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A Nobel Prize for Property Rights Theory

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Abstract: This article provides a brief overview of the Property-Rights Theory of the firm, pioneered by Grossman and Hart (1986) and Hart and Moore (1990), and situates the theory in other literatures.

Nearly 80 years ago[1], Ronald Coase [1] asked a striking question: if markets are an efficient method for allocating resources, then why do firms exist? Had Coase not been so far ahead of his time, he would have had the benefit of the framing of market efficiency provided by Arrow and Debreu's Welfare Theorems [2,3], and might have stated his question as follows. In a world of incomplete contracts, and hence incomplete markets, how can centralized transactions improve welfare, and what form do these centralized transactions take?

Coase, of course, provided his own answer: there are costs of using the price mechanism, and hence it is sometimes preferable to bypass the price mechanism and use the authority relationship. This answer is, at once, both profoundly true and deeply unsatisfying. It begs the question: what are these costs of using the price mechanism, why do they arise, and how can they be mitigated?

The 2009 Nobel Laurate, Oliver Williamson, went a long way to unpacking Coase's "transaction costs", pointing to haggling and other phenomena that can inhibit relationship-specific investments being made [4–6].

Yet this "transaction cost economics", by emphasizing the costs of using the price mechanism, leads one to an uncomfortable and counterfactual logical conclusion: all transactions should take place within one giant firm. In other words, it fails to explain firm boundaries.

Grossman and Hart [7] and Hart and Moore [8] provide an account of both the costs and benefits of integration, and thereby offer a theory of the boundaries of firms. This alone is a path-breaking contribution.

But what has made for an epoch-making pair of papers is that the authors of [7,8] chose to model the ex-post bargaining as taking place under symmetric information to make use of the Nash Bargaining Solution. This ingenious modeling choice has helped make Property-Rights Theory (PRT) models sufficiently portable that they can be embedded in a wide array of economic settings.

Property-Rights Theory[2] not only serves as the standard model for understanding the boundary of the firm, it has also provided important insights into other fields of economics, ranging from corporate finance to international trade. It is altogether fitting and proper that the Nobel Committee recognized this body of work, and in particular, the contribution of Oliver Hart, with the 2016 Prize in Economic Sciences.

To see the basic economics of the Grossman–Hart–Moore Property Rights approach (PRT) consider a relationship between two, wealthy, risk-neutral parties: a B(uyer) and a S(eller). B needs an

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[1] In fact, 85 years ago when he wrote it.
[2] See also [8] for a general treatment with more than two assets.

intermediate input (a "widget") from S in order to produce a final good. The value of the final good is $V(e)$, which depends on an investment e, by B. Similarly, the cost of producing the widget is $C(i)$, which depends on an investment i by S. Both B and C are increasing, concave functions, representing the fact that there are diminishing marginal returns to the investments.

One can think of the investment e as improving a machine that produces the final good, and the investment i as improving a machine that produces the widget. Because of expertise/human capital, it is only possible for B to make the investment in the final-good-producing machine and for S to make the investment in the widget-producing machine.

The key assumption of PRT is that these investments (and their outcomes) are not contractible. This could be because, even though they may be observable to the contracting parties, they are not verifiable by a third party such as a court of law. The court may, for instance, lack the requisite technical expertise or trade knowledge to determine whether the contractually stipulated investments have been made.

What is contractible is the ownership of the widget- and final-good-producing machines. Prior to the investments being made, the parties can contract on who owns these assets. Because there are no frictions at this stage, the parties will bargain to an efficient outcome.

The social optimum (or "first best") involves maximizing the total benefit to the two parties, minus their respective investment costs. That is:

$$\max_{e,i}\{V(e) - C(i) - e - i\} \tag{1}$$

and the optimal investment levels are thus given by $V'(e^*) = 1$ and $-C'(i^*) = 1$.

If B owns the final-good-producing machine and S owns the widget-producing machine then they will respectively solve the following optimization problems:

$$\max_{e}\left\{\frac{V(e)}{2} - e\right\} \tag{2}$$

and

$$\max_{i}\left\{\frac{-C(i)}{2} - i\right\}. \tag{3}$$

This is because, being nonintegrated, the parties will have to bargain over how to split the surplus from their investments. Given their outside options and the use of the Nash bargaining solution, each player gets only half of the benefits from her investment. Thus, each party will underinvest relative to the first best, with: $V'(e^*) = 2$ and $C'(i^*) = 2$.

What if the parties are vertically integrated with B owning both machines? Now B does not need to bargain with S because, in the language of PRT, she has "residual rights of control". B cannot compel S to invest and, lacking the relevant human capital, cannot invest in the widget-producing machine. But B no longer needs to bargain with S about the surplus from the investment in the final-good-producing machine. Being the residual claimant, B will invest at the first-best level. Overall surplus will not be first best, however, because S will underinvest.

Similarly, if the parties are vertically integrated with S owning both machines she will invest at the first-best level, but B will underinvest.

Whether B integration or S integration is better depends on the relative cost-benefit of their investments. Since asset ownership is contractible, we would expect whichever ownership structure maximizes second-best surplus to arise.

Notice that PRT provides a complete account of the costs and benefits of integration. Moreover, the only thing that changes when integration occurs are the incentives to invest. The technology is independent of ownership structure, and thus ownership structures are compared on a level playing field. Quite apart from the technical innovations of PRT, these constitute major conceptual advances.

Property Rights Theory has been tremendously influential across a wide range of fields of economics (see [9] for a discussion) due to its elegance and portability. It has also demonstrated the fundamental role that asset ownership plays in determining economic outcomes and the boundary of the firm.

The Nobel Committee has shown impeccable taste in honoring Oliver Hart's contribution.

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References

1. Coase, R. The Nature of the Firm. *Economica* **1937**, *4*, 386–405.
2. Arrow, K.J. An Extension of the Basic Theorems of Classical Welfare Economics. In Proceedings of the Second Berkeley Symposium on Mathematical Statistics and Probability, Berkeley, CA, USA, 31 July–12 August 1950; pp. 507–532.
3. Debreu, G. Valuation Equilibrium and Pareto Optimum. *Proc. Natl. Acad. Sci. USA* **1954**, *40*, 588–592. [CrossRef] [PubMed]
4. Williamson, O.E. The Vertical Integration of Production: Market Failure Considerations. *Am. Econ. Rev.* **1971**, *61*, 112–123.
5. Williamson, O.E. *Markets and Hierarchies: Analysis and Antitrust Implications*; Free Press: New York, NY, USA, 1975.
6. Williamson, O.E. Transaction-Cost Economics: The Governance of Contractual Relations. *J. Law Econ.* **1979**, *22*, 233–261. [CrossRef]
7. Grossman, S.J.; Hart, O.D. The Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration. *J. Political Econ.* **1986**, *94*, 691–719. [CrossRef]
8. Hart, O.; Moore, J. Incomplete Contracts and Renegotiation. *Econometrica* **1988**, *56*, 755–785. [CrossRef]
9. Aghion, P.; Holden, R. Incomplete Contracts and the Theory of the Firm: What Have We Learned over the Past 25 Years? *J. Econ. Perspect.* **2011**, *25*, 181–197. [CrossRef]