Coasean Property on the Shifting Sands of Transaction Costs

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Introduction

What is a transaction cost and why does it matter? Ronald Coase (1960) provided a path-breaking answer to the latter question, why transaction costs matter, while leaving some tantalizing ambiguities about the notion of transaction costs itself. In this essay, we argue that by exploring an ambiguity in the concept of "transaction costs," an ambiguity discernible even at its historical origins, we can draw out some further implications of the Coase Theorem for the constituents of transactions: property and contract.

Coase's argument has been subject to widely different interpretations, and Coase would say misinterpretations. Coase complains that people have taken the Coase Theorem as a description of the world and an advocacy for reliance on Coasean bargaining and an indifference to entitlement allocation – because costless bargaining will save the day. This is precisely the opposite of the point Coase was trying to make. (Coase 1988; see also Farber 1997; McCloskey 1998) Coase identified the zero transaction cost world with the models of perfect competition and a style of economics he dubbed "blackboard economics," and he lamented that "[t]he world of zero transaction costs has often been described as a Coasean world. Nothing could be further from the truth. It is the world of modern economic theory, one which I was hoping to persuade economists to leave." Coase (1988, 174)

In this essay, we identify a central tension in Coasean analysis, between the technique of the analysis and its purpose. On one of the most widely accepted interpretations of "The Problem of Social Cost," Coase's analysis of transaction costs, whether formulated as a theorem or an extended argument, works as follows (Coase 1960): It begins by hypothesizing a world without transaction costs. Then it is shown that in such a world something is implausibly invariant: the total value of

production, or the pattern of production – depending on which further assumptions are made. One can think of this as a reductio ad absurdum: assume transaction costs are zero and you get a ridiculously ideal result.[1] So the assumption of zero transaction costs must be faulty, or "a very unrealistic assumption" as Coase (1960, p. 15) says. The moral is that non-zero transaction costs are important feature of our actual world; we must go back and figure out the role of transaction costs in the working of the economic system. The argument thus shows the importance of transaction costs in the real world, and the need for comparative institutional analysis to tell us what configuration of institutions will maximize wealth net of transaction costs in our world. The argument's technique therefore is to hypothesize away transaction costs and to observe the absurdity of the consequences that follow; the argument's purpose is to highlight those costs' importance to empirical work in economics.

The Coasean argument and versions of the Coase Theorem are often left ambiguous in several respects. One is the domain of the analysis. Is Coase making a point about markets and the price system? Or is his argument the key to a style of institutional analysis that would encompass not only the market but non-market institutions like the law, courts, legislatures, and the like? Hints at both domains can be found in Coase's work itself, and either domain makes some sense depending on one's purpose. Coase himself claimed to be interested only in the "influence of the law on the working of the economic system" (Coase 1988, p. 10) and the use of the price system, suggesting a narrow domain. But Coase also draws lessons about wider comparative institutional analysis, and Coase has inspired an avalanche of analysis in law and economics and the New Institutional Economics that endogenizes – and seeks to explain – much more than the workings of the price system in a decentralized market based on private property. The latter type of extended Coasean analysis sweeps in law, norms, regulations, and, harking back to Coase (1937), organizations like firms.

The domain question in the Coase Theorem can be usefully examined through the lens of one of Coase's key notions, "transaction costs." The narrowest versions of the Coasean domain, focused on markets and the price system only, naturally pair with a narrow version of transaction costs that covers the costs of contracting – identifying contractual partners and the subject of the bargain, making the contract, and enforcing it. Broader

[1] The authors are of two minds about the plausibility of this common interpretation as an answer to the historical question of what Coase (1960) actually said. Smith considers it a viable possibility; Lee is skeptical. Both authors agree that some older readings, which suggest that Coase believed that transaction costs were zero and bargaining could efficiently resolve any conflict of uses, are incorrect.

Coasean domains, which include a many types of institutions, lead to an expansive – perhaps too open-ended – class of costs. These include the cost not just of contracting but of assigning entitlements, shaping them, policing property rights violations, organizing groups that create further rules, and so on.

Transaction costs are the linchpin of the Coase Theorem and accordingly of our argument. Transaction costs figure both in the technique of the Coasean argument and in the type of empirically driven comparative institutional analysis towards which the argument points. But what exactly are transaction costs? If we conceive of the term broadly, then proof of the relevance of "transaction costs" shows that a broad class of costs collectively has importance in our world. At the same time, however, it both causes the hypothetical zero transaction cost world to be very far from our own and encourages a certain vagueness about what among transaction costs really matters, focusing our attention away from the institutional details that are the real point of the Coasean exercise of hypothesizing about the zero transaction cost world. The abstractness of transaction costs and the zero transaction cost world thus leads to the tension between technique and purpose in Coasean analysis. The technique directs our attention to something—"transaction costs"—but that thing is so general and abstract that the purpose of directing our attention to it—getting economists to appreciate the significance of actual specific frictions in shaping real-world institutions—slips away.

Our goal here is twofold. First, we will analyze the nature of the Coasean argument as it is commonly understood today. (Whether this understanding is in fact the best historical interpretation of what "The Problem of Social Cost" said in 1960 is a question which we need not answer here. Our focus in this essay is on Coase's argument as it has been received and incorporated into subsequent decades of scholarship.) We will show that while the technique of the argument's reductio and its abstractness increase the argument's general applicability, they also have the tendency to obscure the argument's point, which relates to the need for empirical investigation into the specifics of institutions in economics. Put differently, increases in the scope of the abstract argument tend to decrease the scope of the empirical investigations that it points toward, unless one understands the nature of the argument in more detail than is usually the case.

After showing this tension in Coase and some of his predecessors stretching back to the nineteenth century, we will suggest that if the Coase Theorem is truly institutional, we have to give up the thin notion of "entitlement" as a relatively empty notion of "property right." In the zero transaction cost world, it may seem that the nature and scope of property

rights does not matter: any deficiency can be made up for by contracting. However, we also show that in the actual world, we face not just a substitution relationship between either assigning an "entitlement" by fiat or trying to let it be reassigned by contract – both of which are costly institutional procedures – but also another substitution relationship between contract and property as institutions with scope and structure. That is, not just *who* gets the entitlement but *how* entitlements are delineated serve as a substitutes for contracting. The thin atomized notion of entitlement – a right to take an action with respect to a resource and a corresponding duty in another to permit it – would be overwhelmingly costly in the real world.

