Entrepreneurship All the Way Down: A Theory of Property

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Abstract: Which came first – the market, or the property right? We note an apparent contradiction between Mises' (1920) Impossibility Theorem and Demsetz's (1967) account of the origin of property rights. Mises argues that economic calculation is a necessary requisite for private property, but Demsetz maintains that property rights form as a result of economic calculation. We seek to render their accounts compatible. This task requires us to answer the question, "How are property rights formed?" We show that in answering this question, we also answer its corollary, "How do societies move from autarky to market exchange?" Theoretically, we ground our answer in Piano and Rouanet's (2018) distinct levels of calculation, arguing that there is a contextually viable kind of economic calculation that does not rely on money prices. Historically, we argue that property rights develop as a technology used to maximize material output in autarky. We close by pointing out that our theory commits us to two interesting conclusions: 1) property rights do indeed precede market activity, but 2) a kind of entrepreneurship precedes the emergence of property rights.

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Introduction

Which came first – the market, or the property right? This question lies at the heart of economic inquiry. Since at least Coase (1937), economists have been made to deal with transaction costs – the costs of establishing and enforcing claims to goods (Allen 1991). Demsetz (1967), inspired by Coase, argues compellingly that markets themselves generate property rights. Individuals move to internalize the externalities caused by communal ownership, and the result is defined private ownership. Such property rights are costly to establish and enforce; thus, they are only established and enforced when it becomes efficient to do so. The efficiency condition is satisfied when anticipated benefits of privatization exceed the anticipated costs.

If Demsetz's argument is correct, then economic theory must unravel a logical puzzle. It was Ludwig von Mises (1920) who first demonstrated the necessity of private property rights for economic calculation, that is, the determination of profit and loss. Prices that are the product of free-market exchanges communicate the relative scarcity of goods, and thus allow for the efficient allocation of resources. Economic calculation clearly depends on private property rights. If individuals do not possess the right to exchange, market prices do not emerge. If no market prices emerge, there is no profit and loss accounting, which in turn eliminates the producers ability to determine the efficiency of prior production choices (Mises 1920, Lavoie et. al. 2015).

Thus, we find ourselves confronting a clear chicken-egg problem: economic calculation depends on property rights (Mises); yet the existence of property rights depends on economic calculation (Demsetz). That is, the decision to "produce" property rights, in the Demsetz story, reflects anticipation of the relative costs and benefits of doing so.

Demsetz's story works as an explanation for why some property rights arise, but it falls short of establishing an ultimate foundation for the initial emergence of private property rights .

For example, in his classic account, the emergence of private property rights among the Montaigne Indians (implicitly) depends on private property rights already existing somewhere else. Private property over fur hats and coats existed in Europe. Fur products were thus produced and exchanged in international markets. These markets gave rise to prices in fur products. These prices, in turn, serve as exogenous parameters for the economizers of Demsetz's story. When prices in these markets change, the costs and benefits faced by the Montaigne also change—and when they change sufficiently, the prerequisite conditions for the initial establishment of private property rights emerge.

Thus, the Demsetz account only explains why property rights arise within a market context. This ignores a critical explanatory problem, however, for markets themselves depend on private property rights; thus Demsetz's explanation of the emergence of private property *cannot* function as an account of the origins of property rights simpliciter. One potential solution to this quandary is to posit simply that property rights and calculation sprung into existence simultaneously. This thesis, however, needs some defense, for obvious reasons. Perhaps we think that the existence of one necessitates the other, but that tells us nothing about why either exist in the first place. This answer thus merely pushes the explanatory problem back. Moreover, we think that it is fundamentally indefensible. Demsetz's thesis commits him to this claim: markets are a precondition for property rights. Mises' claim is precisely the inverse: property rights are a precondition for markets. To posit the simultaneity of property rights and markets is to ignore the *precondition* portion of both economists' arguments.

Thus, we are left with a serious logical problem. Neither markets nor property rights can exist without the other, and yet one must have existed before the other, which is to say, without the other. We aim to reconcile this contradiction.

Further, we wish to do so in a way that respects the integrity of both theories. Both Mises and Demsetz offer much insight. There is a real sense in which property rights do depend on calculation, and there is a real sense in which calculation depends on private property rights. Our solution will dismiss neither theory as being wrong. Rather, they will be contextualized: by drawing distinctions between different kinds of calculation, we generalize a theory of property rights that recognizes both Mises and Demsetz as broadly correct.

