

Property Rights in Space

There are at least two ways in which substantial amounts of economic activity could move to space. One is if we find some way of drastically reducing the cost of getting things off Earth. That might mean constructing a space elevator, an ingenious idea first proposed by Yuri Artsutanov, a Leningrad engineer, in 1960 and independently invented about half a dozen times since by others. You let a cable down from a satellite in geosynchronous orbit, a counterweight out the other way to balance the pull, attach the cable to the ground, run an elevator up it; for details see the [description](#) in my *Future Imperfect*. An elevator is a much more efficient way of lifting things than a rocket.

There are serious practical problems, starting with the facts that geosynchronous orbit is 35,000 kilometers up and we have no material anywhere close to strong enough to make a cable that length that would not break under its own weight. But at some time in the future, perhaps in the next century, we might be able to solve that problem using a cable constructed at the atomic level by nanotechnology — atom to atom bonds are very strong. Materials with a much higher strength to weight ratio than we now have, even short of what a space elevator would require, would let us greatly increase launch vehicles payloads, lowering the cost of getting off Earth, or we might find some other way of drastically reducing costs.

If we cannot find any inexpensive way to get people and stuff off Earth, we might still be able to use our current expensive ways and bootstrap. There is, after all, lots of stuff already in space, most obviously on asteroids. Get a team of men and sufficient gear, probably including a nuclear reactor, onto an asteroid, mine it, use the material to build space ships and space habitats, repeat. Getting human beings up will still be expensive but we may not need a lot of them. Given enough time, we have a well tested technology for making humans.

However we do it, a space economy raises the issue of a suitable set of legal rules to promote it. The first step in thinking about what they should be is to consider why, here on Earth, some things are property and some are not.

Property and Commons¹

Some things on Earth are treated as property; some person or organization owns them, can control who uses them.² Some things, such as air, ocean water, words, in many contexts wild animals to hunt, are treated as commons, free to all. Most land is property, but not all; some primitive societies do not recognize property in land and some recognize it only part of the year.³ Having land be property makes sense if you are growing crops and do not want someone else to harvest them. It makes much less sense if you are using the land to hunt large animals across and do not want to have to stop to ask permission to trespass each time you come onto someone else's land.

Treating something as property has several advantages. If it has to be produced, ownership is an incentive to produce it, if it has to be maintained, to maintain it. If it is in limited supply, property provides a simple rule for who gets to use it — the owner and anyone he transfers or lends it to.

¹ These issues are discussed in more detail in Chapter 10 of my *Hidden Order*.

² I am not distinguishing here between private property and state property.

³ See Martin Bailey, "The Approximate Optimality of Aboriginal Property Rights," *Journal of Law and Economics*, Vol. 35 (1992), p. 183.

That rule has the attractive feature of tending to move the property to whomever values it most, since he will be the one willing to offer most in exchange.

Treating something as property has costs as well as benefits. Ownership has to be enforced, which means that someone has to be able to know who is using the property and act against anyone doing so without the owner's permission. For someone other than the owner to use the property he has to find the owner — consider the problem of finding the copyright owner for a out-of-print work in a foreign language whose author is no longer alive — and transact with him. If something that already exists is being converted to property, such as land under the homesteading act, claimants have an incentive to spend resources competing for it. It has been argued that the effect was to dissipate a large part of the land value of the U.S. in premature settlement.⁴

Whether it is worth treating something as property depends on the balance between costs and benefits of doing so. The fact that something already exists is an argument against, since it eliminates one of the benefits, as does the fact that something is not scarce, can be used by as many people as want to use it. The former is an argument against propertizing land, the latter an argument for. The former is an argument for copyright law, propertizing writings, the latter against — books have to be written, but my reading a book does not keep you from reading (another copy of) the same book. The fact that something is easy to monitor and protect is an argument for, hard an argument against, which is one reason that copyright made more sense for printed books than for digital.

What Should be Property In Space?

How does all of this apply to property in space? Space itself, volume, makes very little sense to treat as property, since it does not have to be created and, in most cases, my use of it does not interfere with yours. Two space ships cannot occupy the same space at the same time, but since space is very large and spaceships very small, that is unlikely to be a problem.

Unlikely but not impossible, because some parts of space are special. The real world example at present is geosynchronous orbit, which is getting crowded. Defining property rights to geosynch orbits would give the owner of a satellite no longer valued an incentive to destroy it and sell the right to someone else.

If we move a little farther forward to a time where space habitats are being constructed, there are two other spaces of special value, the [Lagrange points](#) L4 and L5, the stable locations in the Earth/Moon system; something located in one of them stays there. That makes them the obvious place to put a space habitat.

