# PROPERTY RIGHTS AND CAPITALISM

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## CONTENTS



## INTRODUCTION

Property rights are a necessary but not sufficient condition for capitalism. This is because all humans have some form of property rights, and even our pre-human ancestors seem to have had property rights, although forms of property were quite basic (Rubin, 2002). Moreover, as Bailey (1992) has shown, even relatively primitive tribes studied by anthropologists have reasonably efficient property rights systems. For example, property rights are defined in agricultural land when crops are being grown, but the land is available for hunting in the fallow season. Nonetheless, these societies cannot in any sense be said to be "capitalistic." Thus, more is needed for capitalism than property rights. On the other hand, capitalism cannot exist without property rights.

Other institutions which are needed for capitalism, in addition to property rights, are: free markets (including capital markets) and competition to organize exchange; the presence of (profit maximizing) firms and entrepreneurs to organize production; and the enforcement of contracts. This essay explores why private property is essential for the working of capitalist economies. It does not attempt to illuminate all aspects of property rights but focuses on the relationship between property rights and capitalism.

The essay is organized as follows. In Section I we provide a definition of property rights as a bundle of rights, noting its various practical limitations. In Section II we briefly describe the historical and philosophical development of private property rights. In

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Section III we discuss the functions of property rights in capitalist systems, in particular the creation of wealth by facilitating efficient resource use and development, trade, capital accumulation, and the peaceful resolution of conflict. Section IV we discuss the creation of property rights to intellectual resources. Section V we take the reverse perspective from that in Section III and focus on the role of capitalism for the creation and continued evolution of property rights.

## I. A DEFINITION OF PROPERTY

What is property? In its idealized form, a property right entitles its holder to a strong form of authority over an asset, called ownership. Ownership can be viewed as a "bundle of sticks," composed of the following rights:

*C*: The right to *control* the asset and decide on its use.

*V*: A claim to the *value* the asset generates.

*E*: The right to *exclude* others from using the asset.

*T*: The right to *transfer* the bundle *C*, *V*, *E*, *T* to another holder.

It is important to understand that property rights do not regulate the relationship between the owner and his property, but the relationship between the owner and other persons, with respect to the property. Unlike contract, which regulates the relationship between *specific* parties, property rights are rights against the world. Owners of property can be individuals, groups of individuals, organizations, or the state, and property owned can be tangible, such as personal property or real property (land), or intangible, such as corporate stock or intellectual property. Further, property rights may or may not be formally recorded, and may be granted perpetually or over a limited duration (e.g., patents, copyrights).

*The limits of property.* Rarely, if ever, does one encounter the "bundle of sticks" *C*, *V*, *E*, *T* in its entirety. A good example is the question whether a person truly owns his or her body: Efforts by states to prevent suicide and controls over drug use (both legal and illegal) interfere with *C*, income taxation and laws against prostitution interfere with *V*, and laws prohibiting slavery or the sale of human organs interfere with *T*.

In general, property rights can be limited by the following factors: Where they interfere with other rights, such as another person's property (e.g., noise and pollution ordinances), by law (e.g., owners of pets or livestock must abide by laws against animal cruelty), by public policy (e.g., regulation of industries, use of eminent domain, regulation of controlled substances or firearms), by community standards (e.g., real estate ownership may require that the property is kept according to aesthetic standards set by neighborhood associations), and by economic constraints (e.g., fencing or policing of land may cost more than the damages inflicted by occasional trespassers).

One could hence make an argument that property rights cannot be practically distinguished from bundles that contain some but not all of the rights discussed above and thus fall short of "true" ownership. In fact, it is possible to define ownership via the bundle of (unspecified) *residual rights* that are left over after any specific rights have been contractually assigned (Grossman and Hart, 1986). For the purpose of this essay, however, we will simply speak of a property right when significant degrees of the rights *C*, *V*, *E*, *T* are present.[2] Furthermore, we will focus on private property rights (meaning property owned by individuals or firms), as opposed to communal property or state property. Moreover, the greater the set of rights *C*, *V*, *E*, and *T* associated with some system, the more that system is "capitalist" (everything else equal).