The puzzle can be solved by distinguishing multiple "levels" on which calculation is undertaken. To do this, we draw on the work of Piano and Rouanet (2018), which distinguishes between primary and secondary calculation. Piano and Rouanet synthesize the Misesian concept of calculation with the New Institutionalists' theory of transaction costs. By recognizing that transaction costs generate a second level on which the entrepreneur must conduct cost-benefit analysis, we may distinguish between "primary" and "secondary" calculation. We take this one step further, positing a kind of tertiary calculation – a rational calculation made by autarkic entrepreneurs (i.e., those in autarkic societies tasked with allocating resources).

In the end, our model is simple. Before an agent undertakes an action, she considers whether the benefits outweigh the costs. To do this, she must determine how the benefits and costs will be calculated. That, in turn, causes her to undertake an antecedent calculation, answering this question: is it cost efficient to use money prices, or are transaction costs prohibitive, such that "accounting" must be performed in different terms? A hypothetical world without private property rights – and thus without money prices – is essentially identical to one with sufficiently high transaction cost that prevent her from engaging in money price calculation. *When money price calculation is impossible, efficiency is pursued on different lines.* We detail some of the ways in which a decision-maker might come to see establishing and enforcing property rights as efficient

in the absence of external money prices. Given this, a "privatizer" can efficiently enforce property rights over a given resource, even if money prices do not exist.

In the first section, we describe and defend Mises' calculation argument, and in the second, we exposit Demsetz's theory of property rights formation. Then, we offer a simple theoretical model explaining how, in the abstract, resources can be privatized efficiently without money prices. We show some specific ways in which primitive societies instantiate our model. We conclude with an analysis of our theory's fruitfulness.

1. Mises' Impossibility Theorem

In 1920, Ludwig von Mises published his now-famous critique of socialism, *Economic Calculation in the Socialist Commonwealth*. He argued that rational economic calculation under socialism is *impossible, in principle.* Even given a central planner with perfectly altruistic motives and perfect knowledge of consumer preferences, no socialist regime could efficiently allocate resources.

All economists are familiar with the epistemic value of prices. Prices communicate relative scarcity. Mises brought two key insights to the table that ground his claims regarding socialism:

(1) Rivalry (competition) is a necessary condition for the generation of meaningful prices for factors of production, just as in consumer goods markets.

(2) Meaningful prices are necessary for calculating profit and loss.

In a simple consumer goods market, with one final good produced by one producer and purchased by one consumer, rivalry is clearly unnecessary. With whom could either party compete? But once a second consumer is introduced to this market, then the rational allocation of the good becomes a serious question. To whom should the producer sell? A rivalrous process between the two consumers emerges. They compete for the right to buy the good. They must somehow earn the

sellers favor. If we stipulate that each cannot incapacitate the other (thereby monopsonizing the market), then there is but one way for a consumer to ensure that he is the one who makes the exchange: he sweetens the deal for the producer. A rivalrous bidding process ensues, and the good in question goes to the highest bidder.

Mises generalizes this idea. Two producers decide to enter the widget market as sellers. Widgets can be made with either input *x* or input *y*. One of these, *y*, is more expensive, so the producers decide to purchase *x* instead. But *x* is limited in supply. Let us stipulate that there is just enough *x* for one of these two producers. The rivalrous bidding process thus ensues. Which of the potential producers becomes the actual producer depends on their relative willingness to pay, which depends in turn on each producers' respective anticipated profits. So, we can conclude that the rivalrous process between producers will ensure that land, labor, and capital are allocated according to the producer who expects to earn the most return. Assuming the producer's prediction was correct, he generates a net welfare improvement for the economy in which he operates. If he suffers loss, then he has destroyed value – but he himself feels the consequences of this most painfully. Further, the kind of inputs used are determined by this rivalrous process. Suppose both producers are highly confident in their entrepreneurial capacities. Then, they might bid the price of *x* so high that it equals the price of *y*. In that case, we should expect widgets to be manufactured with *y* by some producers and *x* by others. Thus, prices perform the same allocative function in the capital structure as they do in the consumer goods market. They determine what capital is used, what proportions of land, labor, and capital are employed, and which producers will ultimately obtain the necessary inputs. They have the same epistemic value: they communicate the relative scarcity of producers goods, just as they do consumer goods.

Socialist economist Oskar Lange (1937) recognized the epistemic role prices play, and proposed a system of "market socialism" to enable rational allocation. Essentially, he argued, a central planner could leave the consumer goods and labor markets untouched – leave the rivalry intact – but monopolize the entire producer goods market, to do away with all the market failures that economists had identified (monopoly, the business cycle, inequality, etc.). That is, since the regime could rely upon meaningful money prices in consumer goods and labor, it could construct a rational production structure based thereupon.

