

THE MARKET MECHANISM OF APPROPRIATION

David Ellerman^o

1. Introduction

Property rights have a life cycle; they are created, transferred, and eventually terminated. Market contracts transfer property rights but what is the institution for the creation and termination of property rights? It turns out that the market also provides, under normal conditions, the mechanism for the initiation and termination of property rights. Our topic is to explain this little-noted role of the market and to outline the underlying normative theory along with the fundamental theorem for this market mechanism in a private property system.

2. The Conventional Neglect of the Question of Appropriation

In ordinary economic activity, property rights are being constantly created in production and they are constantly being terminated in consumption (consumption goods) as well as production activities (inputs consumed in production). It is a remarkable fact—which itself calls for explanation—that the literature on the economics of property rights does not even formulate the question about the mechanism for the initiation and termination of property rights in these normal activities. For example, the question is ignored in the “economics of property rights”¹, in the “property rights approach” to the firm², in the

^o Visiting Professor, Department of Economics, University of California at Riverside. E-mail: david@ellerman.org and website: www.ellerman.org .

¹Furubotn/Pejovich-1974.

² Hart/Moore-1990.

Putterman and Kroszner anthology³ of papers on the “economic” nature of the firm, in the “property rights” literature of the new institutional economics⁴, or in the law and economics literature⁵.

Before turning to an explanation, we could simplify the terminology about the eventual termination of property rights by referring to the legal termination of a property right as the legal assignment or appropriation of the liability for that property⁶. Hence the question before us is the mechanism for the appropriation of the assets and liabilities created in normal production and consumption activities.

One reason for the neglect is that discussions of property creation tend to be restricted in the philosophical literature to a rather mythical state of nature⁷ or original position, or, in the economic literature, to the “appropriation” of unclaimed or commonly owned natural goods⁸ rather than the everyday matters of production and consumption of commodities where property rights are created and terminated “on the fly.” For instance, Harold Demsetz⁹ considers how private property in land with fur-bearing animals was established as a result of the growth of the fur trade. John Umbeck¹⁰ considers how rights to gold deposits were created during the 1848 California gold rush on land recently ceded from Mexico. Yoram Barzel¹¹ considers how the common property rights to minerals under the North Sea were privatized but ignores the assignment of initial rights in normal production [*e.g.*, in his Chapter 5, “The formation of rights”]. On the negative side, the law and economics literature looks extensively at the assignment of liabilities in the legal trials that may follow the destruction of property in torts or crimes. But there is no attention to the mechanism for assigning the liabilities for the production inputs and consumption goods that are used up or consumed in normal activities where legal trials are clearly not the mechanism for liability assignment. What is the mechanism?

³ Putterman/Kroszner-1996.

⁴ Furubotn/Richter-1998.

⁵ Miceli-1999; Cooter/Ulen-2004.

⁶ The termination of rights was an original meaning of “expropriation.” “This word [expropriation] primarily denotes a voluntary surrender of rights or claims; the act of divesting oneself of that which was previously claimed as one’s own, or renouncing it. In this sense, it is the opposite of ‘appropriation’. A meaning has been attached to the term, imported from foreign jurisprudence, which makes it synonymous with the exercise of the power of eminent domain,” [Black 1968, 692, entry under “Expropriation”] Since “expropriation” now has this acquired meaning, I will treat the “expropriation (termination) of rights to the assets +X” as the “appropriation of the liabilities –X.”

⁷ Locke-1690 (1690).

⁸ Cooter/Ulen-2004.

⁹ Demsetz-1967.

¹⁰ Umbeck-1981.

¹¹ Barzel-1989.

3. The Fundamental Myth that Product Rights are Part of Capital Rights

In the case of production (leaving aside consumption for the moment), there is a reason—albeit a mistaken one—for not formulating the question of the mechanism for the appropriation of the assets and liabilities produced in normal production. It is rather commonly thought that the product rights are “attached to” or are “part and parcel of” some pre-existing property right such as the ownership of a capital asset, a production set, or, simply, the firm. This idea in various forms is so ubiquitous that it might be termed the “fundamental myth” about the private property system.