## II. HISTORY OF THOUGHT ON PROPERTY RIGHTS

Scholastic inquiry into the nature of property has a long history and can be traced back to the ancient Greek philosophers, at least. In *The Republic*, Plato (428−348 BC) endorses a concept of common ownership on the basis that common ownership is best suited to promote what he calls the common interest. Aristotle (384−322 BC) rejects Plato's ideal of common ownership in *Politics*, noting the ills associated with common property and advocating private property instead, for reasons we discuss in Section IV. In the rest of this section, we will focus on the philosophical arguments starting with the British philosophers of the 17th century.

*Political liberalism.* With the British philosophers of the 17th and 18th century, the inquiry into the nature of property becomes at the same time an inquiry into the nature

[2] An exception will be in Section III, *Property rights can resolve conflicts*, where were include more general entitlements in our discussion.

and justification of government. One might frame this question as a debate over whether property is a function of government, or government a function of property. The first view has its origins in the writings of Thomas Hobbes (1588−1670). In *Leviathan*, Hobbes identifies the right to property solely with the power to take possession over things and protect them from being taken by others. David Hume (1711−1776), in *Enquiry Concerning the Principles of Morals*, views private property as an organizing principle for the use of resources, justified by their scarcity. Like Hobbes, however, Hume regards property rights as stable only to the extent that the social customs that (implicitly) assign such rights are protected souvereign power. Thus, both Hobbes and Hume advance positive theories of property, according to which a right to property is derived from power because it is created and protected through the exercise of power, ergo by government.

*Natural rights doctrine.* The second view originates in John Locke's (1632−1704) *Two Treatises of Government*. Locke argues that property rights are natural rights which exist absent of any form of government. The normative basis of Locke's theory is the notion that every man holds a quintessential property right to his own body and labor. Because physical things are created by mixing privately owned labor with unclaimed resources of nature, man acquires private property over what he produces. The significance of the Lockean paradigm is that it fundamentally redefines the relation of government and property-owning citizens. For Locke, government cannot create property rights, or assign such rights to citizens, but instead exists solely to preserve man's natural, pre-existing right to property. Adam Smith (1723−1719) continues the Lockean tradition in *The Wealth of Nations* and *Lecture on Justice*, where he asserts the existence of natural rights, though not to property but liberty. Importantly, the right to liberty includes the right to prosper through trade, to which secure property rights are a precondition. Smith therefore arrives at a similar justification for government as Locke: To guarantee and defend property rights, as a necessary condition for exchange and hence man's natural right to liberty.

*Utilitarianism.* A decidely different viewpoint is adopted by writers of the utilitarian school. In *Theory of Legislation*, Jeremy Bentham (1748−1832) advances a role for government that goes beyond merely exercising power because it can, or securing the natural rights of citizens through the exercise of power. Instead, government must act to maximize the welfare of its citizens. For Bentham, this meant the provision of those government goods and services whose benefits, measured as the sum of utilities, exceed their costs.

The implication of the Benthamite perspective for property rights is profound, as it endows government with the power to tax citizens' property for the greater good. This conclusion, however, is not arrived at through an investigation of property rights, but through an investigation of the purpose of government. John Stuart Mill (1806−1863) further expands the envisioned role of utilitarian government in *Principles of Political Economy*, to include the redistribution of income and resources. Again, this is not without implications for property rights. For example, Mill rejects Locke's notion that a property right to land derives solely from human use of land. He argues instead that the distribution of land and other resources to productive uses must maximize the social value generated by them. To the extent that existing ownership rights maximize this value, such rights are endorsed. Thus, for utilitarians, private property is a means to the end of value maximization, but not an end in itself.

*Socialism and Communism.* Toward the middle 19th century, the socialist writers Karl Marx (1818−1883) and Friedrich Engels (1820−1895) continued the utilitarian tradition but began to see private property as a major impediment to welfare maximization. Interestingly, Marx and Engels generally seem to agree with the Lockean view that every man holds a claim to the value of his labor. Private ownership of land and accumulated factors, however, deprives workers of part of this value, especially if land and capital are owned by relatively few—a viewpoint according to which the human struggle for wellbeing can be understood essentially as a conflict among the working-class proletariat and the property-owning classes. The classless utopia envisioned by Marx and Engels hence had to be a society free of private property.