But this is precisely what Mises' impossibility theorem holds is impossible. As one commentator writes,

> Since no rivalrous competition over alternative uses of production goods would take place, the knowledge dispersal function would aid only consumer evaluations and do little for the crucial producer evaluations upon which any rational use of higher order goods depends. (Lavoie et. al. 2015, 75).

In other words, *the socialist producer will never know what the relative values of his inputs will be*. He is operating in the dark. In this respect, the socialist central planner – one thinks of mathematicians in Soviet bureaus scribbling away to solve a general equilibrium equation for the entire economy – is in a rather pitiable situation. He knows what his consumers want, and he must combine inputs in various ways to create and distribute that output. But he has no analytical tool that can help him organize inputs in an efficient way. Should he produce with steel, aluminum, or plastic? Should he use a large number of laborers in place of capital in one industry, and vice versa in another, or should they have roughly equivalent amounts of labor and capital? On what land should he build the factory? In a market, prices communicate all this information: build the factory on the least expensive land, use labor and capital in profit maximizing proportions, produce with the lowest cost inputs that are equally serviceable for output. But *there are no* least-expensive-lands, profits, or lowest-cost-inputs without money prices. Thus, "Just because no producer good

will ever become the object of exchange, it will be impossible to determine its monetary value" (Mises 1920, 4).

Efficiency in production depends upon economic calculation. Calculation tells us whether a producer has created or destroyed value. But profit depends on meaningful prices. Meaningful prices depend on exchange. And exchange, of course, depends on property rights. Communal or state ownership of a good precludes competition for that resource (one cannot compete to control a good she already controls), and private ownership of a resource mandates competition for that resource among all those who desire access thereto but are excluded. Thus, efficiency in production depends upon the existence of tradeable private property rights.[1]

But the New Institutional Economics has long emphasized that property rights themselves must be produced. Is this production ultimately governed by the same efficiency considerations which dictate the efficient resource use in the production of other goods? To answer this question, we must briefly review the classic account of the conditions which generate production of private property rights.

2. *Toward a Theory of Property Rights*

Demsetz prefigures his classic 1967 contribution with some remarks in an earlier paper, *The Exchange and Enforcement of Property Rights* (year?):

> Our first example is zero-priced parking at shopping plazas in which unpaid- for benefits exist insofar as shoppers, in the prices they pay, confer benefits on nonshopping parkers. Most economists, regardless of their philosophical persuasion, would probably argue that the number of spaces is nonoptimal (14).

In other words, there is a tragedy of the commons in many shopping mall parking lots. The mall owner builds the lot, stores rent spaces in the mall, and well-to-do shoppers patronize the stores.

[1] It should be noted that Mises made this argument with respect to large-scale, industrial societies (the USSR was principally on his mind). Demsetz made his argument with respect to small-scale hunter/gatherer tribes. This difference will prove helpful in formulating our solution.

But in a publicly accessible mall parking lot, people patronizing non-mall stores nearby will find it convenient to park there, as will mere window-shoppers, cross-country backpackers looking for places to sleep, misbehaving teenagers, etc.

Nonetheless, Demsetz reasons that we have no reason to think that the situation is inefficent. The efficiency of first producing and then enforcing parking-spot-rights, and restricting use to mall shoppers with sufficiently high budgets, varies from case to case. In many instances,

> We may end up by allocating more resources to the provision and control of parking than had we allowed free parking because of the resources needed to conduct transactions. By insisting that the commodity be priced, we may become less efficient than had we allowed persons to ration spaces on a first come, first serve basis (14).

The implication: a tragedy of the commons might not always be a tragedy, once all relevant costs have been taken into account. Not all externalities are by their nature inefficient – in fact, it might be efficient to allow an externality to persist. The reason for this is simply that *it is costly to produce and enforce property rights,* and so relying on the price mechanism to allocate some resources is inefficient. Of course, Coase (1937) used the same argument to explain the existence of business firms.

It is a short step from recognizing that property rights are costly to recognizing that they are produced, and, if produced, then subject to efficiency evaluation in terms of costs and benefits. This is exactly the move Demsetz makes in his later paper, *Toward a Theory of Property Rights* (1967). Here, he gives a historical account of the origins of private property rights in beaver ownership among Canada's Montaigne tribe.

