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Economic Property Rights

INTRODUCTION

In Chapter 1, we argued that "property rights" matter for resource allocation when "transaction costs" are positive, and that therefore, to understand resource allocation, one must understand property rights and transaction costs. This was the critical point Coase was making in the first half of his *Social Cost* paper. But what are property rights and transaction costs?

This chapter addresses the first of these terms in considerable detail. Ultimately, we will argue that *economic property rights* is the critical concept in understanding the Coase Theorem and therefore the relevant unit of analysis in understanding any resource allocation. Economic property rights are always "spread out" in across several dimensions, and we will call this the "distribution of economic property rights." It will be shown that this distribution determines the level of transaction costs, and we will argue in Chapter 5 that the distribution of economic property rights chosen is one that maximizes wealth net of these transaction costs.

Given the importance of property rights, it is interesting that neither Coase nor most who followed devoted much time to their definition, nor to any linkage with the concept of transaction costs. Indeed, even today property rights are mostly assumed to be a black box of legal rights and independent of transaction costs. In this chapter, we go into considerable detail in terms of the different forms of property rights: economic, legal, and natural. We then concentrate on economic rights as the ultimate unit of analysis for economic behavior. These rights are characterized by three important dimensions: division, completeness, and perfection. Again, confusion over these dimensions abounds and leads to no end of incoherence in the analysis of ownership. However, once the distribution of property rights is defined, it sets the stage in Chapter 3 for a discussion of transaction costs and lays the foundation for the rest of the book.

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PROPERTY RIGHTS

There are three broad understandings of the term "property rights": economic property rights (sometimes called "*de facto*" rights), legal property rights (sometimes called "*de jure*" rights), and natural property rights (sometimes called "moral" or "human" rights). The first is central in the study of organization and behavior because it is the relevant unit of analysis in a theory of choice and because it is functionally dependent on the other two. Often, when "property rights" are discussed, different meanings of the term are being implicitly used, and each person ends up talking past the other. For example, landlords and tenants often fight over the "rights" of whether or not pets can be kept in an apartment. Landlords claim they have a right (meaning legal) to determine the use of their property, while tenants claim they have a right (meaning natural) to have a pet. Both use "rights" language, but a lack of common understanding hinders negotiation.[1]

Thus, we want to be particular and explicit with the definitions of terms being used in specific situations. Our definition of economic property rights is

Economic Property Rights: *The individual's ability (in expected terms) to exercise a choice with respect to a commodity or some other thing.*[2]

The commodity or general "thing" could be anything an individual might conceivably make a choice over. It might be a simple consumer good, a physical asset or capital (including the individual and other people), the stream of income or utility from an asset, or a nonphysical thing like an idea, expression, or digital signature. Choices are often a matter of feasibility, which effects the way we interpret the "thing." For example, two roommates might share an apartment, and we might think of the "thing" as the entire apartment. However, when both roommates have access to the entire apartment, one's choices are limited by the choices of the other. Hence, one roommate can only have an economic property right over what is available within the apartment. On the other hand, a landowner and a farmer might share a crop coming off a field. In this case, once the crop is shared, the "thing" is the fraction of crop in possession of each because there is no interference by the other in how one's share of the crop is used. Specifically, identifying what the "thing" is (whether the entire apartment or a share of the crop) affects how one thinks about the ability to make choices.

The "choice" made might include various uses (consumption, destruction, improvements, possession, enjoyment, production), exchange (selling, buying, mortgaging, leasing), transfer (bequeathing, donating, purchasing), and

[1] Friedman (1994) notes some of the conflicts of trying to understand property rights by using only moral or legal notions. He correctly points out that behavior is often inconsistent with either conception.

[2] This definition follows that by Alchian (1965, 1987, 2007), Cheung (1970), Alchian and Allen (1977, p. 114 and 198), and Allen (1991). It is similar to Locke's (1698) notion of "liberty," the power to dispose of one's possessions.

importantly, the exclusion of others. These different choices are actually different specific types of economic property rights. At an abstract level, these choices can be bundled together in any combination. Hence, one might have the economic property right over the consumption of the flow of services to an asset but not have the ability (right) to transfer that asset – as when an employee is assigned an office at work. It is very common in economics to ignore the different types of economic property rights that might be attached to a particular commodity and rather treat property rights as a monolithic singular right that somehow enhances decisions. Rather, commodities and assets have embodied in them a set of rights, not just one generic property right.

Finally, property rights are a matter of expectation, and this expectation probability expresses the *strength* of the property right. When a person's choice is certain the property right is as strong as it can be. However, there are two basic reasons for why this probability is almost always less than one: either someone else can interfere in your choice or nature interferes.[3] People interfere with your choices all the time. You might want to drive at 80 mph in a school zone, but the police and others might prohibit you from doing so. You might want to just go for a drive with your car but find that someone has stolen it. Nature also interferes. You may have a garden, and at night the deer and rabbits rid you of the vegetables. In each case, your economic property right is not certain. Others and nature each interfere without permission to hinder (or perhaps enhance) the decisions wished to be made. It follows that, among other things, the more prone to theft a commodity is, the weaker is the economic right over it.