I. The Constituents of the Coase Theorem

It is well known that Coase did not present his argument in Coase (1960) as a theorem. George Stigler began that tradition by using the term "Coase Theorem" and restating Coase's argument as the proposition that "under perfect competition private and social costs will be equal." (Stigler 1966, p. 113) Coase's argument and the Coase Theorem have much in common. One common formulation of the Coase Theorem is that in a zero transaction cost world, parties would costlessly bargain to the wealth-maximizing result regardless of who initially has what entitlements. Versions of the Coase Theorem differ as to whether it is only wealth that is maximized or whether the pattern of resource use itself is invariant. And later commentators have noticed the possibility of wealth effects and the like. (Schwab 1989)

In the first part of the 1960 article itself Coase presented a zero transaction cost world, and through a hypothetical involving farmers and ranchers he showed that that the wealth-maximizing resource use – whether this is ranching or farming – would result regardless of whether the rancher had a right to let the cattle roam or the farmer had a right to grow crops free of trampling by animals. (Coase 1960, pp. 2-8) The second part of the article turned to how resource conflicts are solved in the real world by allocating the right to one or the other party, as illustrated by train sparks and farm fields and various nineteenth-century English nuisance cases involving doctors and confectioners and the like. (Coase 1960, pp. 8-10, discussing Sturges v. Bridgman, 11 Ch.D. 852 (1879), and other cases) Coase emphasized the reciprocal nature of the problem and the need to decide for one or the other, and that because transaction costs are non-zero the allocation of the entitlement would determine the use of the resource. The nature of the problem was economic: how to allocate the property right as between equally causally relevant parties, so that the value of production (or by extension, consumption as well) might be maximized.

The natural recourse to bargaining which Coase shows arises in the zero transaction cost world points to the possibility, in principle, of a wide variety of institutional alternatives for solving resource use conflicts, and thus calls into question the automatic privileging of government intervention in the form of taxes, which Coase associated with Arthur Cecil Pigou (1920). Coase argues that if transaction costs are low enough to make it worthwhile and least-cost, people can and will deal with spillovers through contracting. It is an empirical question therefore whether contracting, judicial decision, Pigovian taxes, something else, or even doing nothing is the best alternative once the costs of these various methods are taken into account.

Coase's argument, as it is commonly understood, therefore rests on the zero transaction cost hypothetical. Three aspects of that argument are noteworthy for our purposes:

(1) A hypothetical frictionless world that shows the importance of whatever causes friction in our world.

(2) A decision about what to count as a friction.

(3) A selection of what, and how finegrained, the units of analysis are to be.

Aspect (1) is the familiar zero transaction cost world (although it is easy to forget its purpose). Aspects (2) and (3) are more implicit, and they are related. One thing to notice from the outset is that there is a trade-off implicit in (2) and (3), of scope versus focus. As noted earlier, the more things that are treated as frictions, the more things that the Coasean reductio can show to be important in the world of positive transaction costs, but also the less any specific subclass of frictions can be shown to be important. (And the less the hypothetical world resembles our world.)

The frictions categorized in (2) are those of setting up and running the units in (3). The fundamental unit of Coasean analysis is familiarly said to be the transaction. But what transactions themselves are is itself a question that might receive different answers, which in turn will shape our decisions about what to count as a friction. For example, "transactions" might be identified with contracts. So if the contract is the fundamental unit of analysis, then the frictions are the costs of contracting.

Identifying transactions with contracts (or at least deals) is consistent with the focus in Coase's hypothetical (and in some versions of the Coase Theorem) on bargaining, and is reflected in the terms "Coasean bargaining" and "Coasean bargains" (terms of which Coase would not approve, if they are taken to mean that contracting is simply assumed to be feasible or

worthwhile). Coase takes this contracting to be bargaining over property rights, and Coase accordingly has been taken as seeing well-defined property rights as a necessary condition for maximizing the value of the social product: in the zero transaction cost world we need a starting point for costless adjustments, and in the real world property rights have to be assigned, whether as a platform for further contracting or as the rules by which people will use resources. New Institutional Economists, however, have noted that identifying transactions costs too closely with the costs of contracting obscures the larger import of the Coase Theorem, namely that positive frictions in our world point to the importance of institutions and the need for comparative institutional analysis – without privileging any particular institutional device – in order to know how to maximize value in the real world. So on their view "transaction costs" means "institution costs," which is a very broad notion. (Allen 1991)

A domain problem lurks here. Harold Demsetz (2011) has recently argued that Coase is wrong to believe that transaction costs lead to inefficiency. For one thing, an inefficiency exists only if a situation could be improved by an amount that exceeds the cost of the improvement. Given a set of initial entitlements, transaction costs are no different from the costs of producing goods. So if a transaction costs more than the benefit it would bring, then it doesn't happen – and that's efficient. Key to Demsetz's argument is that law, the legal system, and its effect on initial entitlements are treated as given, as they are to mainstream economists. Demsetz does this because he takes Coase to be making an argument about markets and the price system, again as mainstream economists would do. Coase himself (1960, p. 15) speaks in terms of transaction costs being the costs of using the price system and the costs of contracting:

> 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. These operations are often extremely costly, sufficiently costly at any rate to prevent many transactions that would be carried out in a world in which the pricing system worked without cost.

Moreover, as noted earlier, Coase does describe his focus as the effect of the law on the economy.

But law-and-economics and the New Institutional Economics have interpreted Coase differently. Picking up on Coase's emphasis on the process of contracting and on his suggestions about comparative institutional

analysis, these approaches have endogenized the law too, in the sense of making it a variable part of the system and so within the domain of attempted explanation. But having done this, these approaches are compelled to treat transaction costs correspondingly broadly. As a result, some have called for a notion of "institution cost." How much to endogenize is a tricky issue, because our ability to test broad notions of institution cost may be very limited.