He notes first that there is an undisputed correlation between the land privatization and the development of the fur trade. He then offers a theory as to why this is the case:

> Before the fur trade became established, hunting was carried on primarily for purposes of food and relatively few furs that were required for the hunter's family. The externality was clearly present (351).

Beavers were not privately owned, nor was the land on which the Montaigne hunted. A tragedy of the commons persisted, in the sense that there were no prices to communicate the scarcity of beavers and no incentive to reduce beaver consumption in order to maintain long-run capital accumulation. This completely changed when French traders arrived. Over a short period of time, beavers and land were privatized by the Montaigne. Demsetz explains the causes of this:

> First, the value of the furs to the Indians was increased considerably. Second, and as a result, the scale of hunting activity rose sharply. Both consequences must have increased considerably the importance of the externalities associated with free hunting. The property right system began to change, and it changed specifically in the direction required to take account of the economic effects made important by the fur trade (352).

Because the value of the beavers increased, the externality became relatively more costly to ignore. The increased price that beavers suddenly commanded meant that every beaver misallocated was a more costly mistake, and moreover, it implied that more people wanted to trap more beavers. The external costs of a tragedy of the commons suddenly became tangible. Thus, the tribes faced a significant incentive to internalize the costs – to privatize beaver ownership, which is, Demsetz shows, precisely what they did. In short, "property rights arise when it becomes economic for those affected by externalities to internalize benefits and costs" (354).

To summarize Demsetz's argument, property rights arise when they can internalize in a way that passes a cost-benefit test. This only occurs in cases where the cost of the externalities exceeds the cost of enforcing private property rights. Thus, private property rights are very much creatures of the market. Note that Demsetz's theory is widely accepted in a variety of forms. Hornbeck (2010) argues that land privatization in the American West was facilitated by the technological innovation of barbed wire – which developed precisely because the costs of cattle encroachment on farm land rose higher than the costs of investing in barbed-wire fences. Anderson and Hill (1975) find that all kinds of property rights on the American frontier – land, water,

livestock – were defined and enforced as a result of this Demsetzian cost/benefit analysis. Umbeck (1977) applies a similar argument to explain the proliferation of mining claims in the absence of state government during the California Gold Rush.[2]

Now, the reader is in a position to appreciate the depths of the logical problem. On the one hand, economic calculation cannot occur without a marketplace, without defined and enforced property rights. On the other, the very boundaries of the market itself are determined by economic calculation. Resources are privatized when it becomes efficient for them to be so. Efficiency depends for its possibility on the existence of property rights, and property rights for their existence on possibility of efficiency. Mises' Impossibility Theorem and Demsetz's theory of property rights are incompatible theses, yet both seem inescapably true.

3. Levels of Calculation

We argue that efficiency depends on calculation, *sometimes*. But we've already seen how there are instances in which it does not. Coase (1937) frames his discussion of the firm in precisely these terms. A firm is an organization wherein efficiency is obtained in the absence of prices. Likewise, Demsetz's mall parking lot is a resource to which access is more efficiently allocated on the principle of first-come-first-serve than by willingness-to-pay.

The problem with both of these cases is the same as that with the beavers. In all instances thus far considered, the efficiently unprivatized resource sits in a broader context of market interaction. In each case, the owner decides against allocating resources via price based on considerations of transaction costs. Thus, our solution must point to some generalized, non-monetary kind of calculation. Piano and Rouanet (2018) provide our directions forward.

[2] Umbeck believes that Demsetz fails to account for the increasing costs of privatization that go along with the improved value of the resource that lead to its privatization. This might be so, but it is not relevant to Demsetz's conclusion, nor to our argument here. On both Demsetz's and Umbeck's models, property rights are defined and enforced when the benefit exceeds the cost, i.e., as the result of economic calculation.

Piano and Rouanet (2018) distinguish between two kinds of economic calculation. *Primary calculation* is the kind of calculation to which Mises refers. The entrepreneur determines (or anticipates) whether he has made (or will make) a profit, and he does this by comparing his costs to his revenues. These reveal real information about the relative scarcity of all goods, producer and consumer, if the prices of his inputs and outputs were determined by a rivalrous process. But sometimes, as Coase realized, it is more efficient to *not* engage in that kind of calculation. Transaction costs may prohibit the entrepreneur from engaging in a competitive market. In this case, entrepreneurs employ *secondary calculation.*