To see the fallacy, one only has to consider the result of renting the capital employed in production. The party who hired in the capital and paid for all the other used-up inputs would have the legally defensible first claim on the produced output, not the owner of the capital asset to whom the rent was being paid as one of the input costs.

The simplest version of this fundamental myth is the assumption that the bundle of rights that constitute ownership of a capital asset includes “a right of ownership-over-the-asset’s-products, or *jus fruendi*”¹², the “right of usufruct [which] entitles the holder to the ‘fruits’ or ‘produce’ derived from an asset”¹³, or simply “the right to the products of the asset”¹⁴. Aside from being vulnerable to the “rent the capital” argument given above, this idea of an “asset’s product” has a quaint nineteenth century flavor prior to the development of marginal productivity theory. With MP theory, it was generally understood that the services of *many* assets may be employed in the production of the product and there are no grounds of unique physical causality to present the product as the “fruits” or “produce” of one asset (*e.g.*, the land) rather than another.

But perhaps the primary source of the fundamental myth is the confusion between owning a corporation and “owning” the productive opportunity that a corporation may or may undertake depending on its contracts. The line of reasoning is: “a corporation is an owned asset and a corporation owns the products it produces so there is no need for some mechanism to account for the ownership of the product—it’s all part of the ownership of the firm.” It is only a tautology to say that a corporation owns “its products”; the question is how did the products produced in a certain productive opportunity become “its products.” For instance, must the Studebaker Corporation own the cars rolling off the end of the assembly line in the factory owned by Studebaker? Since Studebaker at one point

¹² Montias-1976, p. 116.

¹³ Furubotn/Richter-1998, p. 79.

¹⁴ Putterman-1996, p. 361.

leased its factory building to another automaker, the answer is “No.” Those cars were owned by the other company who was making the lease payments and paying for all the other inputs in car production and who thus would have the defensible claim on the cars rolling off the end of the assembly line.

The simple fact is that the ownership of a corporation is the indirect ownership of the corporate assets (e.g., the Studebaker factory building) and the “rent the capital” argument applies to those assets. Whether or not the company owns the products produced using some of those assets depends on whether the company hires or leases out those assets to some other party (who would then appropriate the product) or the company hires in a complementary set of inputs to undertake the production opportunity itself. The legal party who ends up appropriating (i.e., having the defensible claim on) the produced assets is the party who was the contractual nexus of hiring or already owning all the inputs used up in production (and thus who “swallowed” those liabilities). Since that party undertaking production is determined by who was the nexus of the hiring contracts (who hires or already owns what or whom), the rights to the product are not part of some prior bundle of rights to a capital asset or to a corporation.

The grip of the fundamental myth in one form or another seems to account for the failure to formulate the concept of a mechanism for the appropriation of the assets and liabilities that are created in normal production activities.

4. The “Invisible Judge” Mechanism of Property Appropriation

Since Adam Smith, economic theory has worked to elucidate the invisible hand mechanism embodied in the price system that guides property rights towards an efficient allocation. However, the life-cycle of property rights includes not just transfers in the market but the initiation and termination of the property rights. The market also embodies an invisible hand mechanism that governs the initiation and termination of property rights—but this mechanism seems to have been truly invisible due to the many forms of the fundamental myth that the product rights are already included in pre-existing capital rights.

There is a visible-hand mechanism of appropriation used when the legal system intervenes into the market. The prime example is a civil or criminal trial to assign the legal liability for property that has been destroyed. Such a trial also illustrates the underlying juridical norm of the *responsibility principle*: assign the de jure or legal responsibility to the person or persons who were actually de facto responsible for destroying the property.

The invisible hand mechanism for the legal assignment of initial and terminal rights comes into play when there is no explicit trial—when the visible hand of the legal authorities does not intervene and when it thus, in effect, renders the *laissez faire* judgment of “let it be.” Using the Smithian metaphor, we might conceptualize “non-action” on the part of the legal authorities as the ruling of the “invisible judge”

who always rules “let it be.”