The New Institutional Economics also points to another lesson latent in the Coasean analysis of transaction costs: Contract and property are to some extent substitutes. Demsetz noticed that in his interpretation of the Coase Theorem, in which the domain is narrowly defined to the market and the price system, contracts and ownership could be substitutes. One could either contract to allocate an entitlement or rely on the initial assignment. In Part III, we will show that contracts and property are substitutes in a more systematic way. But first, this substitution relationship and the tradeoffs inherent in abstraction will become clearer by examining three episodes in the history of the use of transaction costs in economic analysis.

II. Tracing Back the Strands of the Coase Theorem

To understand better the nature of the abstract reductio-style argument that Coase is commonly understood to have made and how it stands in tension with the lesson he wants to draw in favor of empirical work in economics, it is useful to look backward to see this very same tension in some of Coase's predecessors. Herbert Hovenkamp (2009) has argued that an appreciation of the significance of transaction costs preceded Coase and can be found in the work of Arthur Pigou (1920), Coase's ostensible bête noir. However it is possible to find traces of some of these key ideas even earlier. We focus on two nineteenth-century economists, Stanley Jevons and Dionysius Lardner. Like Pigou, Jevons and Lardner treat "impediments to trade" in a fashion that presages transaction cost analysis. Interestingly, as the notion of "impediments to trade" start along the path towards generalization to transaction costs, the tendency toward institutional analysis recedes. We end by noting that Frank Knight anticipated the trade-off or tension we identify in transaction cost analysis, between abstract argumentation and its more important empirical lessons.

A. Jevons

An early recognition of the relevance of transaction costs appears in Stanley Jevons's *The Theory of Political Economy* (1871). Jevons devoted the first part of Chapter IV to developing a mathematical theory of exchange in which the rate of exchange of two commodities is determined by the marginal

utility of each extra unit of that commodity to the participants in the exchange (Jevons 1888, pp 95-96). But in a section titled "Impediments to Exchange," Jevons noted a complication:

> We have hitherto treated the theory of exchange as if the action of the exchange could be carried on without trouble or cost. In reality, the cost of conveyance is almost always of importance, and it is sometimes the principal element in the question. To the cost of mere transport must be added a variety of charges of brokers, agents, packers, dock, harbour, light dues, etc., together with any customs duties imposed on either the importation or exportation of commodities. All these charges, whether necessary or arbitrary, are so many impediments to commerce, and tend to reduce its advantages (Jevons 1888, pp 106-107).

Taken alone, this description might naturally lead one to see Jevons's understanding of transaction costs as narrowly limited to various costs of physically effectuating an exchange, including taxes placed on the transportation of goods. Although the concept of transaction costs does indeed play a narrower role in Jevons's theory than it might in some theories today, Jevons's inclusion of "brokers" in his list of charges reflects an awareness of the importance of information costs as well.

Brokers play a pivotal role in assuring that basic assumptions upon which Jevons's theory rests are in fact satisfied. Jevons explicitly limits his notion of "markets" to a hypothetical system in which many of the real-life impediments to bargaining have been removed. First of all, psychological and strategic impediments to monetarily beneficial exchanges are assumed away:

> Every individual must be considered as exchanging from a pure regard to his own requirements or private interests, and there must be perfectly free competition, so that any one will exchange with any one else for the slightest apparent advantage. There must be no conspiracies for absorbing and holding supplies to produce unnatural ratios of exchange (Jevons 1888, p 86).

In addition, however, relevant information is freely available:

> By a Market I shall mean two or more persons dealing in two or more commodities, whose stocks of those commodities and intentions of exchanging them are known to all. It is also essential that the ratio of exchange between any two persons should

> be known to all the others. It is only so far as this community of knowledge extends that the market extends (Jevons 1888, p 84).

These restrictions naturally raise the question of how significant these abstractions are—how much do we lose by omitting these costs or frictions from our analysis? Not much, Jevons thought: "The theoretical conception of a perfect market is more or less completely carried out in practice" (Jevons 1888, p 86). Jevons justifies this happy conclusion by invoking the role of brokers, whose job it is "to organize exchange, so that every purchase shall be made with the most thorough acquaintance with the conditions of the trade. . . . By the mediation of a body of brokers a complete *consensus* is established, and the stock of every seller or the demand of every buyer is brought into the market" (Jevons 1888, p 87).

Two aspects of this account are worth noting. First is that although Jevons does not here explicitly refer to the costs of acquiring this perfect information, brokers obviously do not work for free, and Jevons's subsequent inclusion of "brokers" in his list of conveyance costs indicates his awareness of these information costs. Indeed, Jevons endorses government intervention to assure that the relevant information is available (thus implicitly shifting costs of information acquisition from those who seek to acquire the information to those who have information to provide):

> So essential is a knowledge of the real state of supply and demand to the smooth procedure of trade and the real good of the community, that I conceive it would be quite legitimate to compel the publication of any requisite statistics. . . . The welfare of millions, both of consumers and producers, depends upon an accurate knowledge of the stocks of cotton and corn; and it would, therefore, be no unwarrantable interference with the liberty of the subject to require any information as to the stocks on hand. . . . Publicity, whenever it can thus be enforced on markets by public authority, tends almost always to the advantage of everybody except perhaps a few speculators and financiers (Jevons 1888, pp 87-88).

However, it is also worth noting that Jevons appears to assume that of all the possible impediments to exchange, physical costs of effectuating the trade and (perhaps to a lesser extent) lack of adequate information overshadow all the others. Thus his justification for concluding that actual markets closely approximate perfect markets is only that brokers ensure the

availability of perfect information, and his catalog of transaction costs includes only physical transfer costs and broker information costs. Jevons here offers no explanation for why the psychological, strategic, and other potential impediments to bargaining, which he explicitly recognized, would not arise in practice.

At times, however, even Jevons himself acknowledges that reality and his analysis may sometimes diverge. A moment ago we saw that Jevons's definition of a market assumed that everyone acts in a self-interested maximizing fashion and that there were no market-distorting "conspiracies." Jevons's thoroughgoing utilitarianism might have given him confidence that the former assumption would generally be satisfied, but the threat of collusion remained a genuine possibility. Moreover, when Jevons introduced what he calls "The Law of Indifference," i.e. the axiom that at any given time there cannot be two different prices for the same item in the same market, he took care to explain why observed reality may not match his theory: "Such differences [in price] as may practically occur arise from extraneous circumstances, such as the defective credit of the purchasers, their imperfect knowledge of the market, and so on" (Jevons 1888, p 91).

