decisions both unchanged and economically efficient within the following (implicit) framework: (a) two agents to each externality bargain, (b) perfect knowledge of one another's (convex) production and profit or utility functions, (c) competitive markets, (d) zero transactions costs, (e) costless court system, (f) profit-maximizing producers and expected utility maximizing consumers, (g) no wealth effects, (h) agents will strike mutually advantageous bargains in the absence of transactions costs.
Cooter and Ulen (1988, p. 105)	... when parties can bargain together and settle their disagreements by cooperation, their behavior will be efficient regardless of the underlying rule of law.
Hurwicz (1995, p. 49)	... the equilibrium level of an externality (e.g., pollution) is independent of institutional factors (in particular, assignment of liability for damage), except in the presence of transaction costs. (p. 49)
Russell (1995, p. 105–106)	... the level of an externality produced in the competitive equilibrium of an economy is not affected by a reallocation of tradeable property rights in the activity which causes the externality.
Dixit and Olson (2000, p. 310–11)	If transaction costs are zero, rational parties will necessarily achieve a Pareto-efficient allocation through voluntary transactions or bargaining.
Allen (1999, p. 897)	In the absence of transactions costs, the allocation of resources is independent of the distribution of property rights.
Foss and Foss (2005, p. 545–46)	In short, the Coase theorem states that all value that can be created from the exchange and use of an economy's available goods will, in fact, be created when transaction costs are absent.
Rochet and Tirole (2006, p. 649)	The Coase theorem states that if property rights are clearly established and tradeable, and if there are no transaction costs nor asymmetric information, the outcome of the negotiation between two (or several) parties will be Pareto efficient, even in the presence of externalities.
Foros and Hansen (2001, p. 215)	Whenever there are gains from trade ... there exist contracts such that both [parties] are better off by signing a deal.

theorem should be considered a benchmark, but why it is a useful one.

First, when used as a benchmark, the Coase theorem becomes “a heuristic generator of insight” (Bergstrom 1989, pp. 1157–58), allowing us to see *things previously not seen*—bargaining and market possibilities, the potential for institutional change to be without effect—and to understand things we *do* see in ways previously not contemplated.⁹⁸ Differently put, contemplation of an ideal type can provide us with insights for understanding and dealing with situations that depart from the ideal.

Second, the Coase theorem’s benchmark function invites us to examine the consequences of loosening the theorem’s assumptions—including (but certainly not limited to) the introduction of various types of transaction costs. So conceived, the theorem becomes a starting point for understanding (i) the origins of market failures (Zerbe 1976, p. 32; Williamson 2005, pp. 3–4) and (ii) why institutions, including property rights, matter (Hurwicz 1995, p. 65), as well as for developing testable hypotheses. This also tells us that the many “disproofs” of the theorem found in the literature are, in reality, applications of this benchmark role rather than refutations of the theorem.⁹⁹

Finally, the benchmark view invites us to analyze the ways in which the real world departs from this benchmark, the consequences for allocative (and distributive) outcomes, and the potential implications for policy—including the efficacy of

decentralized approaches, as with the fundamental theorems of welfare economics (Epstein 1993, p. 556; McCloskey 1998, p. 368).

So conceived, the Coase theorem is not merely an “illuminating falsehood” (Cooter 1982, p. 28), making it all too easy to dismiss. Nor is it “theoretically degenerate . . . and ideologically charged” (Halpin 2007, p. 339). It may well be the case that some have elected to use the theorem in these ways (and here, too, things are in the eye of the beholder), but such uses are not true to the lessons that emerge from a theoretically valid Coase theorem.

4.3.5 *Explaining the Controversy*

Having revisited the Coase theorem debates, worked our way to a valid Coase theorem, and provided a justification for its import, it remains to address the question of why the Coase theorem has been the subject of so much controversy, and even disparagement. There appears to be something about the theorem, or the professional perception of it, that generates a reaction very different from other results in economics grounded in similarly abstract frameworks, such as the first fundamental theorem. And indeed there is.

One explanation given for the controversy lies in the challenge that the theorem posed to the Pigouvian tradition (e.g., Wellisz 1964, Baumol 1972, Coase 2004). As it happens, many of the attempts to refute the theorem included an accompanying demonstration of, or at least argument for, why Pigouvian remedies would be successful where the Coase theorem failed—often sans any attention to the problems that might afflict the implementation of such remedies (e.g., Dick 1974). Yet, we have already seen that this Pigouvian tradition, such as it was, had until the 1970s occupied a relatively minor place in the economics literature, largely because externalities simply were not on the

⁹⁸See also Randall (1983, p. 141). Bergstrom finds a similar function in Becker’s rotten kid theorem, which has much in common with the Coase theorem. Coase’s discussions of frequency allocation (1959) and of lighthouse provision (1974) are just two of the many illustrations of previously unseen market possibilities revealed by this type of reasoning.

⁹⁹D’Amato (2011, p. 766) classes the Coase theorem with Einstein’s theory of special relativity here. Both, he says, are “null theories” that highlight the consequences of introducing frictions.

professional radar in any significant way prior to the 1960s (Medema 2020b). This, then, provides at best an incomplete explanation.

A second possible explanation derives from what Priest (2010b, p. 5) has labeled the “political dimension” of the Coase theorem—the perception, found in the work of both its defenders and its critics, that the theorem is a “decentralization result” (Farrell 1987, p. 114), or, less charitably put, a prescription for limited government, or, still less charitably put, the embodiment of free-market ideology.¹⁰⁰ And if one wades at all deeply into the literature, it becomes difficult to quarrel with Priest’s assessment that the theorem became an exemplar of “[t]he deep Chicago School belief in the superiority of markets” (Priest 2010b, p. 5), or with Samuelson’s conclusion that “[t]he vogue of vulgar and vague Coaseism . . . is strongest among libertarians and other devotees of laissez-faire who believe to find in it ammunition against regulation and voters’ activism” (Samuelson 1995, p. 6).¹⁰¹ Yet, this too provides a less than full explanation. A similar set of charges could be leveled against the first fundamental theorem which, like the Coase theorem, is a decentralization result with no direct bearing on the real world. But there is no first fundamental theorem controversy even remotely similar to that over the Coase theorem.¹⁰²

¹⁰⁰The references here are legion. A representative sample includes Samuelson (1963); Randall (1974); Samuels (1974); Cooter (1982); Farrell (1987); Maskin (1994); Glaeser, Johnson, and Shleifer (2001); and Mueller (2003). Not surprisingly, this “political dimension” is even more prominent in the legal literature on the Coase theorem. See the online appendix for additional references.

¹⁰¹Samuels (1974, p. 11) similarly asserted that the Coase theorem “is but an attempt to lend the credo of science to normative justification of the market and its fantasies of markets everywhere, and to have everything seen in that light.”

¹⁰²What makes this political element all the more curious is the realization that (i) centralized solutions are as good as private ones in a Coase theorem world and (ii) the Coase theorem suggests that preferences for outcomes,

A third possible explanation for all of the to-and-fro over the theorem is economists’ fascination with intellectual challenge that it poses, owing to “its combination of counter-intuitive conclusion with a straightforward and apparently unassailable demonstration” (Halpin 2007, p. 323). This is the force that seems to have attracted scholars such as Hurwicz, Chipman, and Bergstrom to its analysis and, in particular, to the attempt to work out in rigorous fashion the conditions under which it would be true and so might be policy relevant.¹⁰³ But it, too, offers less than a full explanation. There are many interesting theoretical puzzles in economics, but no others have generated this level of controversy or been discussed with the heated (by scholarly standards) rhetoric that we find in the Coase theorem debates.

Forming a complete explanation—particularly for the raging debates of the 1970s and 1980s—requires that we turn to the larger context within which these debates played out. Two contextual factors are particularly relevant here: the increased societal concern with problems caused by large-scale pollution and the rise of the economic analysis of law—itsself a part of the larger (and then very controversial) expansion of economics beyond of its traditional boundaries. The first of these played the major role in the debates over the theorem within economics, while the latter was the more important force in the controversy that emerged within legal scholarship. The intersection of these contextual elements with the aforementioned explanatory factors goes a long way toward explaining both the extent of the controversy

and institutional structures that generate them, grounded in distributional and other concerns can be indulged without sacrificing efficiency (Burrows 1970, p. 44; Medema 1999). The Coase theorem is thus an equally powerful weapon for those whose positions are at odds with ideological implications typically associated with the theorem.

¹⁰³This explanation finds some support from Coase (2004, p. 205) himself.

and the often heated rhetoric in which it was couched.

The heightened attention given to environmental issues at the social and political levels beginning in the late 1960s played a significant role in the development of environmental economics and in the dramatic expansion of the literature on externalities—the latter providing the theoretical grounding for the former. The Coase theorem thus grew up alongside and within the emerging field of environmental economics, and the largest share of economics literature taking up the Coase theorem at this time did so in the context of pollution.¹⁰⁴

At the most basic level, the Coase theorem was perceived as providing the underpinning for policies that posed a threat to improved environmental quality. If it was left to individuals to negotiate with polluters to achieve reductions in pollution, the impact on emissions was likely to be minimal. This was anathema to those concerned with improving the environment—including some of those attracted to environmental economics in the early years. Randall (1974, p. 54) even went so far as to ask whether one can subscribe to the theorem's invariance position “without appearing blatantly anti-environment.” On the face of it, the Coase theorem would seem to have far more to do with farmers and ranchers and with neighbors contending over music played at excessive volume than with large-scale CO₂ emissions. And though the Coase theorem was later to become associated with emissions trading, one searches in vain for an author suggesting during the 1970s that the theorem offered a remedy

for large-scale environmental problems. Yet individuals who were on the scene during the 1970s speak of conversations in department hallways and common rooms to the effect that the Coase theorem rendered the Clean Air Act unnecessary, and Boulding (1971, p. 167) railed in an American Economic Association meetings session on “The Political Economy of Environmental Quality” against the profession's “lunatic fringe who virtually deny the existence of public goods and public bads and think that all things can be done by private bargains between smoky railroads and rational dairy farmers.”¹⁰⁵

Compounding the problems for the theorem was a concern found in both the legal and environmental economics literatures: the idea that the Coase theorem legitimated making victims—whether of pollution or accidents caused by defective products—liable for harm. This possibility brings to the fore the reciprocal nature of harm (Coase 1960, p. 2) that underpins the Coase theorem though, in fact, the reciprocity idea has a lengthy history in both law and economics (e.g., Hohfeld 1913, Commons 1924). The problem, for present purposes, was that its implications often ran counter to social norms, a good deal of legal precedent, and the Pigouvian approach, such as it was. One finds resistance to victim liability in the earliest discussions of Coase's analysis within environmental economics (Kneese 1964) and repeated suggestions that the theorem posited—and even legitimated—a world in which “little children [would be] regarded as ‘hitting’ automobiles in pedestrian crossings” (Randall 1974, p. 53, citing Weld 1972) and potential victims of crimes would be required to bribe their assailants (e.g., Weld

¹⁰⁴Pearce (2002) and Crocker (2002) provide discussions of the formative years of environmental economics. The Coase theorem was perceived as sufficiently important for environmental economics that the *Natural Resources Journal* published two-volume symposium on the theorem and the *Journal of Environmental Economics and Management* included an article surveying *criticisms* of the theorem (Dick 1976) in one of its earliest issues.

¹⁰⁵Kneese's (1971) article, on which Boulding was commenting, sounded a similar note, though in far less charged language, lamenting economists' focus on two-agent externalities and the propensity to generalize from those to bargaining solutions for large-numbers problems.

1973, p. 612). As Baumol (1972, p. 309) put it, under this line of reasoning, “the murder victim too, is then always an accessory to the crime.”

Despite its straightforward grounding in the opportunity-cost reasoning, the reciprocity principle has been called everything from “intriguing and counterintuitive” (Guerra-Pujol 2012, p. 141) to “idiotic” (Jules Coleman, in Hackney 2012, p. 227). Mishan even went so far as to deny its applicability, claiming that enacting a law protecting people from secondhand smoke or from noise and air pollution “does not, of itself, reduce the welfare of others” (Mishan 1971, p. 25). The “economics” of the Coase theorem, then, ran headlong into a controversy grounded in ethics, giving rise to claims that it amounted to an “amoralization of the externality issue” (Randall 1974, p. 53) and led to outcomes which are contrary to “social justice” (Mishan 1967b, p. 68).¹⁰⁶

It bears emphasizing that the Coase theorem does not suggest that victims *should* be made liable for harm; it simply tells us that we achieve the same efficient allocative outcome under victim liability and under injurer liability. But the mere possibility that this could be used justify making “innocent” victims liable for industrial pollution or tortious harms was sufficient to generate vociferous opposition to the theorem. Add to this the perception that it could be used to justify the status quo level of emissions—if lower pollution was efficient, agents would have negotiated their way to it—and you have a recipe for a felt need to demonstrate that the theorem was not merely irrelevant (a claim that would be a matter of perception and taste), but just plain wrong. It is as if admitting the theorem’s validity as a proposition in economic logic equated to admitting its

relevance for resolving real-world problems of externality.¹⁰⁷

In sum, the origins of the Coase theorem controversy lay far more in a desire, among some, to ensure (i) that pollution was reduced and (ii) that “victims” were not made to bear the costs of harm done to them than in propping up Pigouvian remedies or objections to free-market ideology per se. The perceived stakes here were significant, for if the theorem did not pass theoretical muster, Pigouvian instruments—which satisfied both of these desires—would stand alone as efficiency-generating remedies to be recommended by the economist.