Secondary calculation occurs when "market prices for inputs and outputs are either known or can be appraised but where some of the higher order goods involved in the production process are not priced on the market" (14). The entrepreneur must then use his judgment without reference to the price structure to allocate resources. For instance, when allocating assets within a firm, he has no prices to tell him which employees should be assigned which tasks. Instead, by knowing his employees personally and forming observations about their characters, dispositions, abilities, and weaknesses, he can perform secondary calculation in his head. Secondary calculation is in some ways rough, compared to market calculation. But it is by no means irrational. An entrepreneur can make informed, plausible, reasonable judgments without recourse to prices in some cases. The fact that flourishing markets dominated by firms exist attests to this. Piano and Rouanet (2018) conclude that "[t]he job of an entrepreneur in a context where only secondary calculation is available will be for a good part to put resources in the hands of those who he estimates can use them most efficiently despite the absence of primary calculation (Alchian and Demsetz, 1972)" (14).

Entrepreneurs thus face the task of determining what inputs to employ and how to employ them, *without the insight of prices.* While ultimately their decisions are capitalized in, say, stock prices, entrepreneurs do not have access to the stock prices that will manifest as a result of a given decision, antecedent to that decision's being made. Thus, entrepreneurs are truly in the dark, and must rely on some sort of insight to efficiently allocate capital goods within a firm.

This distinction cannot be the whole solution – for secondary calculation occurs in the broader context of a marketplace – but it nonetheless points us in the right direction. Piano and Rouanet note, "As long as they do not live in a simple autarkic economy, however, entrepreneurs will never engage in projects where they can neither use primary nor secondary calculation. In other words, it will remain true that 'every single step of entrepreneurial activities is subject to scrutiny by monetary calculation' (Mises, 1949 230)" (15). But of course that is precisely what we are investigating. How will an entrepreneur make a rational, informed decision without references to any prices whatsoever? More specifically, how is it that a person could come to realize the value of establishing and enforcing property rights without reference to prices?

If we can develop a theory of *tertiary* calculation that allows for the creation of property rights by an entrepreneur who has no access to market prices, then we will have solved the puzzle. We will have found a process that allows for the rational allocation of resources without reference to money prices, which means then that private property rights will not be a requisite for this kind of calculation. Further, as Piano and Rouanet (2018) observe, the only context in which there are no market prices is autarky. Secondary calculation occurs in the context of a firm situated in a market; tertiary calculation is performed by the owner of a "firm" that is not situated in a market. That is to say, tertiary calculation can only take place when the entire economy is a single firm. (This, of course, seems to contradict Mises (1920). After all, Mises was arguing precisely that, if

the economy *is* a single firm, no rational calculation could take place. We will discuss this in detail below, but we do not believe that Mises' Impossibility Theorem is significantly controverted by tertiary calculation.) Once private property rights are established, exchange can take place – exchange *will* take place, if the holders of property rights have different comparative advantages. And exchange leads to the development of money prices (see, for instance, Mises 1934). Thus, the societies that are autarkic are coextensive with the societies that have no private property rights, and these, we have seen, are coextensive with the societies that have no meaningful money prices (Mises 1920). Once property rights are established, a society immediately moves away from autarky. In other words, the answer to our initial puzzle *answers a much deeper question*: how does a society transition from autarky to market?

4. Tertiary Calculation

Before we offer some thought-experiments showing how tertiary calculation could produce property rights, we will provide a brief overview of how we think tertiary calculation might work abstractly. Economic calculation is tertiary if and only if it allocates resources without reference to prices. It might be objected that what we call tertiary "calculation" is not calculation at all. After all, the single most important feature of economic calculation is the feedback received from profit and loss. This feedback condition of course obviously obtains with respect to primary calculation. Primary calculation just *is* analyzing that feedback received from profit and loss. The entrepreneur knows whether he has created or destroyed value by his bookkeeping.

Feedback in secondary calculation is more complex. The profit and loss mechanism remains, of course. An entrepreneur who inefficiently allocates resources within a firm will see that inefficiency reflected in his bottom line. Unfortunately, that is the only information that profit and loss imparts to him. From the fact that he has suffered a loss he may conclude only that he has

allocated resources wrongly – he cannot determine *which* resources were misallocated. If he continues to produce, he must identify *by means of some insight other than profit margins* where the misallocation occurred and how to rectify the problem. For this, entrepreneurs rely on myriad qualitative feedback mechanisms. Consumer reviews, performance evaluations, observation of employees, maintenance on machinery, and a hundred other methods of identifying successes and failures play a role in the entrepreneur's secondary calculation. In short, feedback in secondary calculation remains ultimately informed by the price structure, but also is a function of qualitative analyses conducted by the entrepreneur.