*Modern Evolutionary Theory.* The theory of evolution as applied to humans is most consistent with the Lockean natural rights theory (Ridley, 1998; Rubin, 2002). This is because institutions of property evolved with humans. That is, there was never a time when humans existed without property; even our pre-human ancestors had property rights. Therefore, it is not useful to think of governments as creating property rights, although governments can assist in enforcing property rights, and can also interfere with property rights.

## III. THE ROLE OF PRIVATE PROPERTY FOR CAPITALISM

Societies which respect private property have prospered, and societies which tried to abolish private property have failed. The institution of private property is so strongly correlated with the prosperity of nations because private property is, indeed, a necessary condition for prosperity. Moreover, capitalism is also a necessary condition for prosperity.

In this section, we review the theoretical arguments in support of this hypothesis. Some of the arguments apply to societies in general, not only to capitalist ones. Specifically, we will discuss the role of property rights for the efficient use and development of resources, for trade and specialization, for capital accumulation and growth, and for the resolution of conflict. We also highlight what advantages the institution of private property may have compared to other institutions that try to achieve the same goals.

*Property rights encourage the efficient use and development of resources.* It is well-known that resources which are rivalrous but non-excludable—so-called common pool resources, or commons for short—face the dual threat of overuse (a demand-side failure) and underinvestment (a supply-side failure). Social scientists have examined various kinds of solutions to this problem, which one might call the "modes of governance" of resources. Arranged by the degree to which authority is centralized, these range from state regulation, to local governance and community ownership,[3] to full privatization. Each of these modes comes at a cost, of course. Governance costs can include the costs of asymmetric information, agency costs, the costs of enforcing rules, and transaction costs, and the ideal form of governance is determined to a large part by its relative cost advantage over other forms.[4] In the following, we will focus on the role of private property rights as a form of governing access to rivalrous resources.

Through the right to exclude, private property rights transform common pool resources into private goods. Excludability, together with the right to control and claim to value, eliminates both problems. To see how private property facilitates efficient use, consider an example. Imagine an area of grassland to be used for cattle grazing. We will make the realistic assumption that the value of this resource for each herder decreases with the total amount of cattle on the range, as his herd must compete over a fixed

[3] For empirical studies of community governance, see for example Ostrom (1990) and De Alessi (2003).

[4] If governance costs are too high across forms of governance, it may well be efficient to *not* govern a resource. See, for example, Eggertsson (2003).

amount of grass with other cattle. As long as a positive value is received by herders, however, the range will attract additional users, and may continue to do so even if the arrival of an additional animal results in a loss of value to others that is in excess of the value generated to the new user. Hardin (1968) calls this effect the "tragedy of the commons." One mechanism to turn the tragedy around is private ownership of the resource. As long as the owner's exclusion right can be enforced at a reasonable cost, the owner will have an incentive to set the size of the herd to a level that maximizes the overall value of the resource. In case the land owner does not also own cattle, he could sell or rent access to the range to other cattlemen at a price that induces optimal use. In either case, there would be no overuse of the property, as all value generated by the property is received by the owner either directly through his own use, or indirectly by selling use rights to others.

For similar reasons, non-excludable resources may be underdeveloped. Consider again a piece of land, to be used for farming instead of grazing. Assume that the farming yield can be increased through irrigation and that the value of the additional harvest exceeds the cost of irrigation. If the land is privately owned, the owner would clearly want to irrigate the land. On the other hand, if the land is not privately owned or otherwise made excludable, irrigation may not occur. The reason is that a potential entrepreneur, who contemplates whether to invest in irrigation technology, will anticipate that the potential profits from the additional yield would likely be dissipated by users who free-ride on the investment. Without a property right on what they create, entrepreneurs may not receive adequate compensation for their investment, and therefore may choose not to invest even if this activity is socially desirable. To the extent that the owner's exclusion rights can be enforced at reasonable costs, however, private ownership promotes enterprise and the efficient development of resources.