All that said, we should not minimize the role that the ambiguity surrounding the theorem—its context, assumptions and their content, and claims—played in this controversy. Much of this is an artifact of the collision of Coase’s looser, more intuitive approach to the subject with the profession’s increasing emphasis on formal modeling. Being neither a modern economist with respect to formal methods nor aware that he was laying out an idea that would be labeled a “theorem,” Coase’s analysis exhibits a looseness that opens it up to multiple interpretations and, as we have seen, a wide range of criticisms.¹⁰⁸ This made it relatively simple for sophisticated modelers to construct “disproofs” of the theorem, and equally simple for theorem defenders to construct rebuttals. The debates over the theorem’s validity, then, were as much over competing theorem statements, definitions, and modeling strategies as they were over validity per se.

¹⁰⁷This may also provide a clue as to why the Coase theorem has been so much more controversial than the first fundamental theorem of welfare economics, given that the latter has seldom had actual policy relevance ascribed to it.

¹⁰⁸Coase’s oeuvre contains nary an equation. On Coase’s methodological approach, see, for example, Medema (1994), Posner (1993, 2011), and Bertrand (2016).

¹⁰⁶One even finds reference to the Coase theorem’s problematic ethics in the economics textbook literature. See, for example, Reynolds (1973, p. 214).

Eventually, of course, the debate died down, though articles claiming to refute the theorem continue to appear with some regularity. Discussions of the theorem also took on a life far less closely tied to the environmental context—the latter due in no small part to the expansion of the theorem’s domain far beyond the externality theory within which it originated. For some, the Coase theorem became a proposition in bargaining theory generally, asserting the efficiency of associated outcomes. For others, it became an assertion regarding the equivalence of outcomes under alternative institutional regimes. And its applications came to span the entire spectrum of economic analysis. As the theorem was put to new uses, additional reasons arose to further probe its validity. Before turning our attention to this expansion of the theorem’s domain and the uses to which it is being put in the more recent literature, however, we must consider a second strain of work attempting to assess the theorem—the efforts to conduct experimental and empirical tests of its validity and predictions.

5. *Testing the Coase Theorem*

The last three-plus decades have witnessed the development of an extensive literature, itself controversial, that purports to “test” the Coase theorem. It is rather odd to think in terms of “testing” a theorem. After all, given its premises the conclusions follow as a matter of logic, which explains why mathematicians are not prone to measuring right triangles to test the Pythagorean theorem. And if they did, and if certain triangles were found to violate the theorem, the results would be attributed to measurement error or the failure of the 90-degree angle assumption. Any true “test” of the Coase theorem would confirm its validity, and any result that questions this must involve a

violation of one of the theorem’s underlying assumptions.¹⁰⁹ But as we have already established, the Coase theorem is not your typical theorem. A significant share of these tests have taken place in the lab, but the theorem has also provided the motivation for a number of case studies and for econometric testing of allocative outcomes under alternative legal regimes. More recent work examining the consequences of loosening the theorem’s assumptions also bears some mention here.

5.1 *Experimental Tests*

On the face of it, at least, the laboratory would seem to be a fruitful environment to “test” the Coase theorem, as it offers the prospect of being able to control the environment in ways that minimize the costs of transacting (e.g., by providing information to all agents), as well as to assess how certain types of transaction costs and rationality-violating behavioral phenomena may lead to departures from the efficiency and invariant outcomes attributed to a Coase theorem world.

5.1.1 *Taking Coase into the Lab*

The first generation of Coase theorem experiments, undertaken at a time when experimental economics was both young and quite controversial as a methodology (Svorenčik 2015), appeared to provide significant support for the theorem’s claims.¹¹⁰ For example, roughly 95 percent of

¹⁰⁹See Hovenkamp (1990, p. 787–94) and Crespi (1991, p. 241n.45). Shogren and Nowell (1992, p. 121) insist that “Resources should not be devoted to testing tautologies.” Hackney (1997, p. 304), on the other hand, criticizes Coase for *failing* to test his result.

¹¹⁰See Hoffman and Spitzer (1982, 1985, 1986), Prudencio (1982), and Harrison and McKee (1985). Norton and Patrick’s (1985) dismissive response to Prudencio’s experiments, questioning whether they tell us anything relevant to the real world, is indicative of the low esteem for experimental methods (and in their case, the Coase theorem) in the early 1980s. See also Prudencio (1985).

the full-information experiments conducted by Hoffman and Spitzer (1982, 1986) produced efficient bargains, and increasing the number of agents involved in the bargaining to more than three dozen did not significantly affect the propensity to reach efficient outcomes (and at times increased it). Interestingly, given the information-based challenges to the theorem, there was not an enormous efficiency drop-off in experiments conducted under incomplete information.¹¹¹

The strength of their results led Hoffman and Spitzer to conclude that their findings “produce a presumption in favor of the Coase Theorem,” including “for disputes involving substantial numbers of parties,” meaning that

a judge or legislator who is considering choosing a rule to govern a dispute in tort, contract, or property that involves as many as thirty-eight parties should assume that the parties can and will exhaust the gains from trade by voluntary agreement. One who would show that bargaining breakdown is likely must bear the burden of proof. (Hoffman and Spitzer 1986)

While this seems a bold claim, perhaps more important is the implication that Hoffman and Spitzer drew for the debate over efficiency as a legal norm.¹¹² One of the arguments offered in support of “efficiency as justice” is that it facilitates the achievement of the outcome at which agents would arrive if transaction costs did not get in the way. Hoffman and Spitzer (1986) suggested that their results demonstrate exactly this, and thus that judges should assign rights in accordance with the dictates of efficiency

¹¹¹In the full-information experiments, agents knew all payoff functions; in those with incomplete information, they knew only their own payoff functions unless and until other players choose to reveal theirs.

¹¹²See, for example, the “Symposium on Efficiency as a Legal Concern,” *Hofstra Law Review* 8 (3) 1980 and “A Response to the Efficiency Symposium,” *Hofstra Law Review* 8 (4) 1980.

when transaction costs are perceived to be a barrier to negotiation—as they often will be for cases actually litigated.

Economists were largely silent on Hoffman and Spitzer’s claim—though Hirshleifer (1984) considered their results sufficiently important to merit discussion in his intermediate price theory textbook—but Stanford Law professor Mark Kelman (1985) suggested that the robustness of their results was open to challenge on multiple fronts, including the absence of a physical externality that might make people unwilling to monetize or negotiate over the problem.¹¹³ To get at these issues, Coursey, Hoffman, and Spitzer (1987) introduced both asymmetric payoffs and a disconcerting externality—the prospect that the “victim” would have to hold a safe but foul-tasting liquid in her mouth for 20 seconds. In a set of results that the authors found “striking,” the efficient outcome was selected in 38 out of 40 trials, leading the authors to conclude that the theorem could be fruitfully applied to real-world nuisance problems “among moderate numbers of actors” (Coursey, Hoffman, and Spitzer 1987, p. 236).

Perhaps the most infamous (alleged) experimental test of the Coase theorem did not occur in the lab, nor did it set out to test the Coase theorem. Instead, the Illinois unemployment experiment (Woodbury and Spiegelman 1987), which offered worker and employer bonuses for getting workers off the unemployment rolls, attempted to assess whether incentive schemes could reduce unemployment spells. The results were recast by Donohue (1989) as a test of the Coase theorem, which, he argued, predicts identical allocative and distributional effects across the two different bonus programs. Not surprisingly, the theorem failed

¹¹³A second critique of the conclusions drawn by Hoffman and Spitzer, also from the legal side, can be found in Hovenkamp (1990).

on every front, with agents regularly failing to collect bonuses to which they were entitled, a greater rate of success under the worker-bonus program, and payment recipients capturing the largest share of the bonus. As both Lindgren (1990) and Ellickson (1989) pointed out in scathing commentaries on Donohue's (1989) article, the Illinois experiment was riddled with transaction costs, particularly on the information front, and so did not function as a test of the Coase theorem at all. Instead it illustrated Chelius's (1976, p. 306) contention that an empirical finding against invariance is essentially a finding that transaction costs are significant and a confirmation of Coase's larger message that individuals respond "intelligently to the reality of transaction costs" (Ellickson 1989, p. 625).¹¹⁴ The lesson that emerges, though, is that extending the theorem's insights into more complicated real-world environments is hazardous—a lesson that finds further support in experiments explicitly assessing the implications of loosening the theorem's assumptions.

5.1.2 *The Effects of Costly Transacting*

The results from experiments that intentionally introduce more informationally complex environments and other forms of non-negligible transaction costs are decidedly mixed. Harrison et al.'s (1987) effort to assess Coasean bargaining in a richer and more computationally complex informational environment, including private information on payoffs, provided substantial support for the Coase theorem's efficiency prediction. Other experiments allowing for private information, though, have tended to reinforce the lessons for efficiency drawn from the theoretical literature, as do those

allowing for imperfect contract enforcement.¹¹⁵ McKelvey and Page (2000, p. 200) also find "substantial" deviations from allocative neutrality and a greater propensity for bargaining to break down—the latter suggesting the relevance of both the "Hobbes" and Myerson–Satterthwaite theorems, discussed above. Uncertainty, on the other hand, seems to be less of a barrier to efficient Coasean bargains than private information (Shogren 1992).

Taken together, these results cast significant doubt on a "presumption in favor of the Coase theorem" for many real-world settings. Even so, some of the experiments shed light on factors that may facilitate efficient bargaining. Croson and Johnston (2000) and Cherry and Shogren (2005) find that uncertainty over property rights tends to *promote* efficient outcomes, consistent with the theoretical findings of Schmitz (2001), noted above.¹¹⁶ Shogren (1998), meanwhile provides evidence that increasing delay costs—the erosion of gains due to the passage of time, as with environmental damage—provide a significant incentive to consummate efficiency-enhancing bargains, while Spencer and Shogren (2000) discovered that utilizing a "cheap talk" protocol—whereby inexperienced Coasean bargainers engage in "informal, non-binding talk prior to formal negotiations" tended to increase the efficiency of final outcomes.¹¹⁷

¹¹⁵See Schwab (1988), Shogren and Kask (1992), McKelvey and Page (2000), Rhoads and Shogren (2001, 2003), and Holt et al. (2012). Schwab (1988) also found a notable bias in the direction of the rights holder—providing evidence for the theoretical conclusions reached by Illing (1992) and McKelvey and Page (1999, 2002).

¹¹⁶But see Aivazian, Callen, and McCracken (2009), whose experimental follow-up to their work on the Coase theorem and the core finds that cycling is common, and efficiency suffers, when the core is empty—particularly when property rights are not well defined.

¹¹⁷In light of the nonconvexities discussion in subsection 4.1.1.3, above, it bears noting that Shogren, Moffett, and Margolis (2002) find that nonconvexities—such as may be associated with ecological thresholds for habitat

¹¹⁴As Lindgren (1989, p. 578) noted, Donohue had chosen a particularly bad case study since, in a world of zero transaction costs, "there are no firms, no employers, no employees, no full-time jobs, and no job searches."

5.1.3 *Rationality*

One of the more troublesome findings to emerge from the Coase theorem experiments is the possible failure of agents to behave in ways predicted by the rationality assumption. The issues here are two: the division of the surplus from bargaining and endowment effects.

5.1.3.1 *Distribution of Gains*

Subjects participating in these Coase theorem experiments demonstrated a pronounced propensity to split payoffs fairly evenly. This finding is at once consistent with Coase's view that agents tend to work things out and potentially at odds with strong forms of individual rationality, which suggest to some commentators that agents possessing property rights will utilize their position to secure virtually all of the gains from exchange.¹¹⁸ This behavior was evident in both high and low transaction costs situations and was largely independent of the number of parties to the bargain. To the extent that the Coase theorem hinges on the assumption of agent rationality, these outcomes are potentially problematic—depending on one's view of the relationship between altruism and rationality—and they also cast doubt on whether the theorem-affirming efficiency results extend to situations with rational agents.

There is a good deal of evidence that the propensity for equal payoff splits was a function of the experimental environment. Educating subjects on the meaning and implications of property rights (Harrison and McKee 1985) and giving them a sense that they had “earned” these rights (Hoffman

and Spitzer 1985, 1986)¹¹⁹ largely eliminated this behavior. And, in keeping with what we would expect from the theoretical literature, security of property rights (Cherry and Shogren 2005), private information (McKelvey and Page 2000; Rhoads and Shogren 2001, 2003), and an empty core (Aivazian, Callen, and McCracken 2009) are associated with a greater propensity toward individually rational behavior, as is a time limit on bargaining (Harrison et al. 1987).

It may be that we can simply write off inclinations toward cooperation, altruism, and the like as a consequence of experimenting on student subjects without a good deal of skin in the game, so to speak. But it could also be that, as Coase seems to have suggested, people tend to work things out, even if in less than the fully rational fashion usually attributed to them by modern economic theory—perhaps because of a disposition toward collaboration and other forms of pro-social behavior.¹²⁰ This, in turn, suggests that we may be able to rely more heavily on private solutions than the game-theoretic literature predicts, even if not precisely for the reasons suggested by the Coase theorem (Ulen 1994, p. 516).¹²¹

5.1.3.2 *WTA, WTP, and Endowment Effects*

We have already noted the implications of divergences between WTA and WTP for the Coase theorem's invariance proposition. Willig's (1976) classic defense of consumer's surplus, emphasizing the “very

or species or pollution—do not reduce the efficiency of Coasean bargaining.

¹¹⁸ This can also be interpreted as evidence against Cooter's “Hobbes theorem.”

¹¹⁹ This result may lend itself to real-world situations in which rights are initially “earned” though the litigation process and its associated costs.

¹²⁰ See, for example, Ellickson (1986) and Calabresi (2016). That the property rights holders in the Coursey, Hoffman, and Spitzer (1987, p. 229) experiments with the foul-tasting liquid externality exhibited a strong tendency to share the gains equally was attributed by the authors at least in part to the right-holder's desire to compensate victims for having to taste the liquid.