In the tradition of Ronald Coase¹⁵, there has been an emphasis on a legal system defining clear property rights. Property rights are defined as much by the inaction of the legal system as by its actions. When sparks from a passing locomotive burn the crop growing in a farmer’s field and the invisible judge rules “let it be” (i.e., the legal authorities clearly allow no action), then at least the right to take that specific action was, in effect, established on the part of the railroad.

There are two types of contracts where the role of the invisible judge is particularly important, namely, the first and last transfer contracts in the life-cycle of a commodity¹⁶. When a newly produced commodity is first sold and the invisible judge lets it be, then the first property right was, in effect, assigned to the first seller. Conversely, when a purchased commodity is subsequently consumed, used up, or destroyed and the invisible judge lets it be, then the liability was, in effect, assigned to the last buyer. Thus we have the:

Market mechanism of appropriation:

The property rights (or liabilities) to newly produced (respectively, finally used-up) commodities are assigned by the invisible judge to the first seller (respectively, last buyer) of the commodities.

The application to normal consumption is straightforward. When a commodity is consumed and the invisible judge lets it be then the liability for the using up or consumption of the commodity is imputed to the last buyer.

The most important and consequential application of the market mechanism of appropriation is to normal production activities. Abstractly considered, one legal party purchases (or already owns from past purchases or activities) all the “inputs” to be used up in the production process. When those inputs are used up and new products or “outputs” are produced, then the last buyer of the inputs is in a legally defensible position to be the first seller of the outputs unless the legal authorities would intervene to overturn both sets of contracts. Hence when no such intervention takes places—as in normal production—then that one legal party in effect legally appropriates a bundle of legal rights and liabilities, the input liabilities and the output assets.

Clearly the government’s recognition of new alienable property rights (e.g., tradable pollution permits) will change the market, but the recognition of the market mechanism of appropriation shows that the market has an under-appreciated role in the property system. It is not just for rearranging existing property rights. In view of the widespread belief in some form of the fundamental myth, many supporters and critics of the current private property system have misplaced their focus. The pattern of appropriation is determined not by the ownership of property but by the pattern of contracts. When the government

¹⁵ Coase-1960.

¹⁶ Our focus is on commodities, rivalrous and excludable private goods that are produced and consumed as a part of deliberate human activity—even though in the distant past there may have been endowments of unproduced goods.

validates or invalidates certain contracts, the property system is also transformed. When one company buys another above its net asset value, then “purchased goodwill” is booked on the balance sheet as a property right. But when the customers decide to go elsewhere, no property rights are violated because goodwill was only an anticipated pattern of contracts. We turn now to reviewing some of these beliefs about the combined system of property-and-contract that need to be reconsidered in light the market mechanism of appropriation.

5. Some Descriptive Implications for Economics

5.1. Origins of the Fundamental Myth

The intellectual space to ask the question of appropriation in production was opened up by the realization that product rights were not part of capital rights—the “fundamental myth”—but were determined by the pattern of market contracts. Whence the fundamental myth? Marx shares responsibility by having given his imprimatur—expressed in his misnomer “capitalism”—but the idea goes back to older notions of land ownership. In feudal times, the governance of people living on land was taken as an attribute of the ownership of that land. The landlord was Lord of the land. As Gierke put it, “Rulership and Ownership were blent”¹⁷. Marx mistakenly carried over that idea to his analysis of capital in capitalism. The command over the production process was taken as part of the bundle of capital ownership rights¹⁸.

“It is not because he is a leader of industry that a man is a capitalist; on the contrary, he is a leader of industry because he is a capitalist. The leadership of industry is an attribute of capital, just as in feudal times the functions of general and judge were attributes of landed property”¹⁹.

Marx promoted the fundamental myth that governance and product rights were part of capital—one of the few points of complete agreement between Marxism and orthodox economics.

By “capital” Marx did not simply mean financial or physical capital goods; he meant those goods used by wage labor with private ownership of the means of production. Otherwise, “capital” becomes just the “means of labor.” In short,

¹⁷ Gierke-1958, p. 88.