From this we may make an important observation about Mises (1920). His criticism of socialism remains devastating, for the socialists sought to reduce the entire economy to a single firm. At the same time, when operating on a small enough scale, rational allocation is possible without reference to prices. While no entity could make the kinds of qualitative judgments to assign by fiat all final goods, land, labor, and capital goods at each stage of production in a nation, it is a much simpler problem to allocate a few capital goods and laborers within a firm based on subjective, qualitative performance analyses. (Coase (1937) made this exact point.) In summary, then, rational calculation is impossible without prices when the relevant allocations are sufficiently large in number; but rational secondary calculation is possible when the allocations that must be made are sufficiently small in number.

It is then easy to see that feedback may remain under tertiary calculation, with the qualification that this feedback is of *only* the qualitative kind. Because prices offer no feedback to the entrepreneur engaging in tertiary calculation, he faces a much more difficult problem. All information about every good, producer or consumer – every question of what to make, how to make it, who should make it – must be decided by fiat. This means that the range over which an

entrepreneur can make tertiary calculations is dramatically smaller than that of the one employing secondary calculation, who must only make a small fraction of these allocative decisions by fiat. The difficulty does not entail impossibility. Given a sufficiently small number of resources to allocate, it is conceivable that an entrepreneur could receive enough qualitative feedback so as to make rational decisions. The head of an early tribal (or even familial) society which a) has a small number of consumers and b) employs *very* few capital goods could conceivably aggregate consumer preferences, identify all possible production options, and employ them so as maximize the happiness of each constituent member of his group.

While this kind of tertiary calculation is virtually irrelevant to the functioning of any economy today[3], it both solves our puzzle and fits nicely with our recognition of an autarkic world as being the only one which neither property nor prices yet exist.

But while introducing the notion of tertiary calculation *can* theoretically resolve the Mises-Demsetz contradiction, it does not seem obvious that it *does*. To solve our puzzle, it must also be plausible that an autarkic entrepreneur *would* employ tertiary calculation to create property rights, thus allowing for primary and secondary calculation. This act, again, is what may move a society from autarky to market exchange. Thus, we describe in the following section some conditions of tertiary calculation from which property rights should emerge.

5. Two scenarios that cause property rights to develop

5.1 – Peaceful exchange

Autarkic entrepreneurs must perform tertiary calculation. They must decide how to allocate resources without the guidance of prices whatsoever. An autarkic entrepreneur controls a fully vertically and horizontally integrated production structure, and produces exclusively to satisfy his

[3] Excepting, perhaps, the economic analysis of families.

own ends. There is nothing surprising or interesting in this observation; we have simply described how Robinson Crusoe produces his goods. What is puzzling is that an autarkic entrepreneur would invest in the production of property rights. Why would someone who controls all relevant factors of production invest in the preservation of that control?

He only would in the circumstance that his control is somehow threatened. Robinson Crusoe invests in defenses when he encounters dangerous natives. His production structure has not become less autarkic; he still produces everything in isolation, and for only his own final consumption. But because of a perceived external threat, he secures his control over his goods. He establishes and enforces his own property rights. Additionally, Crusoe might perceive acts of nature as a threat to the security of his control over resources. Thus, he takes steps to provide additional security. He undertakes these actions, as he does all his actions, by means of tertiary calculation, without reference to market prices.

If this kind of autarkically produced and enforced property right conduces to some kind of market exchange, then we have a clear instance in which an entrepreneur employing tertiary calculation is incentivized to establish property rights, and thus enable the formation of a market. Suppose that a society consists of two members, Crusoe and Friday. Crusoe and Friday each seek to accumulate capital. Resources are sufficiently scarce such that competition over the control of resources becomes necessary. Each thus "produces" property rights for himself autarkically, i.e., he stakes a claim over certain resources and defends it. If both parties perceive that the risk associated with violating the other's claim is high, then trade may take place – when force is costlier than exchange as a means of acquiring a good, and other conditions hold (inverse preferences, etc.), two parties will exchange. Crusoe wants some good that Friday has, but he fears Friday's defensive capabilities. Consequently, he offers one of his own goods – that Friday has

clearly been eyeing – in trade. If Friday similarly fears Crusoe's defensive capabilities, and values the good in question more than the one for which Crusoe has asked, an exchange will take place. Thus, it is conceivable that market activity will arise.