¹²¹ See, for instance, Thaler (1991, 1992).

small” distinction between WTA and WTP in most cases, provided some reassurance, but Kahneman and Tversky’s (1979) contributions and the accumulating evidence for endowment effects and related phenomena raised new questions and stimulated experimental work attempting to assess the relevance of these divergence for the theorem’s claims.

The *locus classicus* of this literature is Kahneman, Knetsch, and Thaler’s (1990) widely cited finding that agents in possession of the relevant “property right” (here, a chocolate bar) valued it more highly than they did when that same right was in the possession of another agent—a result that they attributed to the endowment effect. The result was a significant reluctance to trade, which has implications not just for the Coase theorem, but for law and economics generally (Korobkin 2014, p. 300).¹²²

Kahneman, Knetsch, and Thaler’s study understandably stimulated a good deal of additional work in this area, as experimenters attempted to assess the accuracy and robustness of the claims for the endowment effect as well as the validity of and potential reasons for the WTA/WTP disparity. Plott and Zeiler’s (2005, 2007) experiments suggest that the divergences identified by Kahneman, Knetsch, and Thaler may be attributable to “subjects’ misconceptions about the nature of the experimental task” (2005, p. 542),¹²³ but Tunçel and Hammitt’s (2014) meta-analysis of WTA/WTP studies provides evidence for a more complicated story. The weight of the evidence suggests that WTA/WTP disparities do exist, that they are larger for “public or nonmarket” goods—

and particularly for environmental goods and goods related to health and safety—than for “ordinary private goods,” and that the disparities tend to decrease with experience.

All of this leaves one with some confidence that the theorem’s invariance prediction may be accurate to a reasonable approximation in contexts, such as financial markets, where there is regular trading of well-known assets, or where litigants are experienced. This, says List (2003, p. 70), means that “the basis for many normative arguments (Coase theorem) remains intact.” The evidence that outcomes will be more in keeping with the predictions of rationality, and thus more efficient, as agents become more experienced in markets for environmental services provide some support for attempts to extend the theorem’s insights (Henrich et al. 2001; Shogren 2012, pp. 352–53), but the potential for behavioral effects gives us pause in those contexts, such as environmental and other forms of externality, where trading is more irregular—all of this apart from concerns over transaction costs.

5.2 *Empirical Tests*

While the experimental literature focused on the Coase theorem’s efficiency proposition, to the almost total neglect of the invariance claim, the empirical literature has done just the opposite. Of course, the efficiency thesis is very difficult to test empirically, at least directly, whereas the invariance proposition lends itself nicely to empirical examination and can be used, if one is so inclined, to infer efficiency.

5.2.1 *Farmers, Ranchers, and Other Parables*

Though Coase himself conducted no “tests” of his negotiation result, he did publish several articles that fall into this category during his tenure as editor of the *Journal of Law and Economics*, including those by Cheung (1973) and Johnson (1973) which

¹²²One of these implications goes to the valuation process associated with the version of the “normative Coase theorem” that recommends assigning rights according to the dictates of efficiency. See Hovenkamp (1991), Sunstein (1993), and Korobkin (2014).

¹²³Klass and Zeiler (2013) provide a critical overview of the place of endowment theory in legal scholarship.

revisited Meade's (1952) classic illustration of externalities between beekeepers and orchard owners.¹²⁴ While only one of these articles (Johnson's) was explicitly billed as an assessment of the relevance of the Coase theorem, the other was inspired by Coase, and evidence presented in these articles for thriving markets in pollination services, with "pricing and contractual arrangements . . . consistent with efficient allocation of resources" (Cheung 1973, p. 13), was in keeping with the theorem's implication that contracting can resolve externality problems.

It is perhaps natural that two of the other early attempts to empirically assess the theorem's applicability drew on Coase's farmer-rancher parable. In 1982, Ellickson (1986, 1991) immersed himself in the farming and ranching culture of Shasta County, California, to examine how farmers and ranchers resolve trespass disputes. He found that agents do indeed cooperate to resolve disputes and that the Coase theorem's predictions of the invariant impacts of legal rules are often fulfilled—but not for the reasons that the Coase theorem predicts. Rather than bargaining in the shadow of the law, agents ignored it and instead relied on well-developed norms and customs (e.g., the owners of livestock are responsible for the actions of their animals) to govern what were typically "complex continuing relationships" in which transaction costs—particularly in learning and enforcing legal rules—are high (Ellickson, 1986, p. 628).¹²⁵ Studies by Hanley and Sumner (1995) and Fischel (1995) reveal similar

behaviors, seemingly grounded in neighborliness and social custom, in other contexts.

Vogel's (1987) study of nineteenth-century changes in animal trespass law in California offers a large-scale assessment of the invariance claim in the farmer-rancher context. Analysis of cattle and crop output levels reveal that the move to make ranchers responsible for damage caused by their cattle—that is, from "fence out" laws to "fence in" laws—affected both equilibrium outcomes and production efficiency. Crop outputs increased significantly, while cattle outputs increased in some cases and decreased in others. The lesson, then, is that baseline legal rights did indeed impact resource allocation. Vogel acknowledged that his analysis was not a "test" of the theorem itself, owing to the influence of transaction costs and of nonconvexities in the production functions of farmers. Rather, he said, it is a cautionary tale about extending the domain of the invariance thesis to real-world environments. Bleakley and Ferrie's (2014, p. 3) recent study of land use on the Georgia frontier, however, suggests that invariance may indeed be "operative in the very long run."

5.2.2 *Posttrial Bargains*

Coase's negotiation analysis contemplates a situation in which a judge has rendered a decision and the parties to the dispute then negotiate an alternative arrangement if it is in their interests to do so. Though Coase referenced several nineteenth-century legal cases and provided hypothetical discussions of how negotiation might play out (Coase 1960, p. 8–15), no attempt was made by Coase—or by anyone else—to assess the extent and results of posttrial Coasean bargaining until Farnsworth's (1999) study of the subject.

Farnsworth examined post-judgment behavior in 20 nuisance cases that had fact patterns similar to the cases discussed by Coase, seemed to involve low transaction costs, and were resolved with the award of

¹²⁴Coase also published Hoffman and Spitzer's (1982) original experimental study. Lest one conclude that Coase was merely concerned with propping up the Coase theorem, he also published any number of articles that either were critical of the theorem (e.g., Aivazian and Callen 1981) or pointed to the influence of transaction costs on economic outcomes (e.g., Crocker 1971).

¹²⁵Bertrand (2011) provides an interesting discussion of the lessons of the Cheung and Ellickson studies for market and exchange-based approaches to externalities.

a property right to one side or the other. He then contacted the attorneys of record, each of whom reported that there were *no* attempts at posttrial bargaining in the cases in question. Nor, Farnsworth reports, did these lawyers think that the bargaining situation would have been any different if the court's decision had gone in the opposite direction—a fact that is important in that one objection would be that the judges had assigned rights efficiently in the first place (Farnsworth 1999, p. 384). The lawyers ascribed the failure to bargain to “acrimony between the parties” and to the parties’ unwillingness to trade off rights to be free from nuisance for cash (1999, p. 384)—the latter of which, Farnsworth notes, is suggestive of, but may be more deeply rooted than, an endowment effect (1999, p. 396).

How might we reconcile this failure to bargain in the real world with the results of the laboratory experiments discussed above? One possibility, building on Farnsworth's (1999, pp. 406–07) suggestion that acrimony could be considered a form of transaction cost, is that the laboratory environment does not capture important negotiation-impeding aspects of real-world legal disputes. A second possibility, suggested by Sunstein, Jolls, and Thaler (1998, pp. 1499–1501), is that this failure to engage in posttrial bargaining *does* provide evidence for endowment effects, despite Farnsworth's qualification. Posner (1997, p. 1571), responding to Sunstein, Jolls, and Thaler (1998), offers still another possibility—that the courts may have assigned rights efficiently in the first place, meaning that no negotiation was necessary, Farnsworth's suggestion to the contrary notwithstanding.¹²⁶ A final possibility is that the economic approach to the problem

simply gets it wrong as respects these untidy real-world scenarios—that agents exhibit neither the strong rationality of economic theory nor the “work things out” gain seeking described by Coase in many of the situations to which the theorem's insights may seem relevant. Some further insight into these issues can be found in the application of the theorem to messy world of divorce.

5.2.3 *Taking Coase to Divorce Court*

In 1977, Becker, Landes, and Michael offered an economic theory of divorce, asserting that “if all compensations between spouses were feasible and costless, a couple would separate if, and only if, their combined wealth from remaining married were expected to be less than their combined wealth when separated ” (Becker, Landes, and Michael 1977, p. 1144). In a world in which divorce requires mutual consent, if one spouse expects to gain from divorce while the other expects to lose, and combined wealth is expected to increase, the spouse who gains from the divorce will compensate the loser to secure agreement. This “compensation of a spouse to induce acquiescence,” they said, “is *an excellent illustration of the ‘Coase Theorem’* that the allocation of property rights or legal liability does not influence resource allocation when the parties involved can bargain with each other at little cost” (Becker, Landes, and Michael 1977, p. 1144).¹²⁷ One implication of this claim is that all marriages (and all divorces) are efficient. A second is that a change in the legal rules governing divorce, from mutual consent to unilateral divorce, will have no impact on the divorce rate—a suggestion that, for the typical person on the street or even the average divorce attorney, is highly counterintuitive, and even radical.

¹²⁶Posner (1997) also notes that Farnsworth's sample size is too small for the results to be statistically significant and offers a transaction costs-based argument for why his results vindicate rationality.

¹²⁷See also Landes (1978); Becker (1981); Clark (1999); and Fella, Manzini, and Mariotti (2004).

Chiappori, Iyigun, and Weiss (2015, p. 157) have labeled the latter proposition the “Becker–Coase theorem.”¹²⁸

The move by Becker, Landes, and Michael to link divorce rates to the Coase theorem has stimulated “vast and contentious” (Voena 2015, p. 2299n2) empirical literature debating the extent to which the move from fault-based to no-fault divorce accounts for the rise in the US divorce rate that occurred around the same time. The opening salvo came from Peters (1986), who found that divorce rates did not differ significantly between unilateral divorce and mutual consent states, but that settlement payments associated with divorces are lower in states offering unilateral divorce.¹²⁹ Both of these results, she concluded, provide support for the Coase theorem. Studies casting doubt on Peters’s findings, including a particularly influential panel data study by Friedberg (1998), mushroomed in the 1990s¹³⁰ but have been challenged by Wolfers (2006), who utilized a longer sample and a model specification that more explicitly accounted for divorce-rate dynamics. Wolfers found that divorce rates spiked immediately after the introduction of unilateral divorce (perhaps reflecting pent-up demand), but that these effects largely disappeared within a decade.¹³¹ More striking, though, is his determination that while, in the absence of bargaining, one would expect a roughly 50 percentage point increase in the divorce rate from the move to unilateral divorce, the

actual increase was approximately one-half of a percentage point. In light of this, Wolfers concluded that, though the predictions of the Coase theorem are not strictly satisfied, the negligible long-run effect on overall rates of divorce suggests that “the Coasian assumption of efficient bargaining arguably provides a more useful guide than the polar opposite assumption of no bargaining” (Wolfers 2006, p. 1817). Evidence for the theorem’s invariance claim drawn from the examination of other divorce-related variables, such as female labor supply and investment in marriage-specific human capital (Stevenson and Wolfers 2006, Stevenson 2008), however, suggests that Wolfers’s claim may not generalize.¹³²

Despite the frequent suggestions that changes in divorce law function as a testing ground for the Coase theorem, there are at least two reasons to be suspicious of any theorem-related claims. One is the very real presence of transaction costs associated with both marriage and divorce (e.g., Allen 1992, Brinig and Alexeev 1993). A second and related issue here is the possibility of nontransferable utility in marital public goods (e.g., children), the complications associated with which were noted in subsection 4.2, above. As Zelder (1993) originally demonstrated, if utility is nontransferable, unilateral divorce laws may encourage inefficient divorces—a finding recently reinforced by Chiappori, Iyigun, and Weiss (2015). Taken together, these insights suggest that Wolfers’s inference of efficient Coasean bargaining from his invariance results may be somewhat optimistic—though, as Chiappori, Iyigun, and Weiss (2015) point out, in the face of the mixed evidence on transferable utility, “the Becker–Coase theorem . . . may remain an acceptable approximation.”

¹²⁸Invariance also implies that other divorce-related rules, such as those pertaining to alimony payments, will have no effect on the divorce rate (Chiappori et al. 2016).

¹²⁹Peters’s was the first large-sample test of the impact of the change in divorce laws, as well as the first to link this to the Coase theorem.

¹³⁰See, for example, Allen (1992), Brinig and Alexeev (1993), Zelder (1993), and Brinig and Buckley (1998).

¹³¹González and Viitanen (2009) and Kneip and Bauer (2009) found similar results for formal changes to unilateral divorce in Europe, though the latter’s results are less clear cut.

¹³²Further references on this score can be found in the online appendix.

5.2.4 *Free Agency in Professional Sports*

The economics of sports has also provided what some consider a fertile testing ground for the Coase theorem, this going to the effects of changes in labor law—allowing players free agency—on professional sports leagues. The typical sports fan is of the mind that free agency for players favors the wealthiest teams, allowing them to stockpile the best talent. This logic was used by team owners to justify various versions of the “reserve clause,” which bound players to their teams even when their contracts had expired and so gave owners significant monopsony power. A move to free agency, it was argued, would give rise to increased player movement and reduced competitive balance. The Coase theorem, though, suggests otherwise if transaction costs are zero: an alteration in the legal rule governing player movement will not affect the allocation of players across teams, nor the competitive balance. At most, it will shift the distribution of income from team owners to players.