It is often difficult to identify where an idea begins, but the explicit concept of "economic rights" seems to have started with Armen Alchian, an eclectic, mostly self-taught economist's economist who spent his entire career at UCLA and fathered the role and study of economic property rights. Alchian's early work on tenure (1958) and the pursuit of individual utility within the context of regulated firms (Alchian and Kessel, 1962) hinged on the various economic rights within the context of the institutions in question. For example, managers and administrators of nonprofit firms and universities are not full residual claimants of the organizations in which they work, and therefore they face a lower relative cost of private consumption on the job than their counterparts in the private sector; thus, according to Alchian and Kessel, the carpet in the administrators' office is likely to be more plush than it would be in a for-profit firm. Because these firms are not constrained in their need to generate profit, they are able to survive with higher costs. Alchian's insight was that the economic property rights over the firm's assets determined the level and type of output of the firm because they determined the incentives for each individual within the firm.

[3] Alchian and Allen (p. 3, 1972) classically put it this way: "Two villains – nature and other people – prevent us from having all we want."

This theme is manifest throughout Alchian's work and culminated in his famous article with Demsetz (Alchian and Demsetz, 1972), which argued that firms could be thought of in terms of their different distributions of rights.[4] Emphatically, Alchian (1965, 1979, 1987, 2007) clearly made a distinction between economic and legal rights. For Alchian, economic property rights are the ability to enjoy a piece of property; they are "the rights of individuals to the use of resources" (1965, p. 817). This enjoyment is a matter of what actually happens, not just what is legally allowed.

Steven Cheung, a student of Alchian's, pushed the idea of economic rights further in his work on share tenancy, open access resources, and rent control (1969, 1970, 1974). Most notably, he also emphasized that the economic property rights we observe are not solely dependent on the existence of a state, but they also depend on private actions, custom, reciprocity, and voluntary restraints. This notion of the importance of informal norms along with formal laws in determining economic property rights is now commonplace in the modern property rights literature (e.g., Ellickson (1991), Landa (1994), Yonai (2007), Gorlizki (2016)).

A critical application of economic property rights is in the rights to the residual of some activity.[5] Partly because of random elements, in every act of production and exchange, there is a residual (either positive or negative). By definition, economic rights to residuals belong to those individuals who can control them, whether or not they legally own them, have stolen them, or have captured them from the public domain. Controlling residuals often comes from controlling assets (including people). Not surprisingly, there is an economic benefit to connecting the ownership of an asset to the ownership of residuals.

For example, the residual claimant of a building is the one who gains from an increase in the value of the building and loses from a reduction in that value. The residual claimant is motivated to take any action that will, net of its cost, increase the value of the property. For this reason, the economic owner of an asset is always strongly tied to ownership over the residual. The residual claimancy from an asset or an operation is often shared by several individuals, which means there are often multiple economic owners to the asset. An important proposition, to be elaborated on later, is that in order to maximize the value of rights, a person's share in the residual should increase as his contribution to the mean output increases, and it should fall as his contribution decreases.

As we will argue throughout, economic property rights are the individuals' *ends*; that is, they are what people ultimately seek and what determine behavior. In contrast to the concept of economic property rights is the more prevalent

[4] Alchian clearly had a significant impact on the thinking of Harold Demsetz, who also wrote path-breaking articles involving economic property rights. We examine one of Demsetz's seminal ideas in Chapter 10.

[5] We use the notion of residual in the broadest terms. Every action produces benefits and costs, and the residual is simply the difference between the two.

and older notion of legal property rights, which is essentially the rights a state assigns to a person. Legal rights are one *means* – an important one – to achieve the ends of economic property rights. We define legal property rights as

Legal Property Rights: *The individual's authority under the law to exercise a choice with respect to some thing.*[6]

The economic rights people have over assets are not constant and are a function of their own direct efforts at maintaining those rights, of other people's attempts to appropriate them, of formal and informal non-governmental actions, and of governmental protection effected primarily through regulations, the police, and the courts. Legal rights, as a rule therefore, enhance economic rights, but they are neither necessary nor sufficient for their existence. A major function of legal rights is to accommodate third-party adjudication and enforcement. In the absence of these safeguards, rights may still be valued, but the economic rights to assets and their exchange must then be self-enforced. For example, squatters are less secure in their rights to the land they occupy than are legal owners; this is not because they lack deeds but because less police and court protection is expected for such holdings. Agreements based on goodwill are examples of exchange not supported by third-party enforcement.

The third notion of rights is "natural" property rights, often expressed as "human rights" or "moral rights," or even "social norms."[7] In a similar fashion, we can define these as

Natural Property Rights: *The individual's authority under God or Nature or Society to exercise a choice with respect to some thing.*

We take a broad understanding of natural property rights, and for us, they can include values that stem from a high power like nature or God but also include social norms and community standards. They could be formal and written, as in the Ten Commandments, or informal and generally understood. Like legal

[6] The efficacy of a legal right depends on the willingness of the state to enforce them. This definition would not satisfy many legal scholars. Some would add that legal property is a state assigned right to real or personal property, something like land, a car, or a book, belonging to one person against the whole world (rights *in rem*). For us, we will focus on the distinction between *rights under the law* and *rights through control* (possession).