And while he did not include them in his theory, Jevons did reveal an awareness of a broader, psychological set of influences on the terms of exchange. Although his theory assumes that everyone pursues his own "private interests" and is willing to deal with anyone "for the slightest apparent advantage" (Jevons 1888, p 86), Jevons concedes that when bargaining parties' reservation prices overlap—e.g., when "A is really willing to sell at £900, and B is prepared to buy at £1100"—then the final transaction price will reflect various factors independent of the products' marginal utilities:

> I conceive that such a transaction must be settled upon other than strictly economical grounds. The result of the bargain will greatly depend upon the comparative amount of knowledge of each other's positions and needs which either bargainer may possess or manage to obtain in the course of the transaction. Thus the power of reading another man's thoughts is of high importance in business, and the art of bargaining mainly consists in the buyer ascertaining the lowest price at which the seller is willing to part with his object, without disclosing if possible the highest price which he, the seller, is willing to give. The disposition and force of character of the parties, their comparative persistency, their adroitness and experience in business, or it may be feelings of justice or of kindliness, will also influence the decision. These are

> motives more or less extraneous to a theory of Economics, and yet they appear necessary considerations in this problem[2] (Jevons 1888, p 124).

What Jevons appears to overlook (or at least omits to discuss) is that the factors which affect the ultimate terms of a deal when reservation prices overlap can also affect negotiating parties' reservation prices themselves, and thus whether a deal is possible at all. Under some circumstances considerable force of character and persistency might produce stubborn refusals which stymie any bargain; under other circumstances they may overcome substantial resistance and effectuate a deal that otherwise never would have occurred. Since Jevons acknowledges these factors as "necessary considerations" to analyzing an important economic problem, why then is he so quick to dismiss them as "more or less extraneous to a theory of Economics"? Put another way, why does Jevons limit his theory's treatment of impediments to exchange to costs of "conveyance"?

In part this approach may have reflected the economic preoccupations of Jevons's age. Today, costs of conveyance are sufficiently small and routine that they are not particularly interesting to a theorist striving to understand the general effects of transaction costs; other costs are relatively more prominent because less familiar and tractable. However, advanced transportation networks which make speedy delivery of physical goods commonplace also make it easy to lose sight of the extent to which transportation was a significant limiting factor on nineteenth century industrialization. Rondo Cameron (1997, p 204) has noted that:

> The steam locomotive and its adjuncts, iron (or steel) roadways, more than any other technological innovation of the nineteenth century, epitomized the process of economic development. . . . They were both the symbols and the instruments of industrialization. Before the railway inadequate transportation facilities constituted a major obstacle to industrialization in both continental Europe and the United States. Lacking Britain's endowment of natural waterways and handicapped by greater distances to cover, continental and American industrialists found themselves pent up in local markets

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[2] Jevons, at a loss to identify any economic grounds by which the parties might arrive at a determinate settlement price offers the surprising suggestion that "[i]t may be that indeterminate bargains of this kind are best arranged by an arbitrator or third party" (Jevons 1888, pp 124-125). Jevons does not explain what grounds that arbitrator or third party would use to determine an appropriate final price.

> that offered little scope for extensive specialization and expensive capital equipment. The railway and, to a lesser extent, the steamship change that state of affairs. Railways offered cheaper, faster, more dependable transportation. . . .[3]

Thus, costs of conveyance might naturally have overshadowed other types of impediments to exchange in the broad universe of concerns preoccupying students of nineteenth century economies.

The principal influence, however, on Jevons's choice to reduce his treatment of transaction costs to costs of conveyance is likely to have been his drive to subject economics to the discipline of mathematical reasoning.[4] At the very outset of *The Theory of Political Economy*, Jevons declares that "[i]t is clear that Economics, if it is to be a science at all, must be a mathematical science. . . . Many persons seem to think that the physical sciences form the proper sphere of mathematical method, and that the moral sciences demand some other method,—I know not what. My theory of Economics, however, is purely mathematical in character" (Jevons 1888, p 3). And not just any mathematics will suffice: "As the complete theory of almost every other science involves the use of [differential] calculus, so we cannot have a true theory of Economics without its aid" (Jevons 1888, p 3). Acknowledging that many would question whether human behavior can fully be quantified, Jevons then offered an extended justification of his method, based on his commitment to utilitarianism, his hope that future scientific progress will provide the necessary data, and his conviction that "that nothing is less warranted in science than an uninquiring and unhoping spirit. In matters of this kind, those who despair are almost invariably those who have never tried to succeed" (Jevons 1888, pp 7-8).

Jevons explicitly returned to those themes in developing his theory of exchange in Chapter IV, twice emphasizing the importance of quantitative analysis. "But if Economics is to be a real science at all, it must not deal merely with analogies; it must reason by real equations, like all the other sciences which have reached at all a systematic character" (Jevons 1888, p

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[3] Britain began constructing its railway network earlier than other industrializing countries, in 1825. Nevertheless, the decades immediately preceding the 1871 publication of *The Theory of Political Economy* saw dramatic growth in Britain's railroads, and even more explosive growth in other industrializing powers' railroad networks (Cameron 1997, pp 204, 206).

[4] Robert Heilbroner (1995, p 182) called Jevons and Francis Edgeworth the two "great proponent[s] of making economics a 'science.'"

101), he says at the conclusion of his first "Symbolic Statement of the Theory." Later, in discussing utility and his aspirations for its study, he looks forward to the day when we have sufficient empirical knowledge of people's utility that we can give laws which will summarize that data. "[Those laws'] determination will render Economics a science as exact as many of the physical sciences; as exact, for instance, as Meteorology is likely to be for a very long time to come" (Jevons 1888, p 147).

We see here quantification's two aspects. First is the theoretical possibility of reducing the examined characteristic to some numerical value. Second is the practical question of being able to compile sufficient data to make that numerical representation accurate and useful.