Though this logic is regularly identified with the Coase theorem, it originated in an article by Rottenberg (1956), then of the University of Chicago, in what is generally considered the first article in sports economics, “The Baseball Players’ Labor Market.”¹³³ It was Demsetz (1972, pp. 16–18) who, in the midst of the legal challenge to baseball’s reserve clause, first connected player movement to Coase’s negotiation result, defending its application on the grounds that the transaction costs

involved in player–club negotiations “would seem to be negligible.”

The arrival of free agency in US professional sports beginning in the mid-1970s allowed economists to test the Coase theorem’s predictions. Spitzer and Hoffman (1980) provided the first empirical evidence that the abolition of the Major League Baseball (MLB) reserve clause did not affect player movement, a finding echoed in a number of more extensive subsequent studies.¹³⁴ Others, however, have found evidence of increased player movement under MLB free agency, a result that has been attributed to divergent owner–player goals (e.g., the maximization of income versus winning), as well as to the greater outside income opportunities (e.g., endorsements) that a move to a larger market may afford a player (Vrooman 2000). The evidence for the effects of free agency on competitive balance is similarly mixed, both within and across professional sports, with studies finding increases, decreases, and no change in this balance. Nor can any firm conclusions be drawn from the literature on the institution of player drafts, which are often justified on the grounds that they redistribute income from winning teams in larger markets to losing teams in smaller markets and so preserve competitive balance.

If Demsetz was correct in his opinion that the transaction costs involved in player–owner negotiations are negligible, the many findings against invariance here are not comforting for the Coase theorem’s empirical relevance. On the other hand, the inconsistency of this evidence may provide support for the idea that transaction costs are relatively low, and that something approximating invariance is a realistic assessment of the outcome.

¹³³Rottenberg’s invariance claim has been called an anticipation (Cymrot, Dunlevy, and Even 2001, p. 595), an “illustration” (Miceli 2004, p. 213), and a “particular application” (Daly 1992, p. 15) of the Coase theorem. Besanko and Simon (1985, p. 71) apply the “Coase–Rottenberg theorem” moniker. Fort (2005, p. 348) argues that the focus on the Coase theorem rather than Rottenberg in the sports context does the latter an injustice, given Rottenberg’s priority.

¹³⁴Fort et al. (2016) provide a useful overview of this literature, many references to which can be found in this article’s online appendix.

5.3 Interpreting the “Tests”

There are two problems with any experimental or empirical test of the Coase theorem. First, the theorem’s conditions are not fully satisfied in any real-world setting. Second, any true “test” of the Coase theorem would confirm its validity, and any conflicting results must involve a violation of one of the theorem’s underlying assumptions. Given this, these tests of the theorem must be interpreted as explorations of situations in which the theorem’s severe restrictions are loosened—applications of the theorem’s benchmark function—rather than as tests of the theorem itself, even if that is not what is claimed by those doing the testing. Nor is this a problem, as Stigler—a proponent of such studies—noted, since, “after all, it is a theory’s domain of applicability that determines its importance to a science” (Stigler 1992, p. 458). What *is* clear from the Coase theorem literature is that the questions raised by the empirical and experimental literature about the extent of this domain have done nothing to slow its expansion on the theoretical front.

6. *The Many Faces of the Coase Theorem*

If there is a defining feature of the Coase theorem’s more recent history, it is the expansion of the theorem’s domain beyond the realm of externalities. There is virtually no corner of economic analysis untouched by the Coase theorem, even if those uses sometimes stray far from the role that the theorem, as refined here, properly plays.¹³⁵ In its more recent renderings, the theorem (i) tells

¹³⁵The discussion in this section of the paper focuses on how economists and others have used the theorem and not on the question of whether those uses are somehow appropriate or inappropriate. Constraints on both space and the reader’s attention span simply do not allow for the latter. The implications of our discussion in subsections 4.3.2–

us that agents will always negotiate their way from suboptimal outcomes to Pareto efficient points if transaction costs do not get in the way, whatever the context;¹³⁶ (ii) predicts and explains symmetries (invariance) across the spectrum; and (iii) suggests that inefficient institutions will be replaced with efficient ones (Palfrey and Srivastava 1989, p. 669). So conceived, the theorem becomes a general proposition, akin to the law of demand, with wide-ranging application.

While environmental and legal issues have been at the center of Coase theorem scholarship from the start, its tentacles began to spread early on, with Calabresi (1968) suggesting that the theorem’s domain was the entire realm of market failures, from monopoly to public goods. The theorem has even borne progeny. It was one of the inspirations for Becker’s (1974) “rotten kid theorem,” which Bergstrom (1989, p. 1138) calls the “younger sibling” of the Coase theorem and in turn spawned Benjamin’s (2007) “rotten firm theorem.” We also have a “political Coase theorem,” a “linguistic Coase theorem,” a “federal Coase theorem,” and a “Coase theorem about theories”¹³⁷—in addition to *two* “normative Coase theorems” and a “Becker–Coase theorem” on divorce. Others have retroactively painted the Ricardian equivalence theorem, the Modigliani–Miller theorem, and the invariant incidence of sales taxes, ad valorem and per unit taxes, and tariffs and quotas as “special cases” or applications of

4.3.4, above, for the appropriateness of many of these uses likely can be inferred by the reader.

¹³⁶See, for example, Foss and Foss (2005, pp. 545–46), quoted in table 2, above. Anderlini and Felli go so far as to claim that the theorem “shapes the way economists think about the efficiency or inefficiency of outcomes in most economic situations” (Anderlini and Felli 2001, p. 377). At the very least, it is a prime example of the increasing pervasiveness of “the idea that any gains that can be obtained are in fact picked up” within economics (Olson 1996, p. 3).

¹³⁷Peltzman’s “Coase theorem about theories” states that, “If one model generates unexploited gains, another model will come along with some set of deals that realizes those gains” (1987, p. 943).

the Coase theorem.¹³⁸ Though the Coase theorem has often been described as an illustration of Smith's "invisible hand" proposition,¹³⁹ one is surprised to find no one claiming that Smith gave us little more than a special case of Coase.

The literature invoking the Coase theorem leaves one with the sense that there are practically no limits to its perceived domain. It has been applied to topics as far flung as sex and rape (Schroeder 1999), construction management (Lai, Ngar Ng, and Yung 2008), satellite launch and placement (Doherty 1989), social norms (Ellickson 2001), the cancellation of a long-running UK folk music festival (Hojman and Hiscock 2010), "internalities" and paternalism (Whitman 2006, Dodd 2008),¹⁴⁰ squatter communities and eviction programs in third-world urban areas (Hoy and Jimenez 1991), the disposal of cow manure and the determination of the formulation of the cattle feed that gives rise to it (Vukina 2003), and as a vehicle for analyzing the movie *Blade Runner* (Guerra-Pujol and Martinez-Garcia 2011). Turning an eye to history, the theorem has been used to explain institutional obstacles to technological change in eighteenth-century French agriculture (Hoffman 1989), bargains between pirate privateers and their victims (Leeson and Nowrasteh 2011), the English practice

of trial by battle (Leeson 2011), indentured prostitution in imperial Japan (Ramseyer 1991), and manumission in the United States and other slave societies (Cole 2005). It has even been located in the Bible (Schein 2004).¹⁴¹ The nimbleness of the theorem, which no doubt accounts for some of the suspicion of it, is reflected in its use to construct explanations for why medieval English agriculture was inefficient (McCloskey 1976, 1991) and a more recent explanation for why it was efficient (Richardson 2005), as well as arguments for and against privatization (Gerbasi and Warner 2007; Guriev, Kolotilin and Sonin 2011).

In the remainder of this section, however, we will focus on a narrower range of applications of the Coase theorem to various fields of economics. These applications, though, show the full spectrum of Coase theorem uses—policy tool, empirical proposition, and benchmark—on display.¹⁴²

6.1 *Law and Economics*

Daniel Farber has said "if there is anything that can be described as the canon of 'law and economics,' the Coase Theorem is at the heart of it" (1997, p. 397). It has both occasioned "an irreversible transformation in the traditional methods of legal interpretation" (Parisi 1995, p. 149) and attracted significant criticism for doing so. But it is fundamental to the field in a peculiar way, in that, if the theorem were universally applicable, there would be no need for an economic analysis of law; rights would find their efficient final resting place without the assistance of economics. Lawyers, then, "earn their livelihood

¹³⁸See, for example, Allen (1999, pp. 904–05) and Logue and Slemrod (2010, pp. 798–99), as well as the references provided in the discussion later in this section. Stigler (1966, p. 113) pointed to the correspondence between the Coase theorem and invariant sales tax incidence already in his original statement of a "Coase theorem."

¹³⁹See, for instance, McCloskey (1998, p. 368), Samuelson and Nordhaus (1992, p. 379), and Starrett (2003, p. 113).

¹⁴⁰An "internality" is a spillover effect between the present and future selves, such as with present behaviors that lead to future obesity—the idea being that present self can (Whitman 2006) or cannot (Dodd 2008) bargain with future self to generate a Pareto-optimal outcome, with corresponding implications for the desirability of paternalistic government-imposed restrictions, such as soda bans, on individual choices.

¹⁴¹The passage in question is Deuteronomy 23: 25–26. One could argue that this is a rather tortured case.

¹⁴²Additional references to the topics discussed in the remainder of this section can be found in the online appendix.

from transaction costs” (D’Amato 2011, p. 762n15).

The Coase theorem plays three basic roles in the economic analysis of law. First, it is used to prioritize contract when low transaction costs generate a presumption that agents can negotiate. Though Farnsworth’s (1999) empirical analysis of nuisance cases cast some doubt on the willingness of agents to engage in posttrial bargaining, *pretrial* settlement negotiations, long portrayed as an example of the Coase theorem at work, are commonplace.¹⁴³ The only analytical distinction here is that agents are bargaining in the shadow of *expectations* regarding judicial decisions rather than the concrete decisions themselves. Perhaps because of this, Farnsworth’s (1999) results have not slowed the tendency to support negotiated solutions.

Second, and in keeping with its benchmark function, the Coase theorem highlights the inefficiencies generated by transaction costs and the contribution that legal rules can make to increasing or reducing these costs. The idea that legal rules should be designed to minimize transaction costs and so facilitate Coasean bargains—one version of the “normative Coase theorem”—is an outcome of this.

The third major role played by the theorem here lies in the justification that it provides for the deployment of the efficiency criterion in legal decision making—the second version of the “normative Coase theorem.”¹⁴⁴ The theorem tells us that agents will negotiate to an efficient and invariant outcome if transaction costs do not get in the

way. This suggests to some that the role of law in a positive transaction costs environment is to facilitate the attainment of that outcome by resolving disputes as those agents would have done if they were able.

6.1.1 *Real Property*

Given that Coase situated his negotiation result in the realm of property law, it is no surprise that the theorem has been influential in this area. But the nature of its influence has as much to do with how property is conceived as with negotiations over rights. The Coase theorem has been held responsible for the decline in the *in rem* conception of property—providing security against interference by others—and the rise of the *in personam* view that property is simply a bundle of individual use rights (Merrill and Smith 2001).¹⁴⁵ Absent transaction costs, property has no distinctively useful character; all rights would be costlessly and infinitely divisible (Lee and Smith 2012). Property rights simply provide the basis for contracting and for setting down use rights, and the Coase theorem’s contribution is to show that, under these conditions, each stick in the property bundle will gravitate toward its highest-valued use.

The *in personam* view of property has come to pervade post-Coasean views of property, as Merrill and Smith (2001, pp. 375–85) illustrate. It introduces a problem, though, when transaction costs, including those associated with delineating, understanding, and enforcing rights, abound (Merrill and Smith 2011, p. S100). In *in personam* rights can be highly fragmented, exacerbating the influence of transaction costs. In *in rem* rights thus can be seen as an efficient response to

¹⁴³The Coase theorem was part of the inspiration for Landes’s original analysis of pretrial settlement (Landes 1971, p. 102), as well as for the argument that law should promote both pretrial settlement (Schiff 1995, pp. 326–27) and mediation (Duke and Jost 2003).

¹⁴⁴This normative thrust originated with Calabresi (1968, p. 69). It bears emphasizing that the Coase theorem itself provides no justification for either of these “normative Coase theorems.” We need not wade into a discussion of Hume’s guillotine here.

¹⁴⁵The latter viewpoint was not new with Coase; it originated with Hohfeld (1913, 1917)—who also gave us reciprocity—and was central to the activist agenda of the legal realists. There is no small amount of irony in the fact that the legal realists and Chicago-inspired law and economics embraced these views of rights.

the pervasiveness of transaction costs—an application of the transaction-cost minimization version of the normative Coase theorem (Merrill and Smith 2011, S94–95).¹⁴⁶ Ellickson’s (1986, 1991) findings, discussed above, are illustrative of why the Coasean view can be misleading. In rem rights offer a low-cost means of protecting property against what could be a large number of potential violators by bundling these rights together within a system of clearly delineated rules. The norms against cattle trespass found by Ellickson are essentially an example of “an in rem norm” that facilitates exactly this, reducing transaction costs through their ease of delineation and communication (Merrill and Smith 2001, pp. 388–91).

The Coase theorem has been used to provide insight into the manner in which property interests should be protected and, in particular, into the distinction between property rules (prohibiting nonconsensual takings of property) and liability rules (allowing nonconsensual takings so long as compensation is paid).¹⁴⁷ The theorem tells us that, when transaction costs are *zero*, property rules and liability rules are allocatively equivalent. The conventional wisdom for situations outside of this world, following the seminal work of Calabresi and Melamed (1972), has been that property rules are preferred for situations involving low transaction costs because they promote bargaining. Liability rules, in contrast, are preferred in high transaction cost environments because they facilitate efficiency-enhancing reallocations of rights while bypassing the hold-out, free-rider, and other transaction costs-related problems that would plague—and often preclude—property rule-induced negotiation

(Posner 1977, p. 51; Cooter and Ulen 1997, pp. 97–100).