In both cases, describing this as owning a volume of space is somewhat misleading, since what counts as the same volume ten minutes later depends on what you are locating it relative to. On Earth, we ignore the fact that the land my house is located on is on a rotating body hence moving around the Earth's center at almost a thousand miles an hour — it still counts as the same land. In space, what is owned would be an orbit.

⁴ Terry Anderson and P.J. Hill, "Privatizing the Commons: An Improvement?" *Southern Economic Journal*, Vol. 50, No. 2 (October, 1983), pp. 438-450. For a partly fictionalized account of the costs of settling land before it was economically worth farming in order to get ownership, see *Little House on the Prairie*, by Laura Ingalls Wilder.

Moving much farther into the future, imagine a time when we have established a Dyson sphere, more likely a Dyson cloud, around the sun, orbiting bodies that absorb and use most or all of its energy output. The critical resource is then solid angle on the sun, the ability to absorb a certain amount of its output. If you move your orbiting solar cells to where they shadow mine, you could be judged to have violated my property right in that much of the sun's emission. Analogous issues occasionally arise on Earth, when one home owner sues another for shadowing the first's solar cells, or one hotel sues another for shading the first hotel's swimming pool.

Aside from locations in space, what else might we consider propertizing. The obvious candidate is real estate — asteroids and moons to be mined or lived on. Asteroids do not have to be built, since they are there in sufficient quantity so we are unlikely to run out any century soon. But asteroids are not all the same. An asteroid that has been hollowed out to make a habitat has gotten its value largely from human effort, so it would make sense to treat it as private property of those responsible. Even if an asteroid has not yet been altered, information about it, such as what minerals it contains, may be valuable. It might make sense for any asteroid that someone had landed on to be his property, along the lines of modern rules for mining claims.

Enforcing Property Rights

In order for property rights to be of use, there must be some way of enforcing them. The simplest and most familiar is through the existing system of national or international courts. That works in a scenario where the cost of getting off Earth is low enough, perhaps via a space elevator, so that Earth and space are a single integrated economy, with most of the people doing things in space owning property on Earth, perhaps coming there from time to time. It might end up with some national government that was in a particularly strong position, such as one controlling the only space elevator, enforcing law in space. Analogous historical cases would be the Monroe Doctrine and the suppression of the slave trade by the British Empire in the 19th century.

What about a bootstrap scenario, with populations in space that no longer have any close connection to Earth. Conceivably they might form their own government or governments, with courts and enforcement of their verdicts, but there are other alternatives.

To begin with, some things are natural property, because the owner is able to defend them. Information about what is on a particular asteroid fits that as long as the explorer has done nothing that will reveal what he found. Once a mining expedition has been landed on the asteroid it will be obvious that there is something there worth mining, but by that time it may have become natural property for a different reason. A mining settlement on an asteroid may be a lot less vulnerable than a ship trying to land a second settlement, since it has lots of local mass to dig holes in, hide behind, or throw at a trespasser.

A second sort of stateless property enforcement comes via commitment strategies. The U.K. went to war over the Falklands, even though the islands were not worth the cost of even a successful war, because it needed to establish the principle that it was willing to bear substantial costs in defense of its property. With that principle established, there was less risk that Spain would try to grab Gibraltar or someone else try for something else. The Falklands war was a loss for the UK but a much larger loss for Argentina — if the Argentines had correctly anticipated the British response they might not have seized the islands, saving both sides the cost of the war.

For that approach to work, there must be a fairly clear set of claims recognized by all concerned — not necessarily as morally binding, but as defining a set of Schelling points, a set of linked

commitments. I have argued elsewhere that this is the logic underlying all functioning societies, the explanation of how we get out of the Hobbesian state of nature.⁵ For it to work in space people in space would have to develop some form of customary law, common perception, defining rights.

What Else?

I have not considered the issues that would be raised by interaction with intelligent aliens. How that works out depends, first, on whether one side or the other has access to overwhelming force, second on whether the way they think is similar enough to the way we think to make something along the lines of what I have suggested for rights in space among humans workable.

A model for one possibility of interaction, trade without a common language, is provided by [silent trade](#) as it existed historically in Africa. One party puts out the goods he wants to offer. The second party puts out the good it is willing to exchange for them. If the first party finds the offer acceptable it takes the offered goods, leaves its good for the second party to take. If not, the first party withdraws, the second party can change its offer. The process continues until an offer is accepted.

⁵ For a much more detailed explanation of the approach to property rights, see [A Positive Account of Property Rights](#) or Chapters [51](#) and [52](#) of *The Machinery of Freedom*.