

COMMENTARY

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The Return of ‘The Nature of the Firm’: The Role of the Blockchain

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Abstract

In this note, I return to Coase (1937), on its 80th anniversary, to assess whether its logic and insight can be reconciled with the blockchain revolution. I argue that, indeed, it can, and propose the existence of a third method of organizing economic activity in a specialised exchange economy, in addition to the two that Coase considered. I call it the cryptographic stigmergy.

If there be such merit in the argument here, let it be dedicated to the memory of Ronald Coase.

Keywords: *Coase; firms; markets; blockchain; transactions; stigmergy*

1.

In this note, on its 80th anniversary, I wish to re-examine the merit of Coase's article, ‘The Nature of Firm’, rightly considered to be a keystone in economics, for the context of the blockchain economy. A professor once gave me sage advice on tackling Coase along the lines that, if I suspected that Coase may have made some error in logic somewhere, I would be well served to read again. With that caveat in mind, I take this task on perhaps to set his logic right in my own mind on the relevance of that brilliant paper to the emergence of blockchains.

Coase's article, as its title suggests, concerned itself with the task of defining a firm in the context of a market economy. So fundamental a concept needed defining then, because Coase felt that the extant assumptions needed a rethink. He felt that the task was worth his attention because the firm was understood differently by the common man and the economist.

In the intervening years since his article, nothing has altered. However, with the advent of blockchains, an incipient drift in the definition of the firm is increasingly becoming apparent again. The fundamental workhorse for both the blockchain and for Coase is the manner in which they organize transactions. It is a little surprise then that, when the manner in which they are processed is fundamentally altered, so too should the result from a Coasian analysis.

The poster children of blockchain – Bitcoin as a store of financial value and, somewhat more murkily, Ethereum as a store of innovational value — have helped insert the technology firmly into the common lexicon. Its effect on the economic system is, however, less vividly imagined. Enthusiasts of its applications have usually claimed too much for it, including as the messianic harbinger of a libertarian revolution that will obviate the need for government and regulation and remake economies. Detractors have usually missed the mark by even more, claiming that the technology is a flash in the pan and that its applications so far represent little of intrinsic social value.

This note is concerned with Coase's paper, and so these viewpoints matter only so far as they apply to the logic in his paper.

Coase began the paper by setting a standard that few analyses in economics meet: A definition of a firm that is realistic and tractable. And already our task is harder, since a ‘blockchain firm’ does not really exist, let alone in profusion enough to be used in any test for predictions against reality.

Coase provides the solution to this disadvantage, however. He argued that the economic system in which the firm was resident ought to be the starting point. He articulated the perception of the economic system as being one that, for the most part, still agrees well with our own. It requires no central authority and is directed by the price mechanism so effectively that it essentially operates on auto-pilot. Coase argued that somehow

this guidance provided by the price mechanism was suspended within the boundaries of a firm. There, planning seemed to take over. It was this aberrancy, apparent at the time to Coase alone, that drew him to his thesis.

2.

That aberrancy has arguably been engendered again. The economic system has begun to be altered anew by the blockchain in two ways.

First, the boundaries for where the price mechanism is being suspended is being changed, not solely in favor of the market nor solely in favor the Coasian firm.

Second, the diploid system of price and planning is admitting a third in its midst, perhaps best described as cryptographic stigmergy. Stigmergy is the idea that a large group of individuals can interact through identifiable changes in their environment; when that environment is reliably reified in a blockchain, we have cryptographic stigmergy.

Coase asks why it is that the coordination ability of the price mechanism works admirably for market transactions but cannot continue in its function within a firm. He remarks that these are unquestionably different methods for achieving coordination. To these we now have a third: In the space of cryptographic stigmergy, the blockchain provides this coordination mechanism as a feature of its environment.

If this is true, we must put this new entry to the same test that Coase devised for the firm. Conceding that the degree to which the price mechanism is superseded varies, Coase proceeded by asking why there is an organization within a firm by an entrepreneur or manager at all when the price mechanism already exists for that purpose? Citing someone else, he asks why the firm must become a co-equal unit with other entities in the economic system that is then guided by the price mechanism. We, too, must ask why there is an organization by cryptographic stigmergy, so that we might better see whether there are differences between its modus operandi and those of the other two candidates.

The first reason that Coase considers is one that he quickly dismisses. The desire to lord it over others in the setting of a firm, or to hold some preference to be commanded about cannot, he surmises, be the reason for a firm's existence. I am not quite as sanguine about the infeasibility of this rationale in relation to cryptographic stigmergy. The desire to be 'one's own master' is certainly high on the list of stated reasons for those who are involved in this space. Ironically, the test for whether Coase was right (and, I repeat, by default, he is) lies in the reason given by those who choose

cryptographic stigmergy as a method of organizing economic activity over joining a firm, when both are equally feasible.

Coase then proffers his favored and famous explanation. An organization within a firm is preferred when there is a cost of using the price mechanism. These costs, that have since been immortalized as transactions costs, are those of actually discovering what the relevant prices are and the costs of contracting with a variety of different entities that would have been involved in a purely price-directed production process. The firm stands in as a proxy for all those contracts that otherwise must be written, and, in exchange for this convenience, a factor of production volunteers to be directed by an entrepreneur within its boundaries. To these two costs he added a third: The distortionary costs of regulation that favor 'alternative methods of organization in a specialized exchange economy.