Giving top priority to quantification of economic theories, of course, necessarily entails limiting the scope of those theories to conditions and behavior which are amenable to numerical representation. Such a limitation may be reasonable when the resulting marginal explanatory gains from increased quantification are quite large—and in 1871 they surely were—but it is not without ancillary consequences. Thus, the various difficult-to-quantify psychological influences on bargaining, which Jevons acknowledged were "necessary considerations" for a comprehensive explanation of actual settlement prices, were nonetheless dismissed as "more or less extraneous to a theory of Economics," while Jevons's model explicitly included conveyance costs, at least in part, one suspects, because their effect "can be represented in our formulae in a very simple manner" (Jevons 1888, p 107).

However, the second, empirical dimension of quantitative analysis might also have influenced Jevons's decisions about what factors to build into his model.[5] In his preface to the second edition of *The Theory of Political Economy*, Jevons stated that he had "derived the idea of investigating Economics mathematically" from several previous works, of which he was "probably most indebted" to Dionysius Lardner's *Railway Economy* (1850), a work which Jevons said "has always struck [him] as containing a very able investigation, the scientific value of which has not been sufficiently estimated" (Jevons 1888, p xvii). With the exception of one chapter in the middle, Lardner's book made scarcely any use of mathematical symbols, but it contained copious amounts of quantitative data about railway operations in Europe and the United States, data which would reasonably lead to an optimistic conclusion that costs of conveyance were sufficiently on the way to being measured that their inclusion in a quantitative model of transactions would be useful.

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[5] Roger Backhouse (2002, p 169) has noted that "[e]stablishing economics as a science was, for Jevons, closely linked to the exact measurement of economic quantities."

Jevons's acknowledgement of the inspiration he drew from Lardner highlights an additional limitation on Jevons's discussion. Although Jevons explicitly emphasized the importance of information costs, to such an extent that he deemed the existence of adequate information to be an essential feature of any genuine market, he did not extend that insight about the importance of information costs to the analysis of the organization of participants in the market. This limitation is noteworthy in light of Jevons's familiarity with Lardner's *Railway Economy*, a work which economic historian Mark Blaug (1997, p 293) credits as "containing the first exposition in English of what approximates to the modern theory of the firm." And, we might add, a work which also displayed a recognition of the importance of transaction costs in that theory.

B. Lardner

In Chapter IX of *Railway Economy*, Lardner describes the impetus behind creation of railroad clearing-houses in the United Kingdom. The network had originally been built by dozens of different railroad companies which eventually connected their own local rail networks to their neighbors' networks (Lardner 1850, p 149). It was now physically possible to go from any point on the network to any other, but

> [t]he exigencies of the transport had no relation with the arbitrary limits which separated the domain of one company from that of another. Passengers and goods required to be booked and continuously transported from one point of the kingdom to another. But no company possessed the power to do more than carry the passenger or the goods to the limits of its own line; there they were handed over to another company, who, in like manner, carried them over its territory, and transferred them to a third, and so on (Lardner 1850, p 149).

Because each of these railroad companies had its own equipment and its own system of billing, the result was a system that was highly inconvenient to passengers, and even more inconvenient for transporting freight, which had to be unloaded, at each administrative border, from the last railroad's cars and loaded onto the next railroad's cars (Lardner 1850, pp 149-150).

> Such an operation was not only attended with great expense, which must necessarily fall upon the expeditor of the goods, but also with serious delay, damage, and risk of loss. In short, the inconvenience to the public was so

> enormous, and the clamour which it excited, both among the commercial classes, and whose who traveled by the railways, was so irresistible, that it became manifest that some arrangement must be adopted by which the public would be accommodated, and the traffic, both in goods and passengers, expedited over the railways of different companies without being rebooked, repacked, or transhipped.
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> The point was practically conceded, and the traffic of all descriptions carried without interruption from the lines of one company to those of another (Lardner 1850, p 150).

This solution, however, engendered further problems. The revenues received from passengers and shippers had to be divided among the relevant lines, and each railroad's cars would spend time traveling on other railroads' tracks. The result was "an intolerable chaos of cross accounts, out of which sprung vexatious disputes and much litigation" (Lardner 1850, p 150). The ultimate resolution of this difficulty involved the creation of a clearing-house, modeled on bank clearing-houses (Lardner 1850, p 151), which "by a fiction, makes itself the common debtor and the common creditor of all the bankers" (Lardner 1850, p 152). This expedient reduces the number of counterparties with which any given bank or railroad must deal from dozens to just one, the clearing-house, with an enormous gain in convenience, or (as we might say today) in efficiency.

Lardner described the operation of clearing-houses for both banks and railroads in considerable detail, even so far as describing the physical layout of the paper forms which they used and the time of day at which one of the accounts was filled. (Four o'clock.) (Lardner 1850, p 152). The "first object" of these clearinghouses was to "adjust these complicated debits and credits, as well for passengers as for every species of goods, with simplicity, clearness, and dispatch, and in such a manner as not to give rise to subsequent disputes" (Lardner 1850, pp 154-55). The second task was to allocate fees resulting from the use of one railroad's cars on another railroad's tracks (Lardner 1850, p 155). This solution proved very popular, and Lardner emphasized the "enormous extent of the transactions" which the clearing-house was used to settle[6] (Lardner 1850, p 161). In the end, "[t]he practical

[6] The numbers, it must be admitted, seem rather small by the standards of twenty-first century markets. Each day saw 250 communications between the clearing house and provincial railway stations concerning potential errors in reports. Each month the clearing-house balanced approximately 5,000 accounts for the shipment of goods (Lardner 1850, p 162).

effect of the arrangement, even so far as it is hitherto developed, is to facilitate such an interchange of the use of the rolling stock, and the service of the stations between company and company, as to render their benefits in a great degree common to all" (Lardner 1850, p 163). And, Lardner thought, "[t]he perfection to which this system tends" would in fact be for all the railroads to keep a "common rolling stock" and should "as it were club" together to share in the maintenance of that stock, each company paying an amount proportionate to the amount of use which it made of that stock (Lardner 1850, p 163).