More recent work has led to a reconsideration of the efficient rule for *low* transaction cost environments, where Coasean bargaining is feasible and perhaps should be encouraged, but these costs, including those resulting from private information, raise the specter of strategic behavior and thus inefficiency (Ayres and Talley 1995a, b; Kaplow and Shavell 1995, 1996). This line of thinking also has relevance for the analysis of fragmented property where liability rules and mixed remedies often have superior properties (Schulz, Parisi, and Depoorter 2002).

6.1.2 *Intellectual Property*

The initial application of Coase’s insights to the law of intellectual property came at the hands of Breyer (1970), later of the US Supreme Court, whose message was that the significant transaction costs attending, for instance, permission seeking, spoke in favor of loosening copyright protections. A significant amount of the subsequent literature followed this line of thinking, arguing that intellectual property situations, more so than for physical property, are riddled with transaction costs. An inventor (whether of a physical product or software), for example, has significant informational advantages over potential contracting partners and will not be inclined to reveal information that compromises trade secrets. Proper assessment of benefits and costs, then, becomes problematic and holdups a very real possibility (Merges 1994; Witt 1996, p. 123).¹⁴⁸ These costs work against innovation-facilitating agreements and suggest the need for more

¹⁴⁶See also Lee and Smith (2012). In a more general sense, in rem property becomes an efficient substitute for an extensive array of contracts, functioning in a way similar to the firm in organization theory.

¹⁴⁷See the discussion of open and closed classes in subsection 4.1.1.1, above.

¹⁴⁸This issue is germane to recent debates over copyright in music and file sharing. Because there is no centralized database of copyrighted music, determining rights holders is very costly and suggests against any assumption that music licensing follows market principles (Perritt 2010, p. 848).

narrowly defined intellectual property rights (Landes and Posner 2003, p. 421).

A second school of thought, though, contends that transaction costs are actually *low* here and finds in the Coase theorem an argument for *strong* protection of patent (Kitch 1980, Cheung 1982) and copyright (Dam 1995 and Easterbrook 1999, 2005). Strong patents both preserve innovation incentives and, per the Coase theorem, facilitate efficient licensing agreements (Hopenhayn and Mitchell 2001, p. 158). This view also suggests the possibility of scaling back the application of antitrust laws to patent pools and cross-licensing arrangements, since, far from being anticompetitive, they are simply examples of “the Coase theorem at work” (Lemley 2000, pp. 147–48; see also Hovenkamp 2018). The case on the copyright front is even more optimistic, as the transaction cost-reducing effects of technology in the copyright realm are moving us “toward the world where transactions costs are close to zero, and the Coase Theorem can be a reality rather than a thought experiment” (Easterbrook 2005, pp. 966–67).

Others, though, object to formulating any hard and fast conclusions about the strength of intellectual property protection, drawing from the Coase theorem the need to discriminate between high and low transaction cost situations. The implication, consistent with Coase’s larger message in “The Problem of Social Cost,” is that efficient intellectual property protection requires that protections vary within and across its forms and uses (Landes 1992, Choi 2002).

6.1.3 *Antitrust*

The propensity of antitrust scholars working in the Chicago tradition to find competitive justifications for seemingly restrictive practices found an ally in the Coase theorem, which suggests that actions taken by monopolists may well *reduce* rather than increase distortions (Barzel and Kochin 1992, p. 23).

The theorem has been invoked on several fronts as justification for narrowing the application of antitrust law. Meese (1996, 2005), for example, draws on it to suggest that courts are too quick to see anticompetitive behavior in nonstandard contracts—such as tying contracts—that work to reduce transaction costs and therefore promote efficiency. That such contracts can be manifestations of available mutual gains rather than market power/anticompetitive behavior, he says, “is a necessary implication of the Coase theorem” (Meese 1996, p. 131). So read, the theorem informs us that market power goes only to the division of the surplus and not to efficiency concerns (Brickley, Misra, and Van Horn 2006, pp. 173–74).¹⁴⁹

Hovenkamp (1992, p. 383) suggests the need for pause here, however, because while transaction costs may be low for some of the bargains being studied, they may not be for others that bear on efficiency judgments. The danger lies in affixing the “efficient” label to agreements that may be joint-maximizing for the agents involved but not welfare maximizing—for example, cartel-like behavior among competitors (Hovenkamp 1995, p. 338) and exclusionary rebates to complement suppliers (Brennan 2008, p. 364). The lesson, Hovenkamp cautions, is that “the Coase Theorem is not a general equilibrium theorem”; instead, “[i]t is concerned only with the result in a particular market, and that market may be very small” (Hovenkamp 1995, p. 338).

6.1.4 *Accident Law*

Accident law may appear to be a most unlikely and fruitful arena for application of Coase’s negotiation result, given the nature of “accidents” and the seeming impossibility of having agents negotiate regarding the placement of liability. (Think, for example,

¹⁴⁹See also Johnsen (1991), Tye (1992), Harrison (1997), and Easterbrook (2000).

of drivers negotiating with potential pedestrian victims of their careless driving).¹⁵⁰ And, in fact, the theorem's use in this literature is confined primarily to a normative extension—placing liability on the least-cost avoider. But the theorem itself is not without relevance to accident situations, as it provides a justification for the class action lawsuit (Wright 1969). By collapsing the class of, say, defective products victims into a single unit, the class action reduces transaction costs and so promotes efficient bargained solutions, all the while obviating difficulties associated with the judicial determination of the least-cost avoider.

The more significant mark on accident law has been left by the competitive markets version of the Coase theorem, which has been employed as a vehicle for analyzing accidents involving agents in a preexisting relationship—in particular, products liability and worker's compensation. The Coase theorem suggests that, in a competitive environment, the location of liability for injuries caused by product defects or workplace accidents is irrelevant; prices will simply adjust to reflect the exposure to injury-related costs (Calabresi 1961, Priest 1992). The application of the theorem to products liability occurred first in the legal literature (Franklin 1966), but despite this lengthy connection there has been virtually no empirical work done to assess the impact of changes in products liability law—either the move toward increased manufacturer/seller liability through much of the twentieth century or more recent reforms that have reduced its extent. However, a recent study by Shepherd (2013) provides evidence that some among the recent reforms restricting products liability, including limitations on the time period during which manufacturers are liable for product defects, the introduction of

comparative negligence defenses, and limitations on nonmanufacturer liability have had positive effects on economic activity.¹⁵¹ Other reforms, though, such as caps on noneconomic and punitive damage awards, appear to have minimal effects.

The economic theory of the neutrality of liability for workplace accidents goes back to the early twentieth century (Taussig 1911, vol. 2, pp. 327–28; Brown 1922) but has become more commonly identified with the Coase theorem in both its competitive markets (Woodward 1967) and bargaining (Williamson 1967, Chelius 1974) versions. In reality, however, asymmetric information and insurance that is not perfectly experience-rated are particularly problematic for the theorem's application (Butler and Worrall 1983, pp. 582–83; Butler 1996, p. 407; Hylton 1997, p. 272), though, as Hylton points out, competition may lead to information revelation, by employers, that allows these risks to be properly accounted for in employment contracts. Empirical studies by Chelius (1976, 1982), Fishback (1987), Fishback and Kantor (2000), and Butler and Worrall (2008) find that modifications to the liability regime, including the establishment of workers' compensation systems, did indeed affect both accident rates and the severity of injuries and that, consistent with what transaction costs might suggest, these effects varied with differences in supervision and accident-prevention costs across industries.¹⁵²

¹⁵¹The second of these reduces seller liability if the defendant contributed to her injuries though her own negligence when using the product. The last shields a retailer from liability for injuries caused by a product it did not manufacture.

¹⁵²This should not be taken to imply that firm-level Coasean bargains are not feasible for workplace safety conditions or over mandated benefits generally, or that competitive forces cannot at least partially offset their effects on, say, wages. See, for example, Ogus (1995) and Gruber (1994), the latter of which goes to Coase-theorem-related invariance concerns but does not invoke the theorem.

¹⁵⁰Of course, there is the further question of whether "accidents" even exist in a world of zero transaction costs. See Dorfman (1970, pp. 95–98).

6.1.5 *Contract*

The Coase theorem tells us that, in a zero transaction costs world, negotiated contractual terms can be presumed to be efficient—an insight used to justify a default toward the enforcement of contracts as written. Though the reality of transaction costs is rightly considered a barrier to the operation of the Coase theorem’s magic in myriad situations, contract disputes regularly involve situations in which the contract in question *was negotiated* by the parties to the suit—as against, say, a standard-form contract governing liability for the use of a product—and thus where transaction costs may be relatively low. This has led a number of commentators to extend the zero transaction costs enforcement logic to low transaction costs situations—with applications ranging from contracted price discounts (Gordon and Frankel 1994, pp. 1547–48) to parental surrogacy contracts (Trebilcock and Keshvani 1991, pp. 584–85)—both because of the efficiency presumption and because the failure to enforce contracts negotiated under these conditions can generate inefficient litigation or breach (Mattei 1995, pp. 436–37).

Incomplete contracts are the norm even when the costs of transacting are low, and when disputes arise courts fall back on default rules to fill the gaps. But what should these default rules be?¹⁵³ The Coase theorem tells us that default rules may not matter (Ayres and Gertner 1992), but the evidence is unclear.¹⁵³ Ayres and Gertner (1989) suggest the “normative Coase theorem,” where efficiency dictates that default rules be set to mimic the result that parties would have reached if the Coase theorem applied. Easterbrook (1993), in contrast, makes the case for forcing negotiation, particularly for complex relationships, such as fiduciary duty, where courts are

ill-equipped to determine optimal relational structures.¹⁵⁴ But default rules also influence the costs of transacting, and selecting the “wrong” rule can force needless expenditures on negotiation (Farber 2005, p. 932). The need to account for transaction costs, such as the effects of private information, led Talley (1993) to use mechanism design and the Coase theorem to construct a case for the *nonenforcement* of penalty clauses that include sub- or supraoptimal liquidated damages. This, Talley showed, provides agents with a greater incentive to accurately reveal valuations in the renegotiation process, enhancing the probability of efficient breach and minimizing information-related inefficiencies.

6.1.6 *Constitutional Law*

The Coase theorem has been applied to constitutional questions only infrequently. One of its earliest applications (Buchanan and Tullock 1962), though, indirectly implied that a constitution can be conceived of as a set of Coasean bargains, and it has been suggested that both the Magna Carta and the US Constitution can be viewed as the outcome of such bargains (Glaeser and Shleifer 2002, Djankov et al. 2003). The one area where Coase’s result *has* been frequently invoked is in discussions of the Fifth Amendment takings clause, where it has been argued both that governmental takings of private property are not justified, since negotiations would have bought about that result if it were wealth enhancing, and that government taking power is an efficient response to the reality of transaction costs.¹⁵⁵ But as a number of recent commentators have emphasized, there are any number of

¹⁵⁴See also Easterbrook (1999, pp. 110–11). For an alternative view, see Johnston (1992).

¹⁵⁵The two earliest references here are Michelman (1967) and Sax (1971). For more recent discussions, see Fischel (1985) and Miceli and Segerson (2007).

¹⁵³See, for example, the survey in Kessler and Rubinfeld (2007, pp. 349–50).

rights in the US Constitution that could be or have been subject to Coasean bargains, including the sovereign immunity provision of the Eleventh Amendment (Farber 1996), the separation of powers (Sidak 1991a, b; and Koh 1991), and freedoms of religion (Mueller 1997) and speech. On the speech front, Brietzke (1996) uses the theorem to justify legal prohibitions on racist speech, while Rasmusen (1998) draws on it to justify legal sanctions for the desecration of symbols, such as a national flag.

The lesson here is that constitutional provisions can sometimes be bargained. For example, a decision to find a constitutional right to a parental veto of underage abortion, or a finding that parents have no such right, may well be irrelevant, as parents and daughters can strike bargains to achieve their preferred outcome. These examples are admittedly not typical applications of the Coase theorem but, consistent with the theorem's benchmark function, they do "aptly illustrate the startling insights which the Coase Theorem can prompt" (Farber 1997, p. 403).

6.1.7 *The Coase Theorem in Judicial Opinions*

For all of its prominence in the legal and economic analysis of law literatures, the Coase theorem has played a very small (overt) role in judicial decision making. Its reasoning has been invoked in only 36 judicial opinions in US federal and state courts,¹⁵⁶ with the theorem mentioned by name six times. The cases in question come from a variety of areas of law—for example, property, torts, contract, bankruptcy, labor,

taxation, securities—and numerous jurisdictions, though more than 40 percent of the opinions applying the theorem come from just two judges, Posner (eight opinions) and Easterbrook (five opinions).

It is not clear that the decisions in any of the cases in question turn on the theorem. The discussions of it tend to be very brief and constitute just one piece of the court's reasoning. Fifteen, or nearly half, of these opinions involve a judicial assessment that the parties can and perhaps should be expected to make adjustments via negotiation. A representative opinion comes from Judge Posner, writing on a dispute between Chrysler and one of its automobile dealers, who points out that though "The parties . . . have divergent interests, . . . they can be expected to negotiate to the solution that maximizes the net benefits of their relationship."¹⁵⁷ In a similar vein, Judge Kram holds that "When a distressed or nearly bankrupt firm seeks to reorganize its financial structure, the incentives among those financially interested in the firm would generally be to contract to the efficient solution and avoid the transaction costs of a bankruptcy proceeding."¹⁵⁸

The invariance principle is referenced in roughly two-thirds of the cases, sometimes in tandem with the discussion of negotiated solutions or a competitive markets version of the theorem,¹⁵⁹ but also as a stand-alone claim. Judge Posner, for example, writes, "We should recognize initially that, when those

¹⁵⁷*Chrysler Corp. v. Kolosso Auto Sales, Inc.*, 148 F.3d 892 (1998). Here and elsewhere, however, Posner qualifies his position by noting that the possibility that bargaining will not take place justifies the court's use of a specific (efficient) remedy.