3.

Several advances in contract theory in the preceding 80 years have served to formally restate and model what Coase intuited in his article on why it is that the price mechanism constitutes a relative disadvantage to the firm. Kernels of the ideas on asymmetric information, differences in risk preferences, holdup and contractual incompleteness, at the very least, are all to be found in his article.

Nothing dares alter Coasian logic, but the space of cryptographic stigmergy does add nuance to his argument. Indeed, there remains a cost of price discovery associated with the market, and, indeed, the rationale for a firm based on this fact and others also remains. However, the blockchain technology has certain key features that inarguably change the game.

Blockchain technology is usually defined as a cryptographically-secure decentralized ledger that serves as a consensus mechanism based on protocols that require acquiring costly stakes in the system. There are, however, some additional key features that enable it to stand as the mechanism for cryptographic stigmergy. Some of these make it closer in essence to the price mechanism, though others make it seem more akin to a firm; this combination of features makes it all the more evident that the cryptographic stigmergy defines a space for coordinated production in between those of the price mechanism and the firm.

First among these is that the technology chains blocks of verified transactions ad infinitum, in the process giving it an infinite memory. In this respect, the blockchain holds the potential for providing more informative signals as the basis for transactions than can price, since price is memoryless for the purposes of organization. This feature distinguishes it from

the price mechanism, but it also distinguishes it, albeit to a lesser degree, from the Coasian firm. The latter, admittedly, exists by virtue of a preference for longer-term contracts, but also requires unquestioning direction by the entrepreneur within some unspecified, vague 'limits'.

A second key feature, more in line with a market guided solely by the price-mechanism, is that the blockchain is essentially open access. Participation in a market remains far more open than does any current reification of blockchain technology, or indeed any that is likely to occur in the foreseeable future. However, the blockchain provides a wide spread in this respect: It can be adopted by firms for enterprise applications; by pools of firms for collaboration and retained as the basis for broad decentralized collaboration over new ideas.

A third feature of the blockchain is perhaps one that is easy to overlook. It is simply that the blockchain is portable. Blockchains compactify transactions very effectively.

For the purposes of organization this is not an insignificant benefit, especially when we consider that a frequent problem that is cited as being of crucial importance is the prohibitive cost of contractual specificity. A key feature of the environment that enables cryptographic stigmergy is that its technology provides a compact signal in the present that carries with it valuable information on the past.

The final feature is particularly interesting and enables the previous three to function. The costs that motivate organization of economic activity in market-based transacting are ameliorated, if not entirely suspended, within the boundaries of a firm. The blockchain, however, does not suspend their impact. Instead, it seeks to expressly internalize at least some part of the transactions costs to increase its overall value. The cryptographic nature of the stigmergy involved in the blockchain is in large part that the costs of verifying transactions are internalized to the members of its specialized exchange economy, with a view to enhancing overall stability. Coase's message was that the existence of transactions costs justifies alternate methods of organization. Blockchains take this message more keenly than do firms; they do not seek to avoid them, but instead try to leverage them to make alternate methods of organization less appealing.

4.

The cryptographic stigmergy holds the potential to fundamentally alter the boundaries of the Coasian firm, as well as lift some of the burden of organization off the price mechanism. It does not, however, usher in a revolution of the nature that would serve to invalidate

Coase (1937).

A blockchain does not obviate the need for the price mechanism; indeed, the price mechanism remains the superstructure that permits coordination across the cryptographic stigmergic space. A blockchain does not obviate the need for the Coasian firm either. Because they are fully state-dependent and tractable, blockchains can operationalize smart contracts effectively, and possibly even a wider variety of complete contracts. They cannot, however, operationalize all contracts, especially the incomplete contracts that firms, as well as informal transactional relationships, routinely contend with. Such transactions are organized in an environment that is marked by ambiguity arising from an incomplete mapping across the states that it occupies, and, consequently, the prospect of renegotiation and reliance on third-party arbitration.

Coase does, however, give us a glimpse for what we might expect to see when Coasian firms attempt to coexist with the cryptographic stigmergy. Firms, he reminds us, should be expected to become larger as the costs of organization rise more slowly in the number of transactions they conduct. Technologies, significantly those that are rooted in Moore's Law and Metcalfe's Law, are enabling this dynamic for a number of modern firms well beyond the rudimentary telecommunication revolution that Coase based his observations on then. Yet, he arguably presaged platform economies when he remarked that '(i)nventions which tend to bring factors of production nearer together, by lessening spatial distribution, tend to increase the size of the firm.' Generally, his logic suggests a simple rule of thumb. If the costs incurred by a blockchain application to take over all of a firm's activities are higher than those incurred by the firm, the blockchain application would subsume the firm only if it can replicate all of what the firm does at a cost that is lower than the cost incurred by the firm, by at least as much as it would cost the blockchain to rely on the price mechanism. This latter cost can be substantial, possibly even prohibitively so, if incomplete contracts are simply not amenable to tractable blockchain application. So, if it is cheaper for a blockchain application to farm out some of its activities to the price mechanism or to firms, then we should be left with a situation where activities are divided across the three organizational mechanisms on an equi-marginal basis.

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