*Property rights facilitate trade and foster growth and long-term prosperity.* Specialization is central to the wealth of societies, and exchange is necessary to realize the gains from specialization. In capitalist economies exchange typically takes place in markets, and the price signals these markets generate are effective in coordinating the production, consumption, and investment decisions made by individuals and firms. Recognition and enforcement of property rights is indispensible for individuals to voluntarily engage in the activity of exchanging one thing for another. Note that the recognition and enforcement of property rights is complementary to, but not the same as, the recognition and enforcement of contracts, that is, a way to make individuals keep their promises.

To be willing to give up things in their possession, individuals need assurance that what is received in return indeed becomes their property, and is respected by others as such. A system of stable, secure private property rights provides this assurance in two ways: The receiver gains confidence in the legitimacy of the title he is about to receive, and anticipates immunity from the interference of others with his acquired property. Only if these conditions are met is he willing to part with things in his possession. It should be clear that the outlined mechanism relies not simply on the existence of property rights but on the public's trust in their recognition. A government's declaration to respect and enforce private property rights, for example, is not sufficient to facilitate exchange unless it is believed to be true.

For similar reasons, stable property rights are necessary for the accumulation of resources in the form of capital by private citizens, and thus for economic growth. There is little incentive to save resources for later use if it is anticipated that these savings will be appropriated by others. This aspect is particularly significant for the development of the modern, capitalist firm, as investment is a particular type of intertemporal exchange: The entrepreneur supplies resources to the firm, in exchange for a claim to the (risky) returns generated by these resources. The right to property of the firm secures this claim for the investor. The risk the investor is taking is therefore the risk associated with the business itself, but not the risk of appropriation if the business is successful. Private property rights can hence be viewed in parallel to the contracts which secure (certain) payments promised to those who supply labor or debt capital to the firm.

*Property rights can resolve conflicts.* Many conflicts arise out of conflicting uses of a scarce resource to which multiple parties lay claim. Others arise out of negative externalities that one individual's actions impose on others. The resolution of such conflicts may involve considerable costs on the parties involved and on others. These costs range from the cost of protecting one's possessions from appropriation, to the cost of protecting oneself from externalities, to the cost of litigation, to outright violence. From an aggregate economic perspective, these costs constitute a welfare loss. A system of clearly defined private property rights, as long as it is enforced, and believed to be enforced, can reduce conflict resolution costs considerably.

A celebrated result in economics, the *Coase Theorem*, states that if property rights—or, more generally, entitlements—are clearly defined and there are no transaction costs (such as the costs of writing and enforcing contracts), then the allocation of externalities in an economy must be Pareto-efficient regardless of the initial allocation of entitlements

(Coase, 1960). Consider an example where residents in a certain neighborhood are harmed by the air pollution of a nearby factory. Assume the damage to the residents (e.g., a reduced quality of life or the cost of treating respiratory illnesses) is larger than what it would cost the factory to stop polluting (e.g., the lost profit of ceasing production or the cost of installing air filters). It is then efficient for pollution to cease, and this state can be reached in several ways: If the residents are entitled to clean air, they can simply demand that the factory stop polluting and have the courts enforce this demand if necessary. If, on the other hand, the factory is entitled to pollute the air, the parties can agree that the factory stop the pollution in exchange for a payment by the residents. Because the residents are willing to pay more to be free from pollution than it costs the factory to install filters, such a payment can be found. In either case, the final outcome is efficient. The initial allocation of entitlements has distributional consequences, of course: In our example, the residents are clearly better off in the first case than in the second; the reverse is true for the firm.

Reality is different from the ideal state envisioned by the Coase Theorem in two important aspects. First, transaction costs are typically not equal to zero: Enforcing one's rights, or reaching agreements with others, is expensive. Simply notice the number of parties involved in the example above—a possibly very large number of residents plus the polluting factory, which itself might be controlled by more than a single owner or manager. Thus, the transaction costs do not only contain the costs of reaching an agreement between "the residents" and "the factory," but also among the residents and within the firm. Practical complications like these mean that some theoretically efficient outcomes will not be reached in reality, as the actual process of reaching the outcome is more expensive than the additional welfare generated by it.