This situation is more likely than one might initially suspect, and it need not rely on the two parties being of equal strength. It has been demonstrated (Smith et. al. 2014; Leeson and Nowrasteh 2009) that conflict is often itself a sufficiently costly activity to deter potential combatants. Smith et. al. (2014) show that conflict over a resource can generate "destruction costs"; that is, the conflict may damage the resource in dispute, thereby reducing its value, thereby causing the party with superior strength to refrain from engaging in violence *despite* confidence of victory. Leeson and Nowrasteh (2009) show that, historically, conflict is so costly that terms of surrender can be made before a conflict occurs. Privateers would strike "plunder contracts" with the captains of ships they attacked: instead of taking the ship, destroying value in the process, they would contract for the proceeds of the cargo. This practice, though still obviously an abridgment of property rights, was quite advantageous to the plundered ships' captains and owners, as it abridged their property rights less than conflict otherwise would have.

In summary, if two potential combatants perceive each other as being of equal strength, some kind of defined property rights will emerge. Even if this assumption is relaxed, property rights might still emerge, because the costs of conflict can be so high. In all these instances, we need not assume that the value of a dispute resource be measured in terms of money prices. Rather, each actor can subjectively evaluate the costs of conflict to himself (or possibly his family), conducting tertiary calculation. If property rights become established as a result of tertiary calculation here, exchange may follow, leading to the development of money prices (Mises 1934) and thus secondary and primary calculation.

5.2 – Third party imposition

Property rights might also be imposed exogenously. Suppose a new person arrives on the island with Crusoe and Friday. He has vastly superior firepower to either of them. He subjugates the islanders, and demands that they produce for his consumption. Now, Crusoe and Friday must decide who will produce what. If they face some sort of disagreement, their new overlord has an incentive to assign to one the coconut grove and the other the fishing nets.

Generalize this to a larger society. The tribal strongman must resolve a dispute among his people – X and Y both claim to control a resource, and neither of them can overpower the other. They bring this case to the strongman. His decision has at least two desiderata:

1. He must resolve the dispute decisively, i.e., so that he doesn't have to waste time addressing this issue again.
2. He wants the decision to benefit him, which probably entails maximizing material output. Suppose the object in question is a weapon – he'll give it to the more skilled hunter. If a farm implement, he'll give it to the more skilled farmer. And so on.

Clearly, there are some disputes he will face no incentive to resolve. But when it comes to the allocation of a tool, for instance, he has a clear incentive to maximize his subjects' productive output. Because his tribe is small, he doesn't need prices to accomplish this. He has access to each hunter's material output in measurable quantities, and his decision accounts only for his own preferences, not those of his village. So, supposing a goal of the strongman is to maximize the output of hunting, he is able to allocate hunting implements efficiently among his tribesmen, even without the benefit of calculation.

This rule will likewise persist dynamically. There are two ways in which the status of the property right could change: its enforcement might be altered, or the claimant might transfer his claim. We have reason to think that the property right may well persist in both cases.

Let us first take the former case. Suppose that, for instance, a new strongman comes to power, a deputy must temporarily hold office as the strongman leaves the tribe, or some other event happens such that the previous agent in charge of defending an existing property right no longer will do so. Will that property right remain intact? The short answer is, of course, it depends on the particular circumstances. What we want to show is that there exists a range of circumstances under which that property right is likely to remain intact. Let us take, once more, the case of a hunter and his weapon. Suppose a new leader takes over the tribe. Will he reallocate this resource? Perhaps, but he has an incentive not to. Assuming, once more, that he is a profit-maximizer – that he wants to maximize his tribe's hunting success – then he will not forcibly alter the right's claimant. The property right will persist dynamically.

What if the claimant gives his weapon away, however, or trades it to another tribesman? Then the leader faces a different sort of incentive. He may think that the tool would be better used by its original owner. However, if the owner willingly relinquished his claim, then this functions as a signal to the strongman that the resource was not efficiently allocated. The strongman can infer from the fact that the resource was exchanged that some other tribesman valued it more intensely than its original owner. Perhaps the strongman doesn't care too much for Kaldor-Hicks efficiency, but at the very least, he might recognize that exchange is a decent proxy for maximized material output. The more potent concern he faces is this: appearing arbitrary or despotic. Presumably, he needs some support. If he violates the rules that he or his forebears have set in place, his people will likely be upset – deviation from custom, especially by a leader, is rarely

encouraged. So long as the tribe is not particularly progressive, the strongman will have an incentive to uphold the transferability of property claims, ifbthe claim was created with an understanding of transferability in the first place.