Lardner was aware not only of coordination costs, but also of the important role of information. He was powerfully struck by the invention of the telegraph, and its ability to radically increase the speed of information dissemination: "The Electric Telegraph for the transmission of intelligence, in the most literal sense of the term, annihilates both space and time. The interval which elapses between the transmission of a message from London and its delivery in Edinburgh, provided the line is interrupted, is absolutely inappreciable" (Lardner 1850, pp 18-19). Lardner then described in some detail how "the effects of the rapid transmission of intelligence by the combination of all the various expedients supplied by science to art" enabled "the great enterprises of the London newspapers" to provide ready access to information from around the world (Lardner 1850, p 19). Lardner was so enthusiastic that he devoted all of the fifteenth chapter of *Railway Economy* to explaining how the telegraph functions, both technically and institutionally. The implications of telegraphy for business and the cost of information were evident from Lardner's description of "a sort of subscription intelligence rooms" which were opened in "the chief telegraphic stations" around the country. In these rooms

> subscribers can daily and hourly obtain in common the general commercial information which is most in request; such as the state of the stock and share market, and of the money market; the state of the wind and weather at different ports of the kingdom; shipping and sporting intelligence; the rates of the markets of every description; and the general political news of most importance (Lardner 1850, p 361).

"Few of the numerous readers of newspapers," Lardner remarked, "have the least idea of the immense commercial, social, and intellectual powers wielded, and benefits conferred, by these daily publications, a large portion of which influence is to be ascribed to the cheapness, promptitude, and rapidity with which they are transmitted from the capital to all parts of the country" (Lardner 1850, p 21).

The final chapter of *Railway Economy*, "The Relation of Railways to the State," is devoted to Lardner's analysis of institutional features of the railroad industry's organization. Picking up on the theme introduced earlier in his discussion of clearing-houses, Lardner asserted that "[a] railway, like a vast machine, the wheels of which are all connected with each other, and whose movement requires a certain harmony, cannot be worked by a number of independent agents. Such a system would speedily be attended with self-destruction. The organisation of a railway requires unity of direction and harmony of movement, which can only be attained by the combination of the entire carrying business with the general administration of the road" (Lardner 1850, p 503). The result was many "local monopolies of transport," an "evil" which was "speedily aggravated by amalgamation" among connecting lines, leading ultimately to "those colossal monopolies among which the territory of the United Kingdom is parcelled out. . . " (Lardner 1850, pp 503-504).

A political backlash followed, as monopoly "was not slow to develop some of its customary evils," and demands for regulation arose (Lardner 1850, p 506). Lardner's discussion of the debate over these regulations focused on disputes over legal requirements that railroad companies publicly disclose certain information about their operations. The railroads opposed such requirements; the railroad companies' critics (among whose number Lardner clearly counted himself) supported mandatory disclosures. As Lardner tells it, one of the railroads' main arguments against disclosure requirements was that the hostile sentiments which motivated those requirements were inappropriate, and that "if such a system of annoyance and improper interference be continued, it must result either in raising a spirit of opposition on the part of railway interests, which, considering the magnitude of the property at stake, cannot be lightly regarded, or inducing an apathy and indifference in the administration of railways; in either case begin the cause of great injury and inconvenience to the public" (Lardner 1850, p 507).

Balanced against this implicit threat of psychological impediments to future bargaining was a pro-regulation argument based in part on high information costs: Shares in railway companies are now an important part many people's wealth, but the prices of those shares are dangerously volatile as a result of inadequate information. "These violent and sudden variations in the value of the securities of one railway produce sympathetic effect in all the others, and always arise from the want of confidence entertained by the public in the representations made by the directors of railway companies of their financial condition" (Lardner 1850, p 509). Lardner thought that the obvious solution was the creation of an independent auditing body to monitor the railroads' disclosures (Lardner 1850, pp 509, 511). He conceded that

"shareholders have always had a certain power at reasonable times to examine the books of the company" but replied that this power was merely "illusory," because "going to a railway office, and demanding journals and ledgers, and running over their pages . . . is a proceeding which individual shareholders will never be induced to undertake, nor, if they did, would any satisfactory result ensue," since they lacked technical expertise (Lardner 1850, pp 515-516).

But was requiring disclosure of information to the entire public the proper solution? The railroads argued that it was not, that since their "concerns affect only their respective shareholders . . . the shareholders alone have a right to be informed of the affairs of their administration and management" (Lardner 1850, p 524). Lardner's reply to this argument, as in the case of his analysis of clearing-houses, again reflected his appreciation of the costs of having to establish rights on an individual level. There were two difficulties here. First, the number of relevant shareholders was so large that individual disclosures would be impracticable. Second, membership in that body was constantly in flux, making it difficult to identify the individuals to whom disclosure is owed.[7] And even those people who are not currently shareholders are potential shareholders, and therefore have an interest in knowing about the company in which they must choose whether to invest.[8] In modern terminology, the costs of allocating myriad *in personam* obligations to disclose railroads' information were sufficiently high that the only rational solution was to create an *in rem* obligation to disclose the relevant information to the world.

C. A Knightian Approach to Coase

We are not arguing that Jevons or Lardner, any more than Pigou, were the true originators of Coase's ideas. Instead, we have shown that if we look for the seeds of Coasean analysis, we find both an emphasis on transportation and basic information costs and the stirrings of the abstract style of analysis. Even more interestingly, we see early traces of the trade-off

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[7] "[T]o this it may be answered, that nothing short of publicity can bring such information to the knowledge of bodies so large and fluctuating as those of railway shareholders. By what means, short of general publicity, for example, could a body like the proprietors of the North-Western Railway, acquire a clear, full, and satisfactory knowledge of the affairs of that vast enterprise" (Lardner 1850, p 524).

[8] "Besides, it may be answered, the shares being matters of daily bargain and sale in the public market, every individual who may become a purchaser has a claim to a full knowledge of the state of affairs of the company into which he is about to enter" (Lardner 1850, p 524).

between the push for abstractness (especially in the service of mathematization) and the propensity of the resulting analysis to invite empirical institutional study. Jevons and Lardner make a nice pair: Jevons starts down the path of increasingly abstract analysis of the impediments to trade, reaping benefits in mathematical tractability, but at the cost of the attention to institutional detail that characterized Lardner's analysis. Jevons can offer a general theory of how market prices are formed; Lardner can explain why railroad companies tend toward monopolistic combinations.