The second difference is that entitlements are often *not* well defined. This is especially important in situation where economic progress or technological change necessitate the establishment of new rights which hitherto have not existed.[5] The consequence of such a (temporary) lack of entitlements for economic welfare is subtle, but important. In the absence of clearly defined property rights, conflicts are bound to arise both over ownership of assets and over externalities. The resolution of these conflicts induces costs, including possibly the cost of violence.[6] In the presence of property rights, and in transitional phas-

[5] See Section IV, *Some recent developments*; and Section VI.

[6] In the extreme opposite to Coase's ideal (a Hobbesian world), conflicts are over the *possession* of assets, but possession is the same as ownership in this case. These conflicts are resolved by strength alone, which means by violence or at least the threat of violence. Though conflicts need not necessarily arise (Skaperdas,

es during which new rights are being created (by customs, policy, and the courts), conflicts arise over the *definition* of property rights rather than over ownership. Because the definition of rights has long-lasting distributional consequences, much is at stake in these conflicts. Thus, resolution will often come at considerable costs (think of patents litigation). Our point is that the second type of conflict is much less costly in the long run than the first kind: Conflicts over the definition or rights are temporary until the rights are established and recognized, whereas conflicts over ownership can be perpetual, and are in principle solvable without violence. One can make the argument that the success of peaceful capitalist economies has much to do with the development of legal systems, most notably the Anglo-American common law system, which (a) enforce existing property rights efficiently, and (b) offer an effective environment in which new property rights are being defined.

## IV. INTELLECTUAL PROPERTY AND INNOVATION

Intellectual property concerns the rights to *patents*, *trade secrets, copyrights,* and *trademarks*. Loosely speaking, a patent or a trade secret is the right to exclude others from using an invention, such as a machine, an algorithm, or a particular production process. A copyright is the right to exclude others from using original works of authorship, such as literary or musical works. A trademark is a signifier such as a name, symbol, or slogan that can distinguish the source of a seller's goods and from others; a trademark is thus the right of a seller to exclude others from using the seller's reputation. In addition to these exclusion rights (*E*), the other dimensions of property (*C*, *V*, and *T*) are typically included as well in patents, copyrights, and trademarks.[7] Thus, we may talk of intellectual *property* rights.

Intellectual property is extremely important for capitalism. While static markets lead to efficient use of existing resources, for economic growth innovation and technical change is necessary (Schumpeter, 1942). The success of capitalism is in large part due to the growth it fosters; people would not accept some of the negatives of capitalism (such

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1982), the closer the environment is to the Hobbesian world the more likely is it that conflicts are resolved violently.

[7] There are certain qualifications. For example, a trademark cannot be sold under U.S. law without at the same time selling the production process to which the trademark applies (that is, *empty trademark sales* are not allowed). For a discussion of U.S. and international law in this regard, and an economic analysis of empty trademark sales, see Marvel and Ye (2008).

as substantial economic inequality and cyclical activity) without the prospect of growth. Jones (2001) has shown that the most important factor leading to modern increases in income is the share of created wealth going to creators of innovations, and these innovations are facilitated by the existence of intellectual property.

*Historical development of intellectual property.* The idea that property rights might extend to intellectual goods has a long history. Trademarks, for example, have been used since ancient times in almost all cultures to identify the creator of artistic and craft items. Intellectual property laws usually emerged as a means of economic policy by the state. The first trademark law was passed in 1266 in England, protecting bakers' stamps placed on bread loaves. The first patent law emerged in 1474 in Venice to encourage innovation, and the first copyright law in 1709 in England. The French adopted a patent system in 1791. Patent and copyright laws of the United States were first passed in 1790, and U.S. trademark legislation dates to 1870. These laws have undergone various major revisions since their first inception, each time refining their definitions of what constitutes intellectual property. Modern U.S. patent law dates to 1952, and modern U.S. copyright low dates to 1976.