¹⁵⁸*UPIC & Co. v. Kinder-Care Learning Centers, Inc.*, 793 F.Supp. 448 (1992).

¹⁵⁹In these competitive markets Coase theorem opinions, of which there are six, the judges invoke a version of the theorem that has prices adjusting appropriately to account for alterations in legal circumstances—such as for wage rates due to changes in liability for workplace accidents.

¹⁵⁶The data come from searches conducted by the author on "Coase theorem," "Coase," and "Problem of Social Cost" in the WestLaw and LexisNexis databases of US federal and state court cases. Further information on the search methodology is found in the online appendix.

affected by a chosen default rule can easily bargain around it to agree to a mutually beneficial course, the rule choice will generally make little difference to the parties' actual agreement."¹⁶⁰ Judge Easterbrook, who invokes invariance on multiple occasions, sounded a similar note when suggesting in a labor law case that "the rule of liability won't matter when the number of parties is small and no one is judgment-proof."¹⁶¹

Transaction cost-related qualifications, including structural impediments to bargaining, are frequently cited as a possible barrier to Coase theorem-type solutions, and with various degrees of concern. Judge Williams, in a case involving emissions trading, emphasized that "transaction costs notoriously are not zero,"¹⁶² while Judge Kram pointed to aspects of the law that create hold-up incentives in certain contexts.¹⁶³ In light of our discussion of divorce law in subsection 5.2.3, above, it is interesting to note the divergent judicial perspectives on the matter. Judge Shadur expresses no qualms about efficient and invariant negotiated solutions here, even given the "unpleasantness" of this context, calling it "a classic illustration of the Coase Theorem."¹⁶⁴ Judge Holmes, however, provides a very different perspective in his discussion of rights to dependent tax exemptions: "It is one of the great theorems of law that if all sides are rational actors with perfect knowledge and zero transaction costs, the allocation of resources—even including exemptions, child tax credits, and the like—would be the same regardless of the rules we choose. . . . *But in our fallen world, there are few stages on which rational actors are more*

outpeopled by the children of wrath than in domestic-relations law."¹⁶⁵

All in all, given the paucity of references to the theorem in the case literature it is difficult to avoid the conclusion that the theorem plays a far more significant role in legal scholarship than in judicial decision making, but this is also true for the economic analysis of law generally.

6.2 Environmental Economics

The Coase theorem's legacy in environmental economics extends back farther than that in any other applied field of economics,¹⁶⁶ and "The Problem of Social Cost" remains one of the most cited articles in both the environmental and ecological economics literatures (Ma and Stern 2006). Much of the attention given to the theorem within environmental economics during the 1970s was wrapped up in the controversy over it and defenses of Pigouvian remedies,¹⁶⁷ but subsequent decades have seen more practical use made of the theorem as well as the extension of its logic into positive transaction cost situations. Though Harstad (2012, p. 81) can claim with some justice that, beyond emissions trading, "the influence of the Coase theorem on environmental policy has been limited," Shogren (2012, p. 351) predicts that "a Coasean-style collaboration and negotiation is [its] future."

One of several lessons taken from the Coase theorem is the idea that externalities are the result of an absence of property rights over the relevant resources. Such is the influence

¹⁶⁵ *Armstrong v. C.I.R.*, 139 T.C. No. 18 (2012).

¹⁶⁶ See, for example, Milliman (1962) and Kneese (1964), as well as Medema's (2014c) analysis of the uses of the theorem in the environmental economics literature of the 1960s and 1970s.

¹⁶⁷ Krutilla and Krause (2011, p. 298) provides a recent analysis of the theoretical symmetry between Coasean and Pigouvian instruments in the idealized world of zero transaction costs.

¹⁶⁰ *Bidlack v. Wheelabrator Corp.*, 993 F.2d 603 (1993).

¹⁶¹ *Reyes v. Remington Hybrid Seed Co., Inc.*, 495 F.3d 403 (2007).

¹⁶² *Michigan v. U.S. E.P.A.*, 213 F.3d 663 (2000).

¹⁶³ *UPIC & Co. v. Kinder-Care Learning Centers, Inc.*, 793 F.Supp. 448 (1992).

¹⁶⁴ *Coltman v. C.I.R.*, 980 F.2d 1134 (1992).

of this view that both the OECD (1977) and the World Bank (1992) have pointed to the need to establish or clarify property rights as a necessary first step in dealing with environmental issues. The pairing of this insight with the theorem's suggestion that the exchange of these rights will lead to efficient resource use has contributed to several important insights for environmental policy. Though the analysis is often grounded in the Coase theorem, proponents of property-rights approaches recognize that transaction costs are not zero. But with well-defined property rights, they argue, the exchange process is likely to be less costly than centralized solutions and the accompanying bureaucratic oversight.¹⁶⁸

6.2.1 *Emissions Trading*

The insight behind markets in pollution rights, including the cap-and-trade variant, is often attributed to Coase (e.g., Tietenberg 2010, p. 360), but the history is more nuanced. Crocker (1966) first proposed the exchange of pollution rights, and though he does not deny that Coase's article had some influence on his thinking, his inspiration was Hirshleifer, de Haven, and Milliman's (1960) and Gaffney's (1961) discussions of efficiency-impeding barriers to the exchange of water resources (Crocker 2011, pp. 4, 15). The other pioneers of this approach, Dales (1968a, b) and Montgomery (1972), also found their fundamental inspiration elsewhere. Over the years, however, the Coase theorem and emissions trading have developed something of a symbiotic relationship. Indeed, a case can be made that the acceptance of the possibilities of emissions trading played a role in the gradual acceptance of the Coase theorem, and there can

be little question that the theorem—particularly the competitive markets formulations of it—brought increased attention to emissions trading in the latter's formative years.

It is certainly true that emissions trading has a Coasean flavor, though one could justly argue that these trading systems have more in common with Coase's (1959) analysis of the allocation of broadcast frequencies than with "The Problem of Social Cost" (Medema 2014c). Yet, as several commentators have pointed out, these systems are at least as Pigouvian as Coasean, with government setting quantities rather than tax prices (Masur and Posner 2015, pp. 102–03). Efficiency (as opposed to simple cost minimization for a given q) then depends crucially on the government correctly setting the initial number of permits. Emissions trading was more tightly aligned with the Coase theorem, in a conceptual sense, through Montgomery's (1972) demonstration that the initial distribution of permits has no effect on the resultant equilibrium. However, the reality of transaction costs (Krutilla 1999, Hahn and Stavins 2011), as well as the potential for monopoly power (Maeda 2003) and other forces, suggest that the extent of permit trading may be lower than the theorem predicts and that market outcomes may not be invariant across alternative initial allocation schemes. Simulations by Rose and Stevens (1993) provide evidence that outcomes are not greatly affected by the criterion used to make initial permit assignments. And while more recent work by Abrell, Ndoye Faye, and Zachmann (2011), using data from the European Union's Emission Trading System, finds that initial permit allocation and *ex post* carbon emissions are correlated, implying that these markets "deviate from the idealised market conditions assumed in the Coase theorem" (Abrelle, Ndoye Faye, and Zachmann 2011, p. 15), Hahn and Stavins's (2011) analysis of data from seven emissions trading systems, including the European

¹⁶⁸The property rights approach is sometimes referred to as "free market environmentalism" (Anderson and Leal 1991), an unfortunate moniker conjuring up images of the Grand Canyon being offered for sale to the highest bidder.

Union's, finds "modest" but encouraging levels of support for the invariance claim.

6.2.2 *Small-Scale Property Rights Solutions*

A more direct line of inspiration runs from the Coase theorem to smaller-scale applications of the property rights cum exchange approach to managing environmental and natural resources (Anderson and Libecap 2014). Conservation easements, land trusts, individual transferable quotas in fisheries, and water-trading projects, all increasingly prominent over the last thirty years, have an underlying logic that has been linked to the theorem. And because of the small numbers and potential for relatively low costs of transacting, property rights solutions are considered germane to issues ranging from localized water pollution (Söllner 1994) to salinity management (Greiner and Cacho 2001) to common-pool problems associated with wind farms (Kaffine and Worley 2010).

Although the literature is not replete with illustrations of true Coasean bargaining over environmental problems, the rapid growth of land trusts in recent decades is considered by some to illustrate the Coasean bargaining process at work, despite the fact that these trusts are often attended by governmental subsidies (Anderson 2004, p. 363).¹⁶⁹ More common are payment for environmental (or ecosystem) services (PES) systems, which are, as Engel, Pagiola, and Wunder put it, an "attempt to put into practice the Coase Theorem" (2008, p. 665). Under a PES system, an environmental services buyer offers to pay an environmental services seller to undertake an activity that benefits the buyer—for example, watershed management or reforestation of deforested land. The

buyers may be users of the service—the form of PES program that closely approximates the Coasean environment—or the project may be government-financed, the latter being particularly relevant when the requisite conditions for Coasean bargains are not present.¹⁷⁰

There is wide agreement that the conditions necessary for user-financed (Coasean) systems are absent in the vast majority of cases. And while examples of user-financed PES schemes do not abound, they can be found for watershed services and carbon sequestration in Ecuador (Wunder and Albán 2008), watershed and biodiversity services in Bolivia (Asquith, Vargas, and Wunder 2008), watershed services in Nicaragua and Guatemala (Corbera, Kosoy, and Tuna 2007), and wildlife conservation in Cambodia (Clements et al. 2010) and Africa (Nelson et al. 2010). The difficulties that can attend the Coasean schemes are on full display in Abildtrup, Jensen, and Dubgaard's (2012) study of attempts by Danish waterworks to set up voluntary agreements on pesticide use with nearby farmers. Abildtrup, Jensen, and Dubgaard found that these negotiations failed in the majority of cases, typically due to disagreements over compensation and, in keeping with Ellickson's (1986) findings, a feeling that the "polluter pays" principle was being violated. Information problems also prevented objective calculation of damages, giving farmers an incentive to overcharge, and negotiations were lengthy, with farmers sometimes refusing to enter into negotiations at all. This led Abildtrup, Jensen and Dubgaard to question the theorem's

¹⁶⁹See also Beckmann and Wesseler (2007) on farming and Depres, Grolleau, and Mzoughi (2008) on water pollution. An attempt to make water policy in Chile on Coasean lines, however, has not come without criticism (Bauer 1998).

¹⁷⁰Wunder (2005, p. 3) provides a formal definition of PES programs, which are sometimes referred to as a hybrid of Pigouvian and Coasean solutions. Tangentially related to this is the literature on voluntary agreements (VA) between polluters and government for regulating pollution, though the VA literature is not typically couched in Coasean bargaining terms. See Alberini and Segerson (2002) for a survey, as well as Glachant (1999, 2005) for discussions of VA in a Coasean context.

robustness and to conclude that policies that encourage such negotiations are likely to yield disappointing results.

The relatively limited extent of Coasean bargaining over environmental issues and the propensity for direct governmental involvement in many PES programs provides evidence for the significant role that transaction costs play in these situations (Schomers and Matzdorf 2013). The informational asymmetries, problems of property rights specification and enforcement, and nonparticipation/free-rider issues loom large here, and these effects are only exacerbated by the trans-jurisdictional (and especially international) nature of many of these spillovers (Harstad 2012). While Brown, Bergstrom, and Loomis (2007) conclude that transaction cost concerns weigh in favor of direct state action, Krutilla cautions that these solutions, too, are attended by significant (and sometimes underappreciated) transaction costs, including those associated with administration, monitoring, and enforcement of centralized remedies, as well as the costs of rent seeking over environmental tax revenues, and cautions that these must be carefully balanced against those resulting from market-oriented options (Krutilla 1999, pp. 258–59; Krutilla and Alexeev 2014).

6.2.3 *Smoking Bans*

One of the more interesting practical applications of the Coase theorem has been its deployment in arguments against smoking bans in bars and restaurants. The idea that the theorem could be applied to secondhand smoke has been called “the height of absurdity” (Phelps 1992, p. 430; Hofmann and Nell 2012, pp. 238–39) because of the transaction costs involved in having smokers and nonsmokers negotiate with each other. Despite the soundness of this position, that is not what the Coase theorem–based arguments utilized in this

context suggest. Instead, they involve a version of the single-owner argument.

While transaction costs between smokers and nonsmokers are likely to be prohibitive, ban opponents contend that the interests of restaurant owners render those costs irrelevant because the owners’ profit-maximization calculus internalizes all relevant externalities (Tollison and Wagner 1988).¹⁷¹ Outcomes absent regulation will be efficient on an individual restaurant basis, with some choosing smoking, some nonsmoking, and some a mix (along with smoke mitigation technologies and related arrangements). The implication, then, is that blanket legal bans on smoking allocate inefficiently large amounts of space to nonsmokers and inefficiently small amounts of space to smokers.¹⁷² The empirical evidence here, though, is mixed. If the Coase theorem applies, we would expect a smoking ban to negatively affect restaurant and bar profits. Boyes and Marlow (1996) and Dunham and Marlow (2003) provide some evidence to support this conclusion. Alamar and Giantz (2004), in contrast, find that smoking bans have increased profitability, while Adams and Cotti (2007) find that these bans reduce bar employment but have neutral or even slightly positive impacts on employment in restaurants.

* * *

The Coase theorem–inspired approaches to environmental issues are, perhaps understandably, not without their critics. Concerns over intergenerational spillovers (John and Pecchenino 1997, Gerlagh and Keyzer

¹⁷¹ Tollison and Wagner (1988) and Bulow (2003, p. 738) also argue that the Coase theorem likely operates in similar fashion for secondhand smoke within the family.