[7] Alchian and Allen (1977, p. 114) and Alchian (2007) did not recognize natural rights as having any meaning. For Alchian, human rights were simply rights held by humans. In one of his last works, he stated "... the purported conflict between property rights and human rights is a mirage. Property rights are human rights" (2007). However, this ignores the fact that human rights may not be actual economic or legal property rights. Both in scholarship and in practice, people speak of rights in a moral or natural sense. To say "I have a right to health care" is not necessarily a statement of economic or legal rights. These types of rights, however, are harder to observe, and therefore, are often nonoperational. Natural rights are also often ambiguous because people have different concepts of natural justice and morality. For some, the right to abortion is a natural right through the right of privacy. To others, it is a violation of the natural right to life of the unborn. Despite these difficulties, there is no denying that conceptions of social norms and moral values influence our choices, both directly and through support of legal rights.

rights, natural rights either support or limit economic rights.[8] Thus, as we can see, economic property rights functionally depend on legal and natural rights.

When, during the same-sex marriage revolution that took place in the early twenty-first century, same-sex couples claimed that they "had a right to marriage," they neither meant they were able to marry on their own (they did not have economic rights to do so) nor did they mean that the law granted them this right (they did not have legal rights to marry), but that it was a right under natural justice. The argument that any loving couple had the natural right to marry played a strong role in the eventual changing of the law, which enhanced the ability (economic right) of same-sex couples to actually marry. The effect of natural rights on economic rights often depends on how many hold to them. On their own, the small number of same-sex couples interested in marriage had little effect. It was not until many others came on board, who equated the natural rights of same-sex marriage to the natural rights of inter-racial marriage, that real change took place.

In this book, we are concerned primarily with economic rights because our attention is on behavior and organization. It is because economic property rights are not absolute and can be changed toward some purpose that they are useful in the analysis of resource allocation. As mentioned, economic rights change through the actions of people, and these actions often depend on legal and natural rights. Indeed, legal rights are often a primary and significant factor in the creation and maintenance of economic rights because the state tends to enforce them. The past failure of economists to exploit the role of property rights in the analysis of behavior probably stems from two reasons. First, there is confusion over the various notions of rights. Second, there is a tendency to consider rights as either i) absolute, unchanging, and "good" or ii) absent, unchanging, and "bad."[9]

Let's consider the difference between these three notions of property rights with the help of the Venn diagram in Figure 2.1, where the set of rights to some

[8] Locke (1698) in his second treatise defined the state of nature as being governed by the law of nature. This state, where individuals have freedom to control their possessions, is quite the opposite of a Hobbesian state of nature where life is "nasty, brutish, and short." Despite the presence of economic property rights in Locke's state of nature, these rights are weak because others can infringe on them and "enjoyment is very uncertain." As a result, individuals are

> ... willing to quit a condition, which, however free, is full of fears and continual dangers ... and is willing to join in society with others ... for the mutual preservation of their lives, liberties and estates, which I call by the general name, property. (Locke, 2nd Tr., §123)

Thus, for Locke, a civil society requires the existence of legal property rights working with natural rights for the betterment of economic property rights. We return to this issue in Chapter 8 on institutions.

[9] This might stem from the great jurist, judge, and legal scholar William Blackstone who famously stated in his eighteenth century commentaries on the laws of England:

> There is nothing which so generally strikes the imagination, and engages the affections of mankind, as the right of property; or that sole and despotic dominion which one man claims and exercises over the external things of the world, in total exclusion of the right of any other individual in the universe. (Chapter 1, 2016)

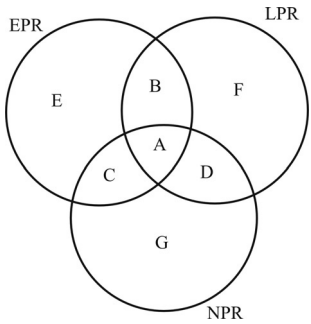

FIGURE 2.1 Different definitions of property rights

thing of value, under each definition, is represented by a circle. Thus, the circle "EPR" is the set of economic property rights for some thing. Likewise, "LPR" and "NPR" are the sets of legal and natural property rights for the same thing. Significantly, the circles do not completely overlap. Let us consider the various intersections.

In the central section A where the three circles overlap, the individual has the economic, legal, and natural rights over some thing. That is, the person is able, allowed by law, and morally justified to make a specific choice with respect to the thing owned. In some sense, this corresponds to the implicit assumption made in most neoclassical economic models where consumption is synonymous with ownership in every dimension. Many things in life fall into this category, such as breathing, or a trip to the store to buy a candy bar. Indeed, one would imagine that many issues of conflict, disagreement, and dispute would be absent in such a situation, and therefore, other things being equal, this would develop as norm or goal.[10] In contrast, some type of rights are absent from all of the other intersections, and as a result some sort of conflict often arises.

Consider section B, for example. Here, an individual has the economic and legal right to something but not the natural right. Some might consider abortion or landlords raising rents during a pandemic falling into this category. Both are legal and available in most jurisdictions, but many would consider them a violation of the natural right to life and the pursuit of happiness. Again, this points to the ambiguity in the concept of natural rights: They are subjective.[11] In section C, an individual has the economic and natural rights but not the legal ones. This might apply to some religious sect that believes in polygamy

Although Blackstone wrote over two hundred years ago, his thoughts on property rights implicitly underlie much economic writing. This view of property perpetuates the idea of moral superiority for "absolute dominion."

[10] Friedman (1994) also argues, but along different lines, that the rules and norms we observe tend to be efficient, just, and enforced by the state.

[11] Although across cultures and time we see common agreement in norms of general and specific beneficence; duties to parents, to elders, to posterity; concepts of justice, good faith, veracity, mercy, magnanimity, etc., it still remains the case that opinion differs on what constitutes the set of natural rights. For example, in the U.S., even after almost fifty years since abortion became

and is tolerated by the state.[12] They are able to have this type of polygamous marriage because the state allows it and they obviously feel it is right, but they do not have the legal right to the behavior.