Admittedly, this situation is fragile. Any number of events could threaten property rights in their incipient form. But this is to be expected – after all, any newly-emergent rule takes time to become stable or normal. If you put all of our sketches together, you get a picture of a primitive world in which property rights can shakily emerge. Tribes arm themselves to defend against one another; so long as a reasonable balance of power remains (that is, so long as tribes perceive they have more to gain by trade than by war) a small "international market" can develop. Within a tribe, leaders have an incentive to "produce" property rights to maximize efficiency within the group. When groups are small enough, they can do this efficiently and without the use of prices. Thus, property rights can be produced autarkically. From this autarkic production of property rights arises a rudimentary market. From the market, we derive economic calculation. Calculation allows for a much more sophisticated development of property rights, along the lines of Demsetz's hypothesis. This more efficient development of property extends the range of the marketplace, allowing for more efficient calculation, allowing for further internalization of externality, and so on.

Section 6: Entrepreneurship all the way down

By explaining the autarkic production of property rights, we make room in economic theory for both Demsetz's theory and Mises' Impossibility Theorem. Mises is correct in that primary calculation, which is necessary for the rational allocation of resources in large economic contexts, depends upon the existence of private property rights. Demsetz is correct in that, once market prices for some goods have been established, they can be used to determine if the

establishment and enforcement of property rights is efficient. Demsetz's theory is further generalizable if we distinguish between levels of calculation. Secondary calculation, which relies less on money prices, and tertiary calculation, which makes no use of money prices at all, can be rationally undertaken in sufficiently small social contexts. By use of the latter, entrepreneurs may efficiently produce property rights without reference to money prices. These then allow for secondary and primary calculation, which in turn allow for more precise calculation and greater efficiency. Because the society that is without prices or property must be autarkic, an application of tertiary calculation to prehistoric autarkic tribes reveals not only how property rights might come into existence, but also thus how autarkies become markets. In short, property rights depend on certain kinds of calculation for their existence (tertiary for their inception, primary and secondary for their expansion and perpetuation) and certain kinds of calculation depend on private property (primary and secondary require property rights, but not tertiary). Thus, to our initial question – which, of market and property rights, existed first? – it may be answered that some property rights are necessarily antecedent to market activity, but some property rights depend for their existence on market activity.

The most interesting implication of all our above theorizing is the fundamental role of the entrepreneur. It is right to say that markets and property rights both depend on the willful decisions of entrepreneurs to create them, in the same way that any product in a market context does. Property rights have the function of a kind of technology. Once discovered, and gains are consequently realized, the privatizer faces an increased incentive (though one still subject to marginal cost) to establish and enforce more rights.

When some kind of effective property law has been established, we should not only expect it to persist in the community of its origin. We should expect it to spread. When tribal strongmen

see the gains to foreign tribes as a result of privatization, rudimentary markets, and a division of labor, they then have an incentive to emulate these foreign rules. Thus, just as in a consumer goods market the gains from innovation are not restricted to the innovator, in the world of incipient property rights production, successful innovations will likewise be widely adopted.

Entrepreneurial foresight is the key to all economic calculation. When making business decisions, an entrepreneur can only speculate in advance as to the outcomes of his decisions. It is this speculation that drives the market process – he calculates *ex ante* with expected prices, and measures his performance by calculation *ex post.* Likewise, secondary calculation is done speculatively, within the mind of the entrepreneur. The decision to vertically integrate a firm is not ultimately one for which the owner has a definite answer in advance – he has merely his insight on which to rely. Tertiary calculation without prices at all functions identically. Entrepreneurial strongmen and claimants make autarkic decisions about whose rights to defend, based on their own subjective estimations of the value of those to rights to themselves.

In summary, we have seen that economic theory provides a compelling reason to see property rights as necessary for economic calculation, and thus efficiency. But this thesis has a deep tension with Demsetz's intuitively plausible account of the origins of property rights. We've rectified this tension by describing a range of possible incentives facing individual actors to generate property rights in autarky, demonstrating the plausibility of tertiary calculation as a viable entrepreneurial tool. In the process, we've described how it is that societies might move from autarkic to market production. We have offered an account of the origins of property rights based on the cost structures facing individual actors. Our account is thoroughly entrepreneurial, thoroughly microeconomic, and thoroughly institutional. Autarkic entrepreneurs can employ tertiary calculation to create property rights and thus rudimentary markets, from which more precise

calculation, more property rights, and more robust markets follow. Thus, while property rights precede market activity, entrepreneurial foresight precedes even property rights. Economic activity is truly composed of entrepreneurship all the way down.

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