¹⁷² Alamar and Giantz’s (2004, p. 524) argument that the Coase theorem fails here because it does not take into account the preferences of restaurant staff ignores related conclusion that smoking-related implications for labor supply and wages, too, would enter into the owner’s calculus.

2001), the morality of ostensibly commodifying the environment (Reibstein 2010, Gómez-Baggethun et al. 2010, Vatn 2010), and the pursuit of efficiency at the expense of sustainability (Cowdy and McDaniel 1995) feature regularly in the literature today, as they did during the Coase theorem controversies of the 1970s. These concerns, along with social norms of fairness, may be as significant as transaction costs in explaining why conflict—as in Cooter’s Hobbes theorem—appears to be more common than Coasean bargaining when it comes to dealing with environmental issues (van den Bergh 2007).

6.3 *Finance*

If Becker’s “rotten kid theorem,” is, as Bergstrom (1989, p. 1138) has labeled it, the Coase theorem’s younger sibling, then the Modigliani–Miller theorem (Modigliani and Miller 1958) is its slightly older brother. Hirshleifer (1973, p. 129) and Alchian and Demsetz (1973, p. 26) seem to have been the first to point out the similarity between the Coase theorem and the Modigliani–Miller claim that a firm’s financing decisions are without consequence for firm value in a perfect capital market, and Monissen (1976, p. 412) soon made this explicit, saying that Modigliani–Miller “can be interpreted as a special case of the more general Coase Theorem.” Not long thereafter, Fama (1978, p. 282) drew on the Coase theorem in defense of Modigliani–Miller to show that the maximization of the wealth of stockholders and bondholders is the only rule consistent with a stable capital market equilibrium. Like the Coase theorem, Modigliani–Miller has been controversial, suggesting that “chief financial officers (and their highly compensated investment banker consultants),” as with the Coase theorem’s judges, are essentially irrelevant (Gilson and Kraakman 2003, p. 719). It, too, has been used both as an argument against regulation and as a baseline against which to analyze the relaxation of its

assumptions to capture important aspects of real-world activity. And, as in the case of the Coase theorem, the empirical evidence is not definitive (e.g., Weinstein 2003, Grossman and Imai 2013).

But the applications of the Coase theorem in the financial realm go well beyond Modigliani–Miller *per se*. Regulations pertaining to information disclosure (e.g., La Porta, Lopez-de-Silanes, and Shleifer 2006), insider trading (e.g., Haddock and Macey 1985), and bankruptcy (e.g., Shleifer and Vishny 2011, Zimmer 2012) have been criticized in light of the possibilities suggested by the Coase theorem and supported based on the impediments created by transaction costs. For those disposed to favor the Coase theorem as a tool for financial markets analysis, the sophistication of agents and the plethora of available contracting forms create a presumption in favor of the efficiency of contract—or at least its superiority over regulatory approaches (Easterbrook and Fischel 1991). As Whitman (1993, p. 880) put it, “Doubtless some bargaining failures do and will occur, but since the Coasian model reflects reality with sufficient regularity, it provides a fully acceptable working assumption for further analysis.” And evidence such as that from La Porta, Lopez-de-Silanes, and Shleifer (2006) that public enforcement, beyond providing a framework to encourage contracting, tends not to affect the growth of stock markets, provides support for those who favor the Coase theorem–inspired contracting approach.¹⁷³

That said, there is no shortage of criticism of those who would view financial markets through the lens of the Coase theorem,¹⁷⁴

¹⁷³See also Glaeser, Johnson, and Shleifer (2001) and Ryngaert and Scholten (2010). For an alternative perspective on Ryngaert and Scholten’s findings, see Listokin (2009).

¹⁷⁴See, for example, Presser (1992); Miller (1996); and Beck, Demirgüç-Kunt, and Levine (2006).

nor of empirical findings that support the critics. Predictably, the criticisms tend to be grounded in the prevalence and magnitude of transaction costs, which in turn are said to provide a rationale for governmental supervision of banks and for a regulatory structure to organize financial transactions, as well as for regulations protecting minority shareholders, creditors, and the like. Even so, some critics acknowledge that the argument for assuming low transaction costs in securities markets, which “render[s] most laws and regulations unnecessary” and perhaps even damaging, is “powerful” (Glaeser, Simon, and Shleifer 2001, pp. 853–54).

6.4 *The Firm and the Organization of Industry*

Much has been made of the relationship between “The Nature of the Firm” (Coase 1937) and “The Problem of Social Cost” (Coase 1960), but there are also those who see a very bright line between them—the former focusing on a world in which transaction costs are pervasive and the latter a world in which they are zero¹⁷⁵—with very straightforward implications for the bargaining process. Hart (2008, p. 406), for example, has called “The Problem of Social Cost” “problematic for followers of Coase (1937)” because, “in a world of Coasian bargaining, it is hard to see why important aspects of organizational form such as authority, hierarchy, and delegation matter. Why would the parties not simply bargain about everything all the time, using monetary side-payments?” What we find at the intersection of Coase’s two most influential articles is a call to examine the effects of transaction costs and property rights on the contracting process—whether to theorize about contractual forms that can mitigate the effects of transaction

costs, better understand (and develop theories to explain) contracts as written, or to assess implications for the organization of production.

It is sometimes suggested that firms *would not exist* in a world of zero transaction costs, but this is not strictly correct. Instead, there is no transaction cost-related *rationale* for the existence of the firm in this world; firms and markets are equally efficient here, just as are Pigouvian taxes and negotiated solutions in the presence of externalities. It nevertheless is reasonable to conceive of a firm as an optimal response to departures from a Coase theorem world.¹⁷⁶ The transaction-cost approaches pioneered by Williamson (1971, 1975) and Alchian and Demsetz (1972), and the nexus of contracts approaches that developed out of the work of Jensen and Meckling (1976) can be thought of as explanations for outcomes when the Coase theorem’s zero transaction costs assumption does not apply, giving rise to, for example, monitoring problems and opportunistic behavior.

The property rights approach to the firm, developed particularly in the work of Grossman, Hart, and Moore,¹⁷⁷ builds on the work of Williamson and others (cited above) but emphasizes the property rights side of the Coase theorem. We have already noted that transaction costs preclude complete contracts. In the hands of Grossman–Hart–Moore, organizational structure turns on the implications of property rights—residual rights of control, or ownership rights—for resolving conflicts under contractual incompleteness, particularly via the influence of these control rights on the parties’

¹⁷⁶A similar explanation has been offered to explain two-sided markets, which have been depicted as instances of network externalities to which the Coase theorem does not apply. See, for example, Niman (2002), Rochet and Tirole (2006), and Spulber (2008, 2010).

¹⁷⁷See, for example, Grossman and Hart (1986) and Hart and Moore (2005), as well as the references cited below.

¹⁷⁵It is important to reiterate that, contrary to common perceptions, “The Problem of Social Cost” (Coase 1960) emphasizes the importance of transaction costs.

bargaining positions. The first wave of this scholarship largely eschewed complications introduced by transaction costs in allowing agents to bargain costlessly *ex post*. More recent work, however, has brought these costs squarely into the picture, in the form of “aggravement costs” and their influence on contractual performance, to offer explanations for the form and structure of contracts (Hart 2008, 2009) and the scope of the firm (Hart and Holmstrom 2010).¹⁷⁸

6.5 *Politics*

No small amount of the support for the Coase theorem lies in the possibilities it is said to offer for taking politics out of the policy picture. But the view that politics is fundamentally exchange suggests that the theorem lends itself nicely to theorizing about political processes. And, in fact, the theorem has been employed to analyze issues across the spectrum of political jurisdictions—from local land use to international conflict.

6.5.1 *The Political Coase Theorem*

The “political Coase theorem” tells us that, under appropriate conditions, the outcomes of the political process will be efficient and that the political decision rules and other institutions in force will have no bearing on the ultimate outcomes, whether that be public good provision or growth rates.¹⁷⁹ One version of this story builds on Becker’s (1983) analysis of political competition and

its efficiency-promoting properties.¹⁸⁰ The Acemoglu–Parisi strand, however, relies on the possibility of Coasean bargains among political agents, calling to mind the commonalities between Buchanan and Tullock’s analysis in *The Calculus of Consent* (1962) and Coase (1960). Wittman’s (1995) extensive defense of the efficiency of democratic processes, which, he argues, tend to serve a transaction-cost-reducing function, draws on both literatures.¹⁸¹

In a political Coase theorem environment, the need for public choice analysis and much of public finance disappears. Arrovian intransitivities are not a problem (Parisi 1998); logrolling is always efficiency enhancing (Parisi 2003); public goods provision, regulations, and the tax code are efficient (Cooter 2000, Hammond 1990); rent seeking is eliminated (Aidt 1997, Epstein and Nitzan 2002); welfare-reducing distributional effects of legal rules would immediately be remedied through the political tax-and-transfer system (Fennell and McAdams 2016); and Tiebout and federalism would both be irrelevant (Migué 1997). In short, there is no government failure.

The problem, of course, is that actual political conditions are unlikely to resemble the stringent conditions required by the theorem. Transaction costs are the source of a multitude of problems—particularly for bargaining over multidimensional policy issues (Luppi and Parisi 2011). At the heart of the problems for the theorem, though, is

¹⁷⁸Aggravement arises when contractual performance falls below expectations, and it gives rise to costs in the form of retaliation and shading on performance. One finds some experimental support for the idea that perceptions of one sidedness in contracts may promote noncooperation in the experiments discussed in Thaler (1991, 1992).

¹⁷⁹See Vira (1997), Acemoglu (2003), and Parisi (2003), as well as Cooter (2000) and Klick and Parisi (2003). It was Vira who first used the term “political Coase theorem” in print, though Stigler appears to have been the first to formulate the basic idea in an unpublished draft in 1972 (Coase papers, Box 33, Folder 6).

¹⁸⁰See also Stigler (1992). Becker did not link his own theory of political competition to the Coase theorem, but others have. See, for instance, Munger (1990, p. 296).

¹⁸¹The first formal demonstration of what is now referred to as the political Coase theorem comes from Bernholz (1997, 1999, 2012), who showed that the Coase theorem generalizes to the larger set of collective action problems in a cooperative game setting with binding contracts, obviating difficulties with empty cores and free riders. Further reinforcement for an efficient and stable political Coase theorem equilibrium has been provided by Parisi (2003) and Luppi and Parisi (2012).

the inability of agents to make enforceable political commitments given the incentives to renege on intertemporal contracts.¹⁸² An experimental test of the political Coase theorem by Galiani, Torrens, and Yanguas (2014) provides some support for the relationship between commitment possibilities and social welfare, though neither low- nor high-commitment opportunities generate the extreme noncooperative and cooperative results (respectively) that the theory predicts.

These realities have led Acemoglu (2003, p. 622) to conclude that while the political Coase theorem may be a “useful benchmark,” a conflict model, à la Cooter’s “Hobbes theorem,” provides the best approach to analyzing political differences. But the literature suggests a more extensive benchmark role for the political Coase theorem, just as for its traditional counterpart. If the institutional policy problem is to “make the political market approximate the zero transaction cost model for efficient economic exchange” (North 1990, p. 109), the analysis of a frictionless political world provides insights into rule-related reforms that could enhance the efficiency of the political decision-making process (Parisi 2003). The breakdown of the political Coase theorem, owing to transaction-cost and commitment problems, provides a window into topics including bargaining over multidimensional policy issues (Luppi and Parisi 2012), the evolution of transaction-cost-reducing rules of procedure (Shepsle and Weingast 1984), the design of optimal monetary institutions (King 2004), the question of whether distributional goals are best pursued through the legislative or the judicial branch (Fennell and McAdams 2016), and even transition by coup (Acemoglu and Robinson 2001).

¹⁸²See, for example, Besley and Coate (1998), Acemoglu (2003), Parisi (2003). Mueller (2003, p. 33) provides an informative summary of some of these issues.

6.5.2 *Federalism*

The Coase theorem has also provided the basis for a theory of federalism, originally developed by Inman and Rubinfeld (1996; 1997a, b), which suggests that negotiation between political jurisdictions—say, between the federal government and the states, between states, or between a state and its municipalities—can resolve interjurisdictional externalities. Based on this, Cooter and Siegel (2010, p. 139) have posited a “Federal Coase Theorem,” which states that, “assuming zero transaction costs, the supply of public goods and the control of externalities are efficient regardless of the allocation of powers to different levels of government.” A further implication is that the *form* of government—whether a single national government or a confederation of states—has no bearing on the outcome (Inman and Rubinfeld 1997b, p. 80).¹⁸³ The point, of course, is not to insist that the allocation of powers across different levels of government does not matter, but to identify the reasons, often related to transaction costs, why it does and the implications for efficient governance structures.

One of the several interesting insights to emerge from this literature goes to the limitations of direct democracy (Merrill 2010, pp. 284–85). If the decisions of jurisdiction *A* have impacts on jurisdiction *B*, bargaining between government officials in those two jurisdictions allows the spillovers to be taken into account in a way that local voting cannot. Consider the “not in my back yard” (NIMBY) problem. If *B* is the best place to put a landfill, then officials in *A*, *C*, *D*, . . . can negotiate compensation with officials in *B* to approve the locating of the landfill there. Under democratic voting, the

¹⁸³The connection of this insight to the relationship between Coase (1937) and the Coase theorem should be obvious.

transaction costs associated with negotiating compensation with each voter effectively preclude negotiation, meaning that voters in *B* likely would reject the proposal.¹⁸⁴ This, then, has important implications for the allocation of political decision-making authority at the state and local levels.

