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# THE COASE THEOREM AND THE EMPTY CORE: A COMMENT

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I would not presume to discuss the value of the theory of the core for economic analysis. What I will do is to explain why study of the example which Professors Aivazian and Callen use as the basis of their argument<sup>1</sup> has not led me to modify my views.

The imagined situation which Aivazian and Callen analyse is one in which there is a laundry, *C*, and two firms, *A* and *B*, which pollute. Profits would be, in total, greater if the two polluters, *A* and *B*, closed down. It is argued that, in the conditions set out in their example, *C* could not induce *A* and *B* to cease operations by means of money payments if *A* and *B* were not liable for the harm inflicted on *C*.

It is assumed that if each firm operated independently, firm *A* would earn profits of \$3,000 per unit of time, *B*, \$8,000 and *C*, \$24,000. However, if a pair of these firms made an agreement to change their mode of operation, the joint profits would be, for *A* and *B*, \$15,000, for *A* and *C*, \$31,000 and for *B* and *C*, \$36,000. Since the firm excluded from these agreements would continue to operate independently, it is apparent, by adding the profit earned by this firm to the joint profit of the two firms in the agreement, that the combined profits of all three firms would always remain \$39,000. However, if *A* and *B* could be induced to close down, so that *C* alone continued to operate, *C*'s profits would be \$40,000. As total profits, with two firms party to an agreement and one firm acting independently, are always \$39,000 and total profits would be \$40,000 if *C* alone operated, it would seem possible for *C* to make payments to *A* and *B*, out of the additional \$1,000 that would accrue, which would make *A* and *B* better off than if they continued in operation and would still leave something over to increase *C*'s profits. Aivazian and Callen argue, however, that this would not happen. They maintain, given the conditions postulated in their example, that even if an arrangement was made between *A*, *B*, and *C*, which enabled profits of \$40,000 to be earned, that position would be unstable.

<sup>1</sup> Varouj A. Aivazian & Jeffrey L. Callen, *The Coase Theorem and the Empty Core*, 24 *J. Law & Econ.* 175 (1981).

They demonstrate this by assuming that the \$40,000 is divided so that *A* receives \$4,750, *B*, \$9,750 and *C*, \$25,500. Since *B* and *C* would be receiving in total \$35,250 and could obtain \$36,000 if they made an agreement between themselves in which, for example, *B* received \$10,000 and *C* \$26,000, this two-party agreement would clearly be preferred by *B* and *C* to a continuance of the three-way agreement. However, this would not be a stable position either. Since *A* would now be operating independently and earning \$3,000 and *B* would be earning \$10,000 (as a result of the agreement with *C*), the total profits earned by *A* and *B* would be \$13,000. But if *A* and *B* made an agreement between themselves, their joint profits would amount to \$15,000—which they would find preferable to the previous situation. But this is not the end of the story. Given this agreement between *A* and *B*, *C* would now be earning \$24,000. Even if all the gain from the agreement between *A* and *B* accrued to *A*, so that *A* earned \$5,000, the combined profits of *A* and *C* would amount to \$29,000. As an agreement between *A* and *C* would bring profits of \$31,000, this would enable both to increase their profits, by sharing the gain of \$2,000. But *B* would now be earning \$8,000 and *B* would be able to make an agreement with either *A* and *C* (or both, depending on how the \$2,000 was split between them) which would improve their situation as well as that of *B*. Aivazian and Callen conclude that “in a world of zero transaction costs, the inherent instability of all coalitions would result in endless recontracting among the firms.”<sup>2</sup>

I do not dispute the arithmetic of Aivazian and Callen's example. But my view of what would happen in the postulated conditions is different from theirs. Let us go back to the starting point, in which *C* alone operates, with the profits of \$40,000, as a result of payments by *C* to *A* and *B*, divided, by agreement between the firms, as follows: *A*, \$4,750; *B*, \$9,750; *C*, \$25,500. As Aivazian and Callen point out, *B* and *C* could make an agreement which makes both of them better off. With the three-way agreement, *B* would have received \$9,750 and *C* \$25,500, a total of \$35,250 but by making an agreement between themselves, they could secure joint profits of \$36,000, a gain of \$750. Let us suppose that they decide to divide this gain equally between them. Each would then earn \$375 more than before: *B* would earn \$10,125 and *C* \$25,875. *A*, however, is now earning \$3,000, and *C* \$25,875, a total of \$28,875, whereas, if *A* and *C* made an agreement, their joint profits would be \$31,000, a gain of \$2,125. Again, if the gain is divided between them, each would earn \$1,062.5 more than before: *A* would earn \$4,062.5 and *C* \$26,937.5. But *B*'s profits are now \$8,000 and *A*'s are \$4,062.5, a total of \$12,062.5. An agreement between *A*

<sup>2</sup> *Id.* at 179.

TABLE 1  
PROFITS OF FIRMS A, B, AND C

Starting position	A	B	C
	\$4,750	\$9,750	\$25,500
<i>Round 1</i>			
B and C contract	3,000	10,125	25,875
A and C contract	4,062.5	8,000	26,937.5
A and B contract	5,531.25	9,468.75	24,000
<i>Round 2</i>			
B and C contract	3,000	10,734.375	25,265.625
A and C contract	4,367.188	8,000	26,632.813
A and B contract	5,683.594	9,316.406	24,000
<i>Round 3</i>			
B and C contract	3,000	10,658.203	25,341.797
A and C contract	4,329.102	8,000	26,670.898
A and B contract	5,664.551	9,335.449	24,000

and B would bring profits of \$15,000. If they divided the gain between them, A's profits would become \$5,531.25 and B's would become \$9,468.75. Nor is this the end. C could make another agreement with B and this would be followed by further agreements between A and C and A and B. This process could go on indefinitely. As Aivazian and Callen say, there would be "endless recontracting." To indicate what would happen as a result of recontracting, I set out, in Table 1, the results, for the first three rounds, of following the procedure described in the text, in which the gain from an agreement is divided equally between the parties and agreements between B and C, A and C, and A and B follow in that order.