Section D, where an individual has the legal and natural right to something but not the economic right, is an interesting case because it applies to most crimes. For example, one might have the legal and natural right to walk through Central Park in New York City at 11:00 PM, but if attempted, a robbery might deprive them of the pleasure. Section E is quite the opposite situation. In this case, a thief has possession of some good and is able to use it, even though it is not his legal or natural property. Section F, where only legal rights are possessed, might apply to the notion of "cancel culture" – the practice of using social media and other means to limit or eliminate an economic and natural property right to income or participation. For example, J. K. Rowling, the famous author of the *Harry Potter* books, faced boycotts, online harassment, and petitions to limit her royalties over comments she (legally) made regarding the effect transgender rights could have on women's rights. Finally, section G might apply to doctor assisted suicide, which many might consider a natural right, but in most jurisdictions they are illegal and unavailable.[13]

Unfortunately, the terms "rights" and "property rights" get used in multiple independent ways that often overlap. Because our concern is over behavior and the design of the distribution of economic property rights within which that behavior takes place, we want to focus on *economic* property rights – recognizing that they depend on the other two.

$$\text{EconomicPR} = f(\text{Legal PR}, \text{Natural PR}, \text{Social Norms}, x),$$

where x is a vector of factors other than legal rights, natural rights, or social norms that also effect economic rights. Unless otherwise noted, we use the term "property rights" in the remainder of the book to mean economic property rights.[14]

DIVIDED, INCOMPLETE, AND IMPERFECT ECONOMIC PROPERTY RIGHTS

The subject of economic property rights is nuanced for at least four reasons. First, the things we produce and consume are complex because they are almost

legal, only 60% of Americans believe it is a natural right of the mother, and in June 2022, the U.S. Supreme Court overturned *Roe v. Wade*.

[12] There is such a community in Bountiful, located in southwestern British Columbia.

[13] Or consider the fictional character of Jean Valjean in *Les Misérables* who served nineteen years in prison for stealing a loaf of bread to feed his sister's children during a depression. Victor Hugo clearly plays on the sentiments of most who would recognize the moral veracity of Valjean's actions, even though they were illegal.

[14] In Chapter 8, we return to the concepts of legal and natural rights and argue that the collection of these rights are a useful way of thinking about institutions. Institutions, therefore, have an effect because they influence economic property rights.

always the collections of various attributes.[15] Simple products like toilet paper vary in terms of weight, bulk, stretch, tensile strength, brightness, and softness. Fruits and vegetables have, among other things, volume, count, weight, taste, freshness, and nutrients; a power tool like a table saw has components made of various materials, design, horse power, amperage, and safety features; a large building might have hundreds or thousands of attributes. These attributes also vary from one specimen to another: Not all apples in the bin are the same, nor does each table saw of a given brand have the same longevity or quality. Attributes are difficult to measure, and some are more difficult to measure than others. This means that one does not always fully know what is owned.

Second, property rights are not a monolithic single thing; there are different types of property rights, not just a single generic one. As mentioned, there are rights of enjoyment, transfer, exclusions, etc. These different types of rights are often "bundled" together, but the specific bundle of property rights held over one good might be very different from the specific bundle of rights held over another good. In many instances there might be little standardization in the bundle of rights we observe. Multitudes of property rights exist with respect to a commodity or asset, and the scope of ownership can be described by what actual set of property rights are held by an individual. Having the right to enjoy an asset is different from having the right to earn income from it, and it is still different from having the right to transfer it or exclude others. Sometimes the owner of a commodity might possess all of these rights, other times not.

Third, economic property rights involve their *strength*. From its definition a property right is a matter of the *expectation* that any given decision with respect to some attribute will be carried out. Except for abstractions, economic property rights are never a dichotomous "zero" or "one" in terms of this expectation. Finally, not only are there issues around what thing, what right, and to what extent is something owned by *a given individual*, but property rights ultimately are distributed across a population. The spread of property rights across one group might be very different to the spread across another group.

Divided Property Rights

To focus on divided ownership, we start by assuming there exists a single "generic" property right in the possession of *a single individual* over a commodity that has many attributes. This is a typical neoclassical assumption, where an individual completely "owns" some good that has multiple characteristics. When a single individual holds the property right over *all* of a commodity's attributes we say that the property right is *undivided*. When a

[15] The notion of commodities having attributes goes back to Becker (1965) and Lancaster (1966). However, Barzel (1977, 1982) first discussed them in the context of property rights. Alchian (1977) discussed the existence of money as resulting from the difficulty of measuring good's attributes, and North (1990, pp. 30–32) built his discussion of institutions on the foundation of hard to measure attributes.

single individual only owns the property right over some of the attributes and the rest are either owned by others or in the public domain, then the property right is *divided*.