If we were to identify a pre-Coasean who came closest to seeing the problem of the domain of analysis and the point that assuming away imperfections in the market economy is a reason to take up the task of figuring out the role of institutions in making such an economy work (or not), it would be Coase's predecessor at Chicago, Frank H. Knight. In 1924, Knight took on Pigou's tales of externality and his supposed refutation of the principle of comparative advantage. (Barzel 1977; Demsetz 2011) Presciently, Knight recognized that a common thread running through Pigou's examples was a lack of well-defined private property rights. For example, in Pigou's hypothetical of a well-paved highway versus an ill-paved but commodious road, Pigou believed the highway would be overused because the private benefit of an additional user would be balanced against the private cost of delay rather than the much larger cost of delay to all the drivers. Foreshadowing Coase, Knight pointed out that a private owner of the road would close this gap by charging a toll. Even more interesting, Knight drew the following general lesson (Knight 1924, pp. 605-06):

> That free enterprise is not a perfectly ideal system of social organization is a proposition not to be gainsaid, and nothing is further from the aims of the present writer than to set up the contention that it is. But in his opinion the weaknesses and failures of the system lie outside the field of the mechanics of exchange under the theoretical conditions of perfect competition. It is probable that all efforts to prove a continued bias in the workings of competition as such, along the lines followed by Professors Pigou and Graham, are doomed to failure. Under certain theoretical conditions, more or less consciously and definitely assumed in general by economic theorists, the system would be ideal. The correct form of the problem of general criticism referred to at the outset of this paper is, therefore, that of bringing these lurking assumptions above the threshold into the realm of the explicit and of contrasting them with the facts of life—the conditions under which competitive dealings are actually carried on.
>
> When the problem is attacked from this point of view, the critic finds himself moving among considerations very different from the

> logical quantitative relations of such discussions as the foregoing. Human beings are not "individuals," to begin with; a large majority of them are not even legally competent to contract. The values of life are not, in the main, reducible to satisfactions obtained from the consumption of exchangeable goods and services. Such desires as people have for goods and services are not their own in any original sense, but are the product of social influence of innumerable kinds and of every moral grade, largely manufactured by the competitive system itself. The productive capacities in their own persons and in owned external things which form the ultimate stock in trade of the human being are derived from an uncertain mixture of conscientious effort, inheritance, pure luck, and outright force and fraud. He cannot be well or truly informed regarding the markets for the productive power he possesses, and the information which he gets has a way of coming to him after the time when it would be of use. The business organizations which are the directing divinities of the system are but groups of ignorant and frail beings like the individuals with whom they deal. (In the perfectly ideal order of theory the problem of management would be non-existent!) The system as a whole is dependent upon an outside organization, an authoritarian state, made up also of ignorant and frail human beings, to provide a setting in which it can operate at all. Besides watching over the dependent and non-contracting, the state must define and protect property rights, enforce contract and prevent non-contractual (compulsory) transactions, maintain a circulating medium, and most especially prevent that collusion and monopoly, the antithesis of competition, into which competitive relations constantly tend to gravitate. It is in the field indicated by this summary list of postulates, rather than in that of the mechanics of exchange relations, that we must work out the ultimate critique of free enterprise.

Once the consequences of the ideal exchange mechanism have been spun out, the work of figuring out what in the real world is going on takes its place. We now turn to one piece of the real-world economy to which Coase's and Knight's moral points us – contract and property.

III. The Coase Theorem and the Relation of Contract to Property

The abstraction of rights in economic theorizing helps explain how Coase and later theorists wound up conflating contract and property, even though the Coase Theorem and Coasean analysis should point in the opposite direction, when it comes to lessons for the style of doing economics. Once transaction costs are understood broadly and recognized to be positive, and once contracts and property are viewed as costly institutional alternatives,

we can see how transaction costs provide reason for choosing one or the other of those alternatives in different real-world contexts.

The substitutability of property and contracts is hinted at in Coase's other work and occasionally elsewhere in law-and-economics literature. Coase (1937) begins building a theory of the firm by asking why we have firms. He notes that if market contracting were costless we could have no firms, and if ordering actions by fiat within firms were costless (i.e. no communication costs and what we could call agency costs), all economic activity could take place in one giant firm. That is, firms and contracts are substitutes. As many have noted, firms are like property in their defining a boundary around assets. (Iacobucci and Triantis 2007; Hansmann and Kraakman 2000) This boundary allows creditors to lend against a defined pool of assets and is an important property-like contribution to the legal infrastructure of firms. In particular, relying solely on contracts to make the pool of assets in the firm immune from the claims of creditors would be impractical in our positive transaction cost world, making asset partitioning the "essential" role of organizational law. (Hansmann and Kraakman 2000) One might say something similar about property: setting up basic entitlements with fine-grained in personam contract-style rights could be done costlessly in a zero transaction cost world (by definition), but not in our world. The legal system (and some customary systems) often set up entitlements using an exclusion strategy as a shortcut over fine-grained specification of use rights. (Smith 2002, 2009; Merrill and Smith, forthcoming). This role of property is "essential" in a way similar to the essential role of firms in organization law: neither is replaceable with a collection of contracts.

So something like the substitutability of contract and property has been acknowledged by both Coase and New Institutional Economics, but we would argue that the extent of their substitutability has been overdrawn. Ironically, this overestimation of the ability to substitute contract and property in a world of zero transaction costs has been accompanied by insufficient recognition of the full range of ways in which contract and property do and do not substitute for each other in our world of positive transaction costs.

In Coasean fashion, let's take the zero transaction cost world as a jumping off point. Stephen Cheung noted that in the transaction cost world we would not even need property rights, an idea that Coase later endorsed. (Cheung 1998, pp. 518-20; Coase 1988, pp. 14-15) If the aim is to replicate the functions of our existing property system, rather than to replace it with a fundamentally different system, then this assertion seems incorrect. Presumably the idea behind the assertion is that in a world with zero

transaction costs, everyone could simply reach agreements with everyone else about what each person would be allowed to do, and prohibited from doing, with respect to each aspect of the physical world. For example, if there were four people in the world, one of them—call her A—might get the others to agree neither to set foot on land—call it Blackacre—located between specified grid coordinates on a map, nor to interfere with A's use of anything on that land. Meanwhile B might get A, C, and D to agree to the same terms with respect to another specified set of land—call it Greenacre—and C and D might likewise obtain similar agreements from everyone else. The end result, the argument would go, could effectively replicate what we currently call "trespass" law and everything else which property law currently does.