I worked out the results of this recontracting process for three more rounds than are shown in Table 1. From these figures and those in Table 1, I calculated the profits per unit of time that would be earned by each of the firms during each round. The results are given in Table 2.

TABLE 2  
PROFITS PER UNIT OF TIME FOR FIRMS A, B, AND C

	A	B	C
Round 1	\$4,197.9	\$9,197.9	\$25,604.2
Round 2	4,350.3	9,350.3	25,299.5
Round 3	4,331.2	9,331.2	25,337.6
Round 4	4,333.6	9,333.6	25,332.8
Round 5	4,333.3	9,333.3	25,333.4
Round 6	4,333.3	9,333.3	25,333.3

What is apparent from Table 2 is that although the division of profits varies as each new contract is made in this endless chain of contracts, the division between the three firms of the total profits of \$39,000 becomes,

over a period, quite definite. The individual two-party agreements may not be stable but the division of profits between the firms does become stable. It is clear from Table 2, and the firms *A*, *B*, and *C* will know, that a continuance of this "endless recontracting" will lead to firm *A* earning per unit of time \$4,333.3, *B*, \$9,333.3 and *C*, \$25,333.3.

Using this illustration as a basis for discussion, let us now compare the profits which would accrue to each firm, (1) with independent operation, (2) with two-party agreements and (3), with *C* paying *A* and *B* to close down. For (3), I have taken over the illustrative figures used by Aivazian and Callen in their discussion. The situation is shown in Table 3.

TABLE 3  
PROFITS PER UNIT OF TIME FOR FIRMS *A*, *B*, AND *C*

	<i>A</i>	<i>B</i>	<i>C</i>
(1) Independent operation	\$3,000	\$8,000	\$24,000
(2) Two-party agreements	4,333.3	9,333.3	25,333.3
(3) <i>C</i> pays <i>A</i> and <i>B</i> to cease production	4,750	9,750	25,500

It is not clear to me whether by "endless recontracting," Aivazian and Callen mean to imply that no agreements will ever be made, in which case the three firms would continue to operate independently, with total profits \$35,000 and the division of profits that shown against (1), or whether the firms are assumed to make two-party agreements which continue in force for a fleeting instance, to be superseded by another agreement which holds for a similar period, with total profits \$39,000 and the division between firms that shown against (2). But whichever alternative they had in mind, it is apparent that all three firms would prefer the situation in which *C* alone continues in operation, earning \$40,000, with *C* making payments to *A* and *B* which are greater than they would earn with either independent operation or two-party agreements. Since *C*'s profits would be greater by \$5,000 than the combined profits of all firms with independent operation and by \$1,000 if there were two-party agreements with "endless recontracting," it is easy to see that *C* could make payments to *A* and *B* that would raise their earnings above what they would otherwise be and still leave *C* with increased profits. Aivazian and Callen's division of profits shown against (3) furnishes an example of one set of payments which accomplishes this.

The division of profits with "endless recontracting" which I gave in Table 2 is dependent, of course, on the assumed starting point, the way in which the gain from recontracting is divided between the parties and the order in which the pairs of firms recontract. But whatever assumptions are made about these factors, some definite division of profits will emerge

and it should always be possible for *C* to make payments to *A* and *B* which would induce them to close down and will have the effect of making all three firms better off.

Up to this point I have not said anything about the belief of Aivazian and Callen that, in their example, the "grand coalition" is itself inherently unstable. If this is true, my argument that *C* could induce *A* and *B* to cease operations in a world of zero transaction costs, even if correct, would have no real importance since such an arrangement would no sooner be entered into than it would disappear. If my argument is to be taken seriously, it has to be shown that the "grand coalition" is stable. It might be argued that no firm would withdraw from this arrangement to enter into a two-party agreement since this would set in motion a process which would lead ultimately to lower profits. But I will not insist on this. I would, however, draw attention to the peculiar character of the contracts which are made in the recontracting process described by Aivazian and Callen, assuming that they are contracts and are not proposals to be superseded by other proposals, so that independent operation continues with the accompaniment of talk about ending it. If these agreements are contracts, they are peculiar in that their terms can be broken at will. The contracts last only so long as the parties are willing to be bound. Thus, if *C* agreed to pay *A* and *B* to close down, there would be nothing in the contract to prevent them opening up again whenever they wanted to do so. Most contracts of this kind, however, would have a time dimension and parties not adhering to the terms of the agreement within that time would become subject to a penalty. For example, if the contract by which *C* paid *A* and *B* to close down was to last for a period of years and if, as part of the contract, *A* and *B* had each to pay \$10,000 per unit of time to *C* if they recommenced production (with its accompanying pollution) and *C* agreed that, if it made a two-party agreement with either *A* or *B*, *C* would pay \$20,000 per unit of time to the firm excluded from the agreement, none of the firms would have an incentive to break the agreement, which would then cease to be unstable. If such provisions were included in the contract, *A*, *B*, and *C* would be able to enjoy indefinitely their higher incomes and they would certainly have no objection to their inclusion, if, without it, there would be "endless recontracting."

I would not wish to conclude without observing that, while consideration of what would happen in a world of zero transaction costs can give us valuable insights, these insights are, in my view, without value except as steps on the way to the analysis of the real world of positive transaction costs. We do not do well to devote ourselves to a detailed study of the world of zero transaction costs, like augurs divining the future by the minute inspection of the entrails of a goose.