To be specific, assume there is a parcel of land called Blackacre, and it is characterized by J attributes indexed $j = 1 \ldots J$. For example, Blackacre has a certain acreage and given location; a terrain and elevation; soil quality made up of soil types, drainage, nutrients, and moisture content; and other things might be tied to the land, such as trees, buildings, or other infrastructure. There are N people who are potentially involved as owners of Blackacre, and these people are indexed $n = 1 \ldots N$, for the moment we will only consider the property rights for the single person n. Finally, for the moment, assume that there is only a single generic property right that can be made with respect to Blackacre, and this is denoted R. We will define the property rights for individual n using the following matrix:[16]

$$\begin{matrix} & R \\ J & \begin{pmatrix} b_1^n \\ \vdots \\ b_J^n \end{pmatrix} \end{matrix}$$

where b_j^n is the probability measure of the strength of the specific property right R, held by person n, for attribute j. For *simplicity* momentarily suppose that this probability only takes on the following two values.

$$b_j^n = \begin{cases} 1, & \text{if attribute } j \text{ is owned by person } n; \\ 0, & \text{if attribute } j \text{ is not owned by person } n. \end{cases}$$

The probability b_j^n might equal zero because some other individual owns that attribute, some other individual always steals that attribute, or that attribute is unowned and is in the public domain. Using these concepts, we define an undivided property right as:

Undivided Property Right: *Individual n's property right extends over all of the asset attributes.*[17]

Thus, undivided property rights over Blackacre means that one individual (e.g., person n) owns every attribute of Blackacre ($b_1^n = 1 \ldots b_j^n = 1$), and no one else owns any of the land's attributes. Person n has full control over every aspect of Blackacre. When Blackacre's attributes are owned by multiple people (and we will spell out what is meant by multiple ownership below), or in the special case where some of the attributes are in the public domain and owned by no one, the property rights to Blackacre are then divided.[18] Below are two possible

[16] The matrix notation we use is for presentation, not analysis.

[17] In the case of all or nothing ownership, undivided ownership means $\sum_j b_j^n = J$.

[18] Divided ownership in this context would mean that some of the probabilities b_j^n's would equal zero, and $\sum_j b_j^n < J$. The idea that each attribute of a commodity or asset can be owned by

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cases of the single property right for person n, assuming four attributes. In case (a) he has undivided ownership and in case (b) ownership is divided.

$$J\begin{pmatrix} R \\ 1 \\ 1 \\ 1 \\ 1 \end{pmatrix}, \qquad J\begin{pmatrix} R \\ 0 \\ 1 \\ 0 \\ 1 \end{pmatrix}$$

(a) Undivided (b) Divided

It is common for economic property rights to be *divided*, especially for complex things with many attributes. Whether or not ownership is divided is a matter of choice, and division exists because the net gains from exchange and production can often be increased if the nominal owner of the commodity transfers subsets of the commodity's attributes to others while retaining the rest. Examples abound. In a large building, the occupants might own the right to the floor plan of a given unit and decide where certain walls go, but other individuals own the right to control the structural walls that support the building. In the case of any sale subject to guarantee, the original seller retains rights to various components of the good's quality beyond the date of purchase and is expected to fix any failures. Indeed, all exchanges that are beyond "buyer beware" result in divided property rights where two or more individuals own distinct attributes of the same commodity. The case of rental agreements is interesting because now some rights are divided across time. During the rental period the renter holds rights over some attributes of the commodity, but once the agreement expires the ownership over the attributes reverts to the original owner.

As mentioned, the residual is an important attribute that results from the exploitation of a commodity through exchange or production. Even for relatively simple commodities, the ownership over the residual might be divided; that is, several individuals share in ownership of the residual. Consider a firm's photocopier. If the firm has a service contract for the copier, then the firm owner does not have full economic rights over the copier's residual because he is not the only party that gains when the copier performs well and loses when it does not. The service supplier is a residual claimant of the servicing operation, gaining if it provides good service or service at low costs, and losing if the service is poor; the servicer is thus a part owner of the copier. Among other partial owners is the copier manufacturer, which is liable for certain damages the copier may cause. Thus the residual is divided among several potential owners.[19]

separate individuals was first noted by Alchian (1965), and elaborated on in Barzel (1982) who also noted that property rights in practice are almost always divided. Posner (1992), too, noted that ownership can be divided.

[19] Divided ownership refers to attributes owned by different individuals and should not be confused with "shared ownership." Shared ownership means that different individuals share

Incomplete Property Rights

In defining divided ownership, we assumed there was only one generic "property right" to the commodity, but as mentioned in the discussion of what property rights are, there are many different types of rights over commodities and different sets of rights can be bundled together. The extent of one's property rights over a commodity or thing is called *completeness*. Individuals seldom are in possession of the universe of rights to any given thing, and so property rights are often incomplete. In discussing the extent of completeness, we will use the term "scope" of rights. An increase in scope means that a single person possesses more of the rights to a commodity.[20]

To focus on incompleteness, assume that Blackacre is simple and contains only one attribute, J (say acreage), but there are R feasible rights associated with Blackacre, indexed $r = 1 \ldots R$. For example, Blackacre can be sold, leased, put into various types of production, and others can be excluded from traveling across, above, or below it, and so on. In this case, the property rights held by individual n would be represented as

$$\begin{array}{c} \\ J \end{array} \begin{array}{c} R \\ \begin{pmatrix} b_1^n & \ldots & b_R^n \end{pmatrix} \end{array}$$

where b_r^n is the probability strength of a particular property right R_r, held by person n, for the attribute acres. For the moment, once again assume that the values of b_r^n take on only the values $(0, 1)$, depending on whether individual n owns that particular right or not. Incompleteness expresses the extent to which these different property rights are held by one individual. If an individual holds all of the property rights over the commodity, then the economic property right is *complete*. Complete property rights is a *theoretical benchmark* and is defined as:

Complete Property Rights: *Individual n's property rights include all of the feasible rights of the commodity.*[21]

The number of feasible property rights are obviously limited by simple facts of nature. If some wood was consumed yesterday by burning it in a fireplace, there are no choices to be had over the wood today – the wood doesn't exist. Likewise, the choice to leap over tall buildings in a single bound is not in the feasible set of choices for mere mortals. Despite limitations on choices forced by nature, we will not consider these as cases of incomplete property rights. Incompleteness refers to the situation where *feasible* choices are held by different people (or no one).

control over the same attributes (perhaps all of them) and relates to imperfect ownership discussed below.