The complications of interjurisdictional bargaining, of course, can be severe, as we have already seen.¹⁸⁵ On the theoretical level, the frequency of incomplete contracts in interjurisdictional agreements has led Lüllesmann (2002) to suggest that the Grossman–Hart–Moore approach (discussed in subsection 6.4, above) provides the more suitable vehicle for analysis. And in a practical vein, some, and perhaps many situations undoubtedly require that the national government institute policies to deal with interjurisdictional spillovers. Yet, there is reason to believe that the practical effect of these limitations in small-numbers bargaining situations may not be overly restrictive (Feiock 2007; Feiock, Steinacker, and Park 2009), and Inman and Rubinfeld (1996, 1289–97) are sufficiently optimistic about the possibilities to recommend that national policies be designed with a view to facilitating Coasean bargains.

6.5.3 *Zoning*

The property rights approach to zoning, too, was inspired by the Coase theorem, with Fischel's (1978) realization that zoning works as a *de facto* property right, vested in the community. The theorem tells us that it does not matter whether the property right "belongs" to the community or the individual landowners; the land-use rights will end up where they are most highly valued,

regardless of how the rights are initially assigned (Fischel 1985, p. 232). As such, any zoning restrictions that persist will be efficient in a Coase theorem world.

Some, in what Hovenkamp (2002, p. 528) has called "exuberant displays of enthusiasm over the Coase Theorem," have used the theorem to infer that zoning is not necessary because agents can privately contract over land-use controls to maximize joint wealth (e.g., Siegan 1972, Ellickson 1973). A somewhat less exuberant approach views *the zoning process* as an efficient response to transaction costs. Assume, following Fischel (1980, 2015), that planners are subject to the will of political majorities in the jurisdictions in which they operate. In bargains between the citizens and developers over land use, the planners, as representatives of the people, turn a large-numbers situation into a small-numbers one (Fischel 1980, pp. 74–75).¹⁸⁶ Moreover, if local governments are responsive to the median voter, then any land-use rules that emerge, including zoning, can be seen as the efficient outcome a Coasean bargain between the citizens/government and developers (Fischel 2015, pp. 242–45). If this view of the zoning process is accurate, the effects of zoning restrictions are purely distributional—for instance, transferring wealth from private developers and owners of undeveloped land to the general public. Berry (2001) and Groves and Helland (2002) provide some evidence supporting this position.

¹⁸⁴Sobel (1997, pp. 473–74) and Wildasin (2007) provide applications of the theorem to the allocation of taxation authority across governmental jurisdictions.

¹⁸⁵In the present context, see also Rubinfeld (1997) and Jéhiel (1997).

¹⁸⁶In this sense, planners perform the same function as the class action lawsuit serves in the legal realm—aggregating many agents into a single bargaining unit. See subsection 6.1.4, above. Zoning regulations may also function as a solution to fragmented property rights, the transaction costs associated with which can preclude efficient Coasean bargains, as discussed in subsection 6.1.1, above (McMillen and McDonald 1993).

6.5.4 *Transnational Agreements*

Suggestions that the Coase theorem can be applied to international conflicts (e.g., Friedman 1977) have met with significant resistance. Breakdowns of the theorem in situations as diverse as pollution control (Cooper 1995), the US–Soviet arms race (Anderton 1990), and the Middle East conflict (Cowen 2004) have been cited to counter the theorem’s applicability, with responsibility ascribed to factors ranging from transaction costs (including the ubiquitous enforcement problems) and the absence of property rights to the complete failure of the theorem’s behavioral premises to apply to these conflicts.¹⁸⁷

On the other hand, the theorem *has* been used to provide the underpinnings for free trade arguments (Findlay and Wellisz 1982, Cooper 1995), as well as for the fact that trade rivalries seldom give rise to full-scale trade wars—as the Hobbes theorem and the prisoner’s dilemma might predict (Conybeare 1984). Here, transaction costs become the explanation for the existence of tariffs, for pessimism regarding the optimality of such trade agreements as are reached (Cooper 1995, Dudley 1998), and for the role of larger political complications in the (non-)settlement of trade disputes at the World Trade Organization (Guzman and Simmons 2002).

The goal, then, is to identify institutional structures that will facilitate negotiated solutions. Sykes (1999, p. 32–33) draws on the theorem to argue that negotiated settlements offer better prospects for efficient outcomes than rigid rules imposed by organizations such as the World Trade Organization. Keohane (1982, 1984), meanwhile, invokes a version of the single-owner argument in

suggesting that the transaction costs associated with international conflicts create *demand* for transnational regimes, such as the European Union, which reduce transaction costs and so facilitate agreements. The logic of this position notwithstanding, the European Union’s violation of the “linguistic Coase theorem” (Portuese 2012) and the resulting costs imposed by its lack of a common language function as a cautionary tale, illustrating that the ability of these institutions to efficiently reduce transaction costs poses a significant challenge for institutional design.

6.6 *Development and Transition*

There are strong incentives for Coasean bargains that would replace inefficient institutions with those that are growth promoting and poverty alleviating (Olson 1996, p. 23). But the reality is that such bargains typically are not made. We do not see agreements between rich and poor nations that would have labor migrate from low-productivity to high-productivity countries, despite the prospects for gains well in excess of the associated transaction costs (Olson 1996, p. 9). The prescription to simply “assign private property rights,” which will then flow to their highest valued uses, has been blamed—and the Coase theorem with it—for the problems with the transition to market systems in Eastern Europe.¹⁸⁸ Why are these bargains not made? The answer, obviously, lies with the impediments posed by transaction costs and institutions—toward which the benchmark reading of the theorem points us.¹⁸⁹

¹⁸⁸ See, for example, Deakin and Hamilton (2015) and Stiglitz (1994). Brue and MacPhee (1995, pp. 192–93) found the invocation of terms such as “Coase theorem” by Russian economists in the early 1990s as evidence that some had been keeping up with Western economics.

¹⁸⁹ For two very different views of the utility of the Coase theorem proper as a tool for thinking about development issues, see Ehrlich and Lui (1991) and Field (1991).

¹⁸⁷ The argument here is that moral, religious, ethnic, and other considerations may be at least as important as material considerations and often are not amenable to Coasean bargaining.

Corruption, which Hodgson and Jiang (2007, p. 1056) have called “the nemesis of the Coasean solution,” poses a significant impediment to the enforcement of Coasean bargains in many developing and transitional areas (Sutter 1995, La Porta et al. 2000). But the Coase theorem reveals that political corruption may be efficiency enhancing, with bribery improving on allocation practices otherwise used by public sector agents by internalizing to political agents the full cost of inefficient decisions. This, in turn, works as a low-cost method of redistributing wealth and prevents self-interested political agents from expropriating wealth in less efficient ways.¹⁹⁰ Of course, these efficiency claims turn on the desire of agents to maximize social wealth, the ability to enforce corrupt contracts and the wider effects of corruption of which this bribe scheme is a symptom,¹⁹¹ but the lesson is that the welfare effects of corruption may well be situation specific and, in some instances, rooting it out may do more harm than good.

Fractionation of coercive authority also can be a particularly serious problem in many developing and transitional areas. While a monopoly of coercive force and attendant minimization of expropriation is likely efficiency enhancing (per Olson) and could be achieved via Coasean bargains among competing power groups, the reality is that such agreements tend to break down, leading to instability that is damaging to the growth process (Besley and Ghatak 2010). One consequence of dispersed coercive authority is poorly defined property and contract rights: it is neither clear who has the authority to define these rights, nor that these rights ultimately will be protected (Rubin 1994, p. 33; Rapaczynski 1996, p. 87). This, in turn, may

mitigate the efficiency-promoting effects of corruption pointed to by Shleifer and others (cited above).

6.7 Labor

Donohue’s (1989) application of the Coase theorem to the data from the Illinois unemployment experiment, discussed above, provides some insight into the alternative perspective that the theorem provides on labor market institutions. Hiring, separation, and job reassignment decisions will be efficient and independent of the underlying employment law, including, for example, the presence or absence of at-will employment laws (Krueger 1991, Miles 2000), mandatory retirement (Siegfried 1997), and, if workers are able to adjust effort, minimum wage laws (Ippolito 2003). Unions, too, are without purpose or effect in a Coase-theorem world; employers can negotiate individually with all prospective employees at zero cost, and unions offer no prospect of improving on these contractual terms (Hylton 1992). Unions also have no impact on prices and employment levels here, one implication of the latter being that any gains to union members come at the expense of employers rather than consumers (Dau-Schmidt 1992).

The vast majority of this literature allows that transaction costs are positive in reality and thus that these labor market institutions do matter. Viewing these questions through the lens of the Coase theorem’s suggestion that institutions should not matter, though, offers new possibilities for explaining the consequences of labor market institutions, and perhaps improving them. But the theorem also cautions us against *presumptive judgments*. Freeman (2001), for example, provides evidence that while labor market institutions have significant distributional effects, their efficiency effects are only minimal. The explanation, he says, may lie in the Coase theorem—that labor and capital reach

¹⁹⁰See Shleifer and Vishny (1994), Shleifer (1994), and Boycko, Shleifer, and Vishny (1996).

¹⁹¹See Aidt (2003, pp. F634–35) for a brief overview of criticisms of this bribery approach.

efficient negotiated solutions regardless of how rents are appropriated.¹⁹² Additional support for this position comes from Hall (2009), who finds that cyclical impacts on labor markets are efficiently resolved in existing bilateral relationships between employers and workers, even though inefficient levels of overall unemployment may remain.

6.8 *The Coase Theorem and “Coasean Bargaining”*

We see in some quarters an implicit assumption that if the Coase theorem can be dispensed with—whether by “disproving” it or by invoking the reality of transaction costs—we can move on to “real” solutions, typically centralized ones. But this “throw-out-the-baby-with-the-bath-water” approach misses out on one of the most important insights to be drawn from the Coase theorem: the possibilities of bargaining and the associated potential of private ordering (Farrell 1987, pp. 125–26; Kidd 2014). The extent to which we can rely on “Coasean bargaining” is germane both for those who (wrongly, we have argued) subscribe to positive transaction costs versions of the Coase theorem and for those who see the theorem as a benchmark, suggesting the possibilities of efficiency-enhancing negotiated solutions under conditions not too far removed from the frictionless world contemplated by the theorem.

Coasean bargaining, in its more narrow form, refers to the process of bargaining around inefficient institutions. More broadly conceived, it refers to bargaining to a joint-maximizing (but not necessarily efficient in a general-equilibrium sense) outcome and so is indistinguishable from Edgeworth processes. Yet, its distinctive naming suggests that there was something new here—a need to look for bargaining

possibilities where economists and others had not looked for them before. Perhaps the potential for Coasean bargains is hard for people to notice. But the fact that bargaining is costly does not make it, or efficient outcomes, impossible (Myerson 2008); in fact, transaction costs can facilitate bargains (Hovenkamp 2011, Robson 2014). Likewise, the reality that there is scope for strategic behavior does not tell us that people typically exploit those opportunities. Even Cooter (1982, p. 19) for all of his pessimism about the Coase theorem, allows that “gains from trade in bargaining situations are realized more often than not.” The question, then, is one of the extent to which extant institutions facilitate, or can be rearranged to facilitate, these private agreements. Ironically, after several decades of focus on the Coase theorem proper, this literature takes us back to some of the very comparative institutional questions that Coase was pointing to in “The Problem of Social Cost.”¹⁹³

7. *Conclusion*

When Adam Smith wrote that the individual pursuit of self-interest, channeled through the competitive marketplace, is the best vehicle for increasing the wealth of a nation, he offered no formal proof. That proof, of something rather more restrictive than Smith had postulated, had to wait nearly two centuries. But this did not prevent his idea from attracting legions of supporters, some of whom saw in Smith’s *deus ex machina*, the “invisible hand,” a prescription for extreme laissez-faire. Of course, Smith’s idea also spawned numerous detractors,

¹⁹²Caballero and Hammour (2001) provide an alternative perspective on Freeman’s findings.

¹⁹³It is this comparative institutional emphasis in Coase that led McCloskey to formulate—and, in Stiglerian fashion, present in her price theory textbook—her own unique version of Coase theorem: “in the presence of transaction costs the location of a pollution tax or of other liability for damages does matter for efficiency” (McCloskey 1982, p. 354).

who expended no small amount of effort attempting to demonstrate that his theory was erroneous, morally bankrupt, or some combination of these. No small amount of the controversy over Smith's theory owes to its vagueness—particularly regarding the “invisible hand” that would guide the translation from private vices to public benefits—leaving it to subsequent generations of scholars to fill in the blanks. And so they did, and in a variety of ways.

The Coase theorem's history, like that of Smith's “invisible hand” proposition, is defined at once by ambiguity, controversy, and an ever-expanding domain—to say nothing of resilience. “Like malaria,” Cooter tells us, “attacks on the Coase Theorem just seem to make it stronger” (1993, p. 422). But this resilience, it appears, has brought us to an (unstable) equilibrium in which there are several competing versions of the theorem and a variety of meanings attributed to its central assumptions. Because of this, we have a significant segment of the profession that believes the theorem is correct—even if not agreeing on what it is—and a significant segment (game theorists in particular) convinced that it is rubbish. Such ideas are hardly the stuff of textbook microeconomic theory. Yet, the Coase theorem is, and has for decades been, a staple of the microeconomics textbooks from the principles level on up.¹⁹⁴

There is good reason to doubt that Coase, when originally laying out his negotiation result, had a full understanding of the conditions necessary for it to be true. The same can undoubtedly be said of Smith. An understanding of those conditions has come only as the result of its probing by subsequent generations of scholars. Viewed from

this perspective, the Coase theorem controversy is anything but an illustration of “more heat than light.” Instead, supporters and critics alike have moved us toward a valid theorem. Having arrived there, we find that the Coase theorem is neither prediction nor testable hypothesis nor descriptor nor policy prescription. It is, and can be nothing more than, a benchmark—a generator of predictive, testable, descriptive, and policy insights. And as with the first fundamental theorem that eventually emerged from Smith's insight, it demands that we examine the consequences, for economic theory and for the world in which we live, of the many deviations from the rigid conditions that it imposes.

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