The degree to which intellectual property rights are recognized and protected has varied over time and across countries, and has always been subject to the pressures of advocates pro and against intellectual property.[8] This is in part because once intellectual property has been created, the marginal cost of additional users is often close to zero, so that there is a short run deadweight loss from protecting rights to existing intellectual property. However, the overall trend in intellectual property protection is broadly correlated with the rise of capitalism. In fact, some institutional features associated with capitalism had to exist prior to the full development of intellectual property rights, as we will discuss in Section V below.

*Economic benefits of intellectual property.* In the following, it will sometimes be convenient to draw a distinction between patents and copyrights on the one hand, and trademarks on the other, as the former differ from the latter in important economic aspects.

Patents and copyrights are rights to the "products of the mind," and such rights are different from physical property rights in very elementary ways. If one subscribes to the natural rights theory of Locke, it is unclear whether it would support a right to intellectual

[8] See Machlup (1958), Scherer (2006).

property. On the one hand, ideas, novels, or musical compositions are products of the mind, and if a man owns his mind as much he owns his body then it seems that, indeed, he would acquire property over what he conceives in his mind. On the other hand, ideas are vague and often conceived in similar form by many people. Since two persons cannot, independently of each other, have ownership over the same good, how can property be acquired over an idea that one conceives the day after it was conceived by somebody else? If one subscribes to utilitarian reasoning, then the justification of patents and copyrights as a means to welfare maximization faces a different challenge. Unlike most physical items, the goods protected by patents and copyrights are non-rivalrous: Once used, they remain intact for further beneficial use. Protecting an idea as intellectual property therefore does not transform a commons into a private good (which is desirable, as we have argued in Section IV) but rather a public good into a club good. Why, then, should utilitarian society create an institution that excludes individuals from the use of goods which can be produced in arbitrary quantities at no incremental cost?

The answer, quite obviously, is that it is not costless to create the first copy of an idea—even if additional copies can be produced at zero cost. The costs of creating intellectual goods include both tangible costs of research and development activities, as well as intangible effort and opportunity costs. The benefits include both their value as consumption goods and their value as inputs in production. Because the cost of creating intellectual goods is borne privately, the intellectual entrepreneur must be able to appropriate a sufficiently large fraction of the benefits created by his idea, or otherwise he would be unwilling to incur the cost. Thus, patents and copyrights rights enable innovators to receive rewards for their efforts and thereby create innovation incentives. Granting ownership rights, including exclusive-use rights, over "products of the mind" therefore serves a utilitarian role similar to ownership over physical resources: To encourage the efficient development of (intellectual) resources.

The story for trademarks is different, and somewhat more subtle. Similar to patents and copyrights, trademarks facilitate the development of socially valuable intellectual resources. The intellectual resource in this case is the trademark owner's reputation, typically concerning a seller's reputation for the quality of his goods. Good reputations, which can be viewed as a form of informational capital, are costly to establish but privately and socially beneficial because they facilitate trade when sellers are privately informed about the quality of their goods (reputations can help overcome *adverse selection*). An important aspect of reputations is that a unique, distinguishable trademark can serve as a "sufficient statistic" for it, even if buyers have not observed the seller's past

transaction history (see Tadelis, 1999). Thus, being able to exclude others from using one's trademark is essential to protect one's reputation from appropriation by others (i.e., imitators). Trademark protection thereby provides incentives to establish reputations in the first place.