[20] Thus, when an individual in possession of two rights to an asset comes into possession of three, we will say the scope of property rights has increased rather than the completeness has increased. The term "complete" is useful mostly to describe the benchmark case of complete property rights where the individual possesses all rights to the commodity.

[21] In the case of all-or-nothing ownership, complete property rights mean that $\sum_r b_r^n = R$.

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Below are two possible cases of property rights for person n, assuming there are four different types of property rights over Blackacre acreage. Suppose the first right was the right of exclusion to the airspace above the land. In case (a) person n has complete ownership over Blackacre. Of all the different types of property rights that could be had, he possess all of them, including the right to the airspace. In case (b) person n only possesses two rights, and so his rights are incomplete and do not involve the right of exclusive airspace.

$$\begin{array}{c} \quad R \\ J\ \begin{pmatrix} 1 & 1 & 1 & 1 \end{pmatrix} \end{array} \qquad \begin{array}{c} \quad R \\ J\ \begin{pmatrix} 0 & 1 & 1 & 0 \end{pmatrix} \end{array}$$

(a) Complete (b) Incomplete

Like divided ownership across attributes, incomplete property rights are common. The various cards in one's wallet may seem to be completely owned, as in "this is my credit card," but these and other cards have limited uses for the person possessing them. For credit cards there are legal spending limits and restrictions on selling the card. Even within the spending limits, some sellers of high valued items will not accept payment by credit card to avoid the fees. These rights are not in the public domain; they are held by the bank issuing the card and the seller of the high valued item.

Returning to the case of the copier, we see that ownership over it is not just divided but also incomplete. The firm has the right of making copies for business purposes, but the employees who are able to put the copier to personal use without charge also own an economic right over it. Although the firm is the legal owner of the copier, employees have some scope of economic rights because it is too costly for the firm to prevent the employees from making personal copies free of charge.

If we recognize that Blackacre has both multiple attributes and multiple feasible rights, then the economic property rights over Blackacre for person n is described by the matrix B^n

$$B^n = \begin{array}{c} \quad R \\ J \end{array} \begin{pmatrix} b^n_{11} & \cdots & b^n_{1R} \\ \vdots & b^n_{jr} & \vdots \\ b^n_{J1} & \cdots & b^n_{JR} \end{pmatrix}$$

where each element b^n_{jr} is the strength (measured as a probability) of the specific property right R_r, held by person n, for attribute j. That is, each element b^n_{jr}, is the expectation by person n that his choice over attribute j will be exercised. Of course, for a given entry, such a right may not exist, may be held by someone else, or is in the public domain, and the probability would be zero.

Like divided ownership, the number of rights held by a single individual is a matter of choice over which owners maximize, and often the set of attributes held by an individual is related to the set of rights owned over those attributes. That is, divided ownership is often *correlated* with incomplete ownership.

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Indeed, the relationships between attributes and rights can become so standard that often it is hard to distinguish between the concepts of divided and incomplete ownership. For example, the set of property rights over a house is often divided in a way very similar to the set of rights over the land that the house is resting on, and when someone states they "own a house" it is commonly understood that the division of ownership for the land underneath is the same as for the building on top.[22]

As we will elaborate in later chapters, incomplete property rights often take the form of restrictions on one or all of the divided owners in order to enhance the total value of ownership over the given commodity. For example, suppose some attributes of a commodity are most efficiently owned by multiple parties in the form of common property. Since common property creates incentives for the suboptimal use of the attributes, it might pay to restrict the owners' choices over use and transfer of the commonly owned attributes to mitigate these problems. In the case of the copier, restrictions on the ability of employees to use of the copier for private copies (or restrictions on who is allowed access to the copy room) can enhance the value of the copier and raise the net wage of the employees.

Incomplete property rights also arise from restrictions on legal rights, as in the case of inalienability. Inalienability is the limited legal authority to carry out certain choices of ownership, such as transfer or use. Some commodities can be given as gifts but not sold (e.g., children through adoption), some things can be sold, but not given away (e.g., assets within an insolvent estate), and some uses may not be legally permitted (e.g., digging too deep in a yard with gas lines). When private ownership leads to socially poor outcomes, such limitations make sense. For example, those willing to pay the most for adopted children might wish to employ them as child slaves. Andolfatto (2002) argued that borrowing restrictions on social security entitlements reduced vagrancy and social squalor by preventing extremely impatient people from consuming all of their future income early in life. Allen (2012) argued that the Crown prevented naval captains from selling their officer commissions because those willing to pay the most would only seek merchant ships as prizes and never attack the enemy.

Imperfect Property Rights

Economists commonly make the assumption that the strength of property rights is all-or-nothing – as we just did in the last two sections. Thus, until now the elements of our property right matrix have only had the values zero or one; that is, an attribute was either owned or not. This all-or-nothing strength characteristic of property rights hides the most important characteristic of property rights: *imperfection*.