What this argument overlooks is a fundamental problem arising out of the interaction of property and time. Property rights and duties extend across generations in ways that cannot be replicated by a purely contractual set of arrangements, even in the absence of any transaction costs. Consider, for example, the simple rule against trespass. If you own Blackacre, your property right in that land is a valid not only against potential entry by me, but also against potential entry by my descendants and any other member of future generations. Contracting alone cannot replicate such a right. In a world with no transaction costs, you might be able to induce everyone else alive to agree not to enter Blackacre without your permission, and might even induce them to agree to continue to observe that restriction if you later designate someone else to be "owner" of Blackacre, including heirs. But their entering such an agreement would not, and could not, bind their descendants to refrain from entering that specified land without your permission. The agreement is with those who are living now, not with their descendants, who may not even exist at the time of the agreement and who have not given their consent to any such agreement. The power to contract does not enable the living to bind their descendants in this way any more than I am able to enter into a contract with you pledging that one-hundred years from now my great-grandchildren will serve as your descendants' household servants.

This distinction between property and contract is not, of course, limited to trespass or the right to exclude. Property law is shot through with rights and restrictions which extend through time and bind multiple generations, including those yet to be born. Consider the law of easements, real covenants, and equitable servitudes, to give just three obvious examples. This durational robustness is sufficiently characteristic of property rights that property law can be thought of, at least in part, as a way of overcoming the temporal limitations on the possibilities of contract, a way of establishing the security and stability of certain rights through time.

Once we relax the assumption of zero transaction costs, and approach the real world of bargaining frictions, we see property exhibit a parallel property. The existence of positive transaction costs does not make bargaining with large numbers of people theoretically impossible, but as the numbers become very large, positive transaction costs make such bargains increasingly inefficient, and ultimately impossible in practice. The structure of property itself can be explained as both a means of dealing with trans-generational rights through time and a response to the implications of positive transaction costs. Property is a substitute for a vast multiplicity of contracts, ensuring stable rights when contracting is impracticable or impossible.

But the abstract nature of the Coase Theorem and Coasean argumentation tends to obscure the essential role of property in a more pervasive fashion in our world of positive transaction costs. Coase treats property as a bundle of use rights – a thin notion of entitlement. (Merrill and Smith 2001) The result is to make the picture of property look more like the bundle of sticks (very thin ones) of Legal Realism. When it comes to property, Coase was a hyper-realist, although for his purposes, i.e. to show the working of law on the economy, it was not necessary to settle on one view of property. (Merrill and Smith 2001, forthcoming). The Legal Realist bundle picture gains plausibility from the an increasingly abstract and thin notion of entitlement, because the sticks have become as much like twigs as possible and as little like a holistic "thing." Put differently, Realist property can be viewed as a collection of fine-grained in personam use rights, much like contracts. The value of coarse rights as a short cut has no place in this version of abstract entitlements. The no-arbitrage result and abstract rights make many things look like transaction costs and the fundamental unit of analysis to look like contract.

This tendency of abstract reduction-style argument to lead to the Legal Realist view of property is not unique to Coase or to law and economics. Interestingly, from a very different perspective Tom Grey saw abstract rights from increasingly sophisticated contracting and financial engineering as leading to the Realist disintegration of property. (Grey 1980) He noted that property was being fragmented in response to the needs of a complex economy, with more abstract and fine-grained rights making it impossible to say who is the owner and what collection of fragments is "property." The bundles labeled "property" no longer have independent or essential content. Unlike Coase, Grey thought that late capitalism was undermining its own foundations. Grey was echoing and extended the concerns of Adolf Berle and Gardiner Means, who are famous for highlighting the problem of the separation of ownership and control in corporations. (Berle and Means 1932) Less well known is that they saw this as a challenge to the notions of private

property itself (although their angst is reflected in the title of their work, *The Modern corporation and private property*). A focus on sophisticated divisions of property and complex contracting over property can obscure the everyday work it does in setting up a platform for anonymous interactions and preserving basic order. (Merrill and Smith 2001, p. 398).

But the import of the Coase Theorem is if anything the opposite from this rarified picture of thin entitlements in a zero transaction cost world. The point of Coase's analysis is that in a positive transaction cost world like ours, transaction costs do matter. How we set up institutions may determine resource use and the value that it gives rise to, because further adjustments (for example, through contracting) may turn out to be too costly to be worthwhile. It is because of positive transaction costs that property and contract are not equivalent or perfect substitutes in our world. More generally, many institutions are partial substitutes, and the problem for law is to set up a framework that, in conjunction with activities like contracting that people will undertake in a more decentralized fashion, will tend to lead to maximum value (or, to step outside the Coasean framework, other goals, like fairness or liberty).

Thus, contracts and property are sometimes substitutes, and the right mix of exclusion and governance (the former being more distinctive of property and the latter more resembling contract) is an empirical matter. (Smith 2002) It is a problem in transaction cost engineering to choose which combination is best. But the shortcut that property offers over a world of in personam rights to finely delineated uses is likely to be important in a wide range of real-world circumstances, even if not so salient when we focus on sophisticated adjustments at the margins. Whether we take transaction costs to be more closely identified with contracting or to stand for the costs of institutions, the structure of property itself can thus be explained in significant part as a response to positive transaction costs. Providing an alternative to contracting when the barriers of time or vast numbers of potential counterparties make bargaining impossible is property's essential economic role.

Conclusion

Coase's abstract transaction costs argument calls us to give more detailed attention to the costs and structures of institutions. Recognizing the implausibly ideal consequences that follow from assuming that transaction costs are zero highlights the central role that transaction costs actually play in our nonideal world. But as with his predecessors and followers, Coase let the abstraction of his argument lead him to a correspondingly abstract and thin notion of entitlement, in place of real-world notion of property, when it

comes time to return to our world. We agree with Knight that it is in the "mechanics of exchange relations" that we need to look for explanations of economic institutions, and that includes the institution of property itself. The real lesson of the Coase Theorem is that the presence of transaction costs in the real world makes property a sometimes essential shortcut over full contracting. Property and contract are substitutes, and one cannot simply be reduced to the other.

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