Trade secrets are an additional form of intellectual property. These are useful when a product cannot be reverse engineered, so that competitors cannot easily duplicate the idea. The advantage of a trade secret is that it does not expire, as does a patent. The disadvantage is that if a rival can determine the method of production the originator of the item has no protection. Courts will recognize rights to trade secrets if owners take steps to protect them, as by having workers or others (e.g., potential acquirers of the firm) sign non-disclosure and non-compete contracts.[9]

*Economic policy toward intellectual property.* Unlike property rights over physical goods (and also unlike trademarks), patents and copyrights right have a considerable social cost: The inefficiency that arises from granting the owner monopoly power over his property. Monopoly power arises because intellectual goods often cannot be perfectly substituted for one another.[10] While monopoly creates rents which compensate the owner for his innovation costs, it also induces a deadweight loss. Thus, unlike physical property rights, patents and copyrights generally lead to an inefficient use of the intellectual resources they protect. Economists speak of a tradeoff between static efficiency (the welfare loss) and dynamic efficiency (the innovation incentives), and patent/copyright policy can best be understood as an attempt to maximize welfare by achieving an optimal balance in this tradeoff.

States have various tools available to fine-tune intellectual property rights to achieve this balance, for example by limiting the lifespan of an intellectual property right, or regulating the owner's exercise of market power. The first economic analysis of optimal patent life span in Nordhaus (1969) and Scherer (1972), who show that patents should have a finite lifespan after which the owner's monopoly power ceases. In fact, intellectual

[9] Non-compete agreements (sometimes called covenants not to compete) with workers serve an additional function. These exist when an employee obtains some "general human capital" (Becker, 1975) that is too valuable to be paid for by accepting reduced wages (Rubin and Shedd, 1981). Then a contract not to use the human capital for another firm is an important way of protecting this capital and therefore providing incentives to create it.

[10] For example, if a person owns a car we do not consider him a monopolist owner, as there are many other persons owning similar cars. A pharmaceutical company owning the patent to a certain drug, on the other hand, derives considerable market power from this property right if competitors' drugs are only imperfect substitutes of the one in question.

property rights are typically not granted forever: In the United States, for example, patents are granted for 20 years while copyrights expire 70 years after the author's death.[11] The analysis by Nordhaus and Scherer is extended in Klemperer (1990), Gilbert and Shapiro (1990), Tandon (1982), and others, who investigate what they call "patent breadth," that is, the degree to which owners can benefit from the patent during its life span. The result is that, if it is possible to regulate the flow of profits the patent holder receives during the lifespan of his patent, then reducing this flow while increasing the lifespan (perhaps to infinity) is preferable.

Finally, there is some evidence that actual patent and copyright protection might offer too large rewards for the innovator and hence be suboptimal. Scherer (2006) summarizes a number of studies and reports that compulsory licensing, used as an anti-trust instrument in the United States and Great Britain from the 1930s to 1960s, has had no negative impact on innovative activity in U.S. and British corporations, with the exception of the pharmaceutical sector. Burt and Lemley (2003) indicate that the "one size fits all" approach to patents (the existence of one set of patent laws for all industries) is inefficient as different industries would benefit from different forms of patent protection.

*Some recent developments.* The institution of intellectual property continues to evolve, often driven by technological advances and frequently changing business practices and aspects of capitalism along the way. We will briefly discuss just two examples here.

The first is the issue of digital media, such as music and video files. In the late 1990s, the advent of the MP3 file format and the spread of fast internet connections made it considerably less costly to obtain and distribute copies of copyrighted content. At the same time it raised new legal issues, such as the question whether sharers or downloaders of illegally distributed content should be the ones prosecuted for intellectual property rights violations. In response to these challenges, the entertainment industry has responded with a mix of aggressive enforcement tactics (lawsuits against file-sharing college students), technological innovations to prevent unauthorized copying (Digital Rights Management), and new product offerings (unbundled content and a variety of subscription services).

The second issue is that of genetically modified plants, which the courts have considered intellectual property since the 1930 U.S. Plant Patent Act. Traditionally, genetic

[11] There are exceptions. Copyrights to pseudonymous or commissioned works expire 95 years after publication or 120 years after creation, whichever comes first; design patents expire after 14 years instead of 20 years. In any case, as Machlup (1958, pp. 9−10) notes, patent and copyright lifespans are usually not derived from economic analysis, but from political considerations.