[22] In contrast, someone who rents a room in the house does not possess the rights to the land, and no one would confuse "renting a room" with "owning the land."

Property rights are defined in terms of an expectation, and in reality the probability that a choice will be carried out is virtually always less than one. This means that the very concept of an "economic owner" is necessarily more nuanced than that of a "legal owner." A legal owner of a commodity is the one with the legal authority or entitlement to make choices with respect to that commodity, but in reality there is only a probability that the choice will come to pass. Others who are not the legal owner might also have some positive expectation that their choices over the same commodity will take place. This other person is also an economic owner. Returning to the copier case again, those employees printing off their annual Christmas letter on the company copier are partial economic owners of the copier but not legal owners.

The level of this probability, or the extent to which one expects a choice to be carried out, defines the *strength* of the property right.[23] It is this characteristic that is essential for an understanding of transaction costs and organization because individuals can take actions that influence the strength of their property rights, and these actions relate to the concept of transaction costs.

As another theoretical benchmark, when a decision is carried out with certainty then the property right is said to be *perfect*. This is the implicit assumption that traditional neoclassical economics makes, and which we assert is seldom ever reached. With respect to the matrix B^n, which describes the property rights for a given person, a perfect property right for the r^{th} right and the j^{th} attribute means that the probability $b^n_{jr} = 1$. When $b^n_{jr} < 1$, then the right over that attribute held by person n is imperfect. We define the perfection benchmark for an individual as:

Perfect Property Right: *The individual's choice with respect to an attribute is carried out with certainty; that is* $b^n_{jr} = 1$.

The strength of property rights always comes down to a matter of enforcement in establishing the property right to begin with, and then maintaining that right. Issues of enforcement arise for many reasons, but there are three important cases.[24]

First, complex commodities often have simultaneously divided and incomplete ownership, and these multiple owners can infringe on the rights of each other. For example, in the case of Blackacre the legal landowner who controls many attributes about the land might rent to a farmer who then temporarily controls the level of soil quality. The farmer has a legal right to use the soil, but this access also allows him to excessively exploit the soil to his own benefit at the expense of the legal landowner. The presence of multiple economic

[23] We will use the term "strength" to describe the level of imperfection throughout the book.

[24] It is always tempting to assume that property right strength is exogenous. For example, Besley and Ghatak (2010) assume that property rights are "insecure" because of an exogenous threat of government expropriation. This turns the problem into a purely neoclassical one where the government threat is essentially a tax on effort to produce.

owners with access to the land leads to problems of infringement on many land attributes because the landowner finds it too expensive to enforce his legal rights to those attributes.

Second, complex commodities are often shared. Whereas with divided ownership different people own different attributes of the same commodity, shared ownership is where different people own the same attribute in some shared fashion. There are shared spaces and commodities all over, and those people who are shared owners often have access to every attribute of the commodity. The sharing arrangement might be formal and legal or informal and based on social norms. With Blackacre the landowner might share the crop with the farmer, each contractually receiving 50% of the crop. However, the farmer at harvest has access to 100% of the crop and might actually take 60% because the landowner is again unwilling to enforce his property right to the full extent. When commodities are shared everyone involved might attempt to capture more than their agreed upon share.

In both of the above cases property rights were imperfect because numerous people had legal access to the commodity and its attributes. However, property rights are also imperfect due to outright theft. One might expect to exercise some choice over a commodity or one of its attributes, but discover that the thing has been taken. Given that the threat of theft is almost always present to one extent or another, property rights are almost always imperfect, and owners spend resources to protect them from theft. This protection is a matter of enforcement and choice, and the unwillingness to protect fully, leads to the imperfect property right.

Thus, property rights are imperfect because they must be established and maintained through some enforcement mechanism against other people. As we can see, the level of perfection is a matter of choice and depends on how strongly an individual maintains their right, the extent others (individually or collectively) try to infringe on an individual's right, and the extent other third parties (either through the state or other means) encourages and enforces the right.[25]

The Distribution of Property Rights

To this point we have *described* the property rights held by a specific individual. The last step is to describe property rights across a population. We define the collection of all the individual property rights over a specific commodity as the *distribution of property rights* for that commodity. If we return to our example of Blackacre and assume there are N potential owners, then the final distribution of property rights over Blackacre can be described as the collection of the individual rights:

[25] One different reason for imperfect property rights is because nature interferes with the ability to make decisions. One wishes to eat the strawberries in their patch, but discover rabbits got their first. The role of nature is important and discussed in the next chapter. However, we exclude from the definition of transaction costs actions taken directly against nature.

$$J\begin{pmatrix} b^1_{11} & \cdots & b^1_{1R} \\ \vdots & b^1_{jr} & \vdots \\ b^1_{J1} & \cdots & b^1_{JR} \end{pmatrix}^R \cdots J\begin{pmatrix} b^n_{11} & \cdots & b^n_{1R} \\ \vdots & b^n_{jr} & \vdots \\ b^n_{J1} & \cdots & b^n_{JR} \end{pmatrix}^R \cdots J\begin{pmatrix} b^N_{11} & \cdots & b^N_{1R} \\ \vdots & b^N_{jr} & \vdots \\ b^N_{J1} & \cdots & b^N_{JR} \end{pmatrix}^R$$

where each matrix describes the rights held by a specific individual over Blackacre.[26]