modification was performed through selective breeding, but it increasingly is done by directly manipulating an organism's DNA, a practice that requires considerable investments in research and technology. Growing crops from seed amounts to the making of copies of the seed material's genetic information, giving seed companies the right to interfere with the disposition of the harvest, as it embodies copies of their intellectual property. "Buying" seed material of genetically modified plants increasingly does not mean acquiring ownership of the seeds, but instead licensing intellectual property from seed companies. The licensing agreements of large seed companies, such as the Monsanto Corporation, include the provision to not save any fraction of the harvest, thereby changing traditional farming practices that have existed since the beginning of agriculture.[12]

## V. CAPITALISM CREATES PROPERTY

So far we have been discussing the effect of property rights on capitalism. However, there is another dimension of the relationship between these constructs. That is, as capitalism advances, new types of property are created by capitalism itself.

*Financial instruments.* The creation of new types of property by capitalism is most obvious with respect to financial instruments. We might view stocks and bonds as the essence of capitalism. But these financial instruments are novel forms of capital with novel sets of rights. While bonds are a form of debt instruments, an old form of wealth, stocks represent a new innovation associated with capitalism itself. Fundamentally, stocks enabled an individual to invest in an enterprise with limited risk and to separate investments from management.

As capitalism has advanced, new and innovative forms of financial instruments have been created. For example, in his discussion of property rights, Rapaczynski (1996) identifies forms of property owned by wealthy individuals: "When one looks at the more 'propertied classes' of modern America, the intangibles become ever more prevalent and ever more esoteric: patents, futures, financial derivatives, tax shelters, mortgage-backed securities, junk bonds and instruments that only a few wizards understand."[13] These

[12] A recent technological advance, the so-called "terminator genes," circumvent enforcement problems of seed licensing by making the patented traits unavailable in all copies.

[13] Written in 1996, before many more modern forms of "instruments that only a few wizards understand" were created, and before this lack of understanding caused our current severe problems.

forms of property serve important economic functions (such as efficient allocation of risk) although as we have recently seen they can be abused.

*Intellectual property.* In Section IV, we discussed intellectual property and its importance for innovation, entrepreneurial vitality, and growth in capitalist systems. Like various modern forms of capital and financial instruments, capitalism not only benefited from intellectual property rights but created these rights in the first place. This is not to say that intellectual achievements have not been made before capitalism, or that pre-capitalist societies have not utilized the intellectual outputs of their members, but that there was little need to protect this output from the appropriation of others. There are several reasons for this coevolution of capitalism and intellectual property, and we will discuss two here.

First, the idea of exchanging goods for economic profit is important to understanding why and when intellectual property rights emerged. If goods are not produced and sold by profit-maximizing firms, then the reasons to undertake scientific inquiry could not have included the motive of deriving a monetary profit. Hence there seems to be little need for a patent system in this situation. Similarly, the need for copyright protection to works of art and literature depends on whether such works are routinely bought and sold on markets for profit. Throughout most of history, these goods flourished as religious or spiritual artifacts, as part of common folklore, or were the leisurely realm of the feudal classes, but they were not produced by an entertainment industry. Thus, the concept of a copyright did not develop until a commercial need for it arose.

A second reason is that the enforcement of intellectual property rights requires a more sophisticated legal system than what is needed to protect physical property rights, as well a larger effort on part of the state to police these rights. While physical property can, in principle, be defended by the owner (or a group of owners) against being taken, the same is not true for intellectual property. Intellectual property requires more elaborate systems for registering these rights, as well as a sophisticated judicial framework to deal with disputes over intellectual property. The act of "stealing" someone else's intellectual property is not easily observable, and proving that it happened requires, among other things, proving that the "owner" either created the property, or otherwise legally procured it from its previous owner. Again, it is unlikely that societies would develop this kind of sophistication unless capitalist institutions existed in which intellectual property would be valuable.

From these examples, we can see that capitalism does not merely utilize existing property rights efficiently. An equally, if not more, important function is the actual creation of property rights of all sorts. These rights—some of them beyond imagination only a few decades ago—are not created by government, but rather by markets themselves, and more particularly by capitalistic markets. The relationship between capitalism and its institutions is therefore an organic relationship, characterized by the coevolution of capitalist economies and the institutions of capitalism such as property.

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