By way of an illustration on how to interpret this description of property rights, suppose there were only three people (1, 2, 3) involved with Blackacre, which has just two attributes (minerals (m), and acres (a)), and there are only two property rights (exclusion (E), and use (U)). Furthermore, assume some arbitrary values of b^n_{jr}. Then one distribution of property rights could be:

An Arbitrary Distribution of Property Rights

	Person 1		Person 2		Person 3	
	E	U	E	U	E	U
acres	1	1	0	0	0	0
minerals	.5	.6	.25	.1	.25	0

In the core neoclassical model, it is assumed that all goods have one attribute, one universal all-purpose right, and are owned perfectly. In the current illustration of Blackacre, "acres" almost fits this case. Person 1 owns the acres completely: There are two property rights to Blackacre (exclusion and use), and person 1 is able to exercise both of them alone. Person 1 also owns the acres perfectly and is able to exclude all others from infringing on his acres and stop them from using them. Persons 2 and 3 have no property rights over the acres of Blackacre.

In this example the mineral attribute describes a more complicated and typical case. Consider first the property right over exclusion on Blackacre, which is spread across all three parties. Perhaps Person 1 is the legal owner, but he finds it too costly to keep the other two from accessing his minerals through tunnels. Note that even though every individual has an imperfect property right of exclusion, the fact that the probabilities sum to one *does not* mean this right is perfectly held collectively! What we can say is that Person 1, perhaps because he is the legal owner and can rely on some state enforcement, has the stronger economic property right compared to the other two.

With respect to the property right to *use* the minerals we see that there is also imperfect property rights spread across two people, but this time the sum of the probabilities is less than one. In this case the distribution of property

[26] It is tempting to want to add up the strength probabilities b^n_{jr} across people, but this has no meaning without understanding the context for their values. The strength of a property right is rooted in an individual, and three people with $b^n_{jr} = 1/3, n = (1, 2, 3)$ is not the same as one person (say $n = 2$) with a perfect property right, $b^2_{jr} = 1$.

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rights is more concentrated, and the strength of Person 1's property over use is better than over exclusion ($.6 > .5$). The sum of the probabilities is less than one, and therefore some amount of the minerals is unowned by anyone.

This simple example shows that economic property rights can be described in terms of division, incompleteness, and imperfection – both at the individual and societal levels. Once again, we want to drive home the idea of thinking about property rights as a "distribution" of rights on multiple dimensions, and to think of this distribution in terms of the collection of all the individual rights (B^n), recognizing that the strength of each right can range, in principle, from zero *to* one.

We see complicated distributions of property rights all around us, even though we colloquially refer to ownership in simple terms. For example, return to the case of a house on a city lot to which a homeowner might casually say "I own this house." However, under the right of "use" there are attributes of the home the owner controls (like the temperature inside) and ones that he does not control. The homeowner might want to park three broken cars on blocks on the front lawn but be prevented from doing so through zoning restrictions, or the homeowner might want to skateboard on his paved driveway but find that his neighbor's tree roots have encroached on his land and raised the asphalt. Thus not all use rights of the property are owned by him and none of them are held perfectly. The state's ability to impose and enforce zoning restrictions and the neighbor's tree root encroachment imply that the state and neighbor are partial economic owners of the city lot – the property right to use the home is divided between the homeowner, the state, and the neighbor.

There are other rights to the house, such as the ability to generate income from it, and once again some types of income generation (like a home office for consulting) are held by the homeowner, and other ones, (like starting up a small restaurant) are not. In addition, there are other physical attributes of the home (like the gas lines), that are owned and controlled by others. Thus, the rights to the home are divided because the homeowner has no economic property rights over certain attributes. With respect to any combination of attributes and property rights over them it is also likely that ownership is imperfect. Children cut across the property as a shortcut and burglars are a threat because the owner finds it too costly and not in his interest to establish perfect rights of exclusion. This means that the children and the thieves are part (economic) owners of the home (but not the legal owners!).

As stated, in the neoclassical economic model, goods are assumed to be one dimensional and rights over them are assumed to be completely and perfectly owned. In the real world, however, property rights are almost always divided, incomplete, and imperfect, and these realities describe the *ability* to make choices. If our choices are totally absent, then no property rights exist. Economic property rights, however, are not all-or-nothing, and people are not indifferent to the degree of property rights on any of the dimensions.

CONCLUSION

When the term "property right" is bantered about in both casual conversation, policy debates, and academic circles, not only is there little attention given to whether these rights are economic, legal, or natural, but the subtle – but by no means minor – aspects of property rights are almost universally ignored. Property rights over commodities are bundles of rights that get split, shared, and combined in many different ways across many different groups of people, and all in a world where commodities are not uniform. The ultimate distribution of property rights describes an equilibrium choice over to what extent rights are divided, bundled, and enforced.

This chapter has described these specifics in detail and developed a nomenclature to help clarify exactly what is meant by economic property rights. We will develop an operational model of property rights, but it is essential that specific words mean specific things. Not developing a consistent language around property rights leads to a failure to understand what transaction costs are.

To possess an economic property right is to be able to make a choice with respect to a commodity. An economic property right has a strength, which is measured in terms of a probability. The level of this probability is a matter of choice and depends on such factors as the legal and moral status of one's ownership, the efforts made to directly measure and enforce the choice, and the incentives of all the other people who might interfere with the choice. This latter effect depends critically on how rights are divided across the attributes of goods and how the various specific property rights are spread out across people.