¹⁸ This view survives to our day, *e.g.*, the “rights of authority at the firm level are defined by the ownership of assets, tangible (machines or money) or intangible (goodwill or reputation).” [Holmstrom/Tirole-1989, p. 123] The cavalier inclusion of “goodwill” (never mind “reputation”) in “the ownership of assets” is all too typical in the standard economic literature.

¹⁹ Marx-1967(1867), p. 332.

Marx's capital* = Means of labor (capital) + contractual role of being the firm (with wage labor).

If one wishes to use the word “capital*” in that Marxian sense, then one gives up being able to talk about the “ownership of capital” since there is no “ownership” of a contractual role. But Marx continued to talk about “capital” as being owned, a common fallacy of using the same word with different meanings at different places in an argument. Many versions of the fundamental myth take the form of assuming that the capital owner has the contractual role of being the firm (*i.e.*, capital*) and then taking all the property rights accruing to capital* as being part of the ownership of capital²⁰.

For instance, take the common notion of “owning a factory.” There is the ownership of factory buildings (or corporations with such assets), but there is no “ownership” of the going-concern aspect of *operating* a factory since that is a contractual role in a market economy. By using the same phrase “owning a factory” to straddle both meanings, one could seem to have an “argument” that the contractual role of operating a factory was “owned.” For instance, when it is pointed out that operating an owned factory is a contractual role, not an extra owned property right, a typical response is: “Yes, but it is that role which I call the ‘ownership*’ role.” After thus redefining factory-ownership* to include the contractual role, the semantics shifts back to conclude that “the product rights are part of the ownership* of the factory.” Such loose patterns of thought allow the fundamental myth to persist.

5.2. Implications for Capital Theory

The fundamental myth has unfortunately crept into some of the basic definitions of capital theory and thus into corporate finance theory. We need to introduce some more notation and terminology to express the problems in terms familiar in economics. If a production opportunity during a certain time period were described by a production function $Q = f(K,L)$, then the “inputs” would be the flow of capital services K (shorthand for all non-human inputs) and the flow of labor services L (shorthand for all the *de facto* responsible human activities of production), and the outputs Q produced during the period. The last buyer of the inputs would receive the *laissez faire* assignment or “imputation” of the liabilities for those used-up inputs which can be represented by the negative quantities $-K$ and $-L$. Hence that party would have the legally defensible claim on the outputs (in the absence of any overturning of the input contracts) and thus the invisible judge would also let stand that party’s first sale of the output assets $+Q$. Putting the bundle of assets and liabilities that were thus appropriated together in one list or “vector” yields $(Q,-K,-L)$. This might be called the “production vector” or “input-output vector” but for historical reasons, I will call it the *whole product* vector²¹.

²⁰ Of course, authors who slide back and forth between “capital*” and “capital” do not signal it by the inclusion or exclusion of the asterisk.

²¹ I have used the “whole product” phrase to recognize the tradition summarized by Carl Menger’s jurisprudential brother Anton Menger [Menger-1899].

Ordinarily, “product” just refers to the outputs Q but the whole product also includes the liabilities for the used-up inputs. While prices play no essential role in property theory, they will be used here to relate property theoretic notions back to economic theory. If p , r , and w are the unit prices of the outputs, capital services, and labor services, then the value of the whole product is the profits $\pi = pQ - rK - wL$.

One form of the fundamental myth is the idea that the “product rights” are part of the ownership of the capital asset, say a widget-maker machine, from which the capital services K flow. Let us suppose that the capital asset would yield the capital services K without diminution for n years and then has no salvage value. The asset owner has the property right to the stream of capital services K or, in vectorial terms, $(0,K,0)$ each year for n years. But if the asset owner also has the contractual role of “being the firm” or residual claimant in that production opportunity for the n years, then that party will additionally appropriate the whole products $(Q,-K,-L)$ which sum to the stream of net ownership vectors $(Q,0,-L)$ for n years [the first row plus the second row equals the bottom row in the following table 1].

	Year 1	Year 2	...	Year n
Property vector owned by asset owner.	$(0,K,0)$	$(0,K,0)$...	$(0,K,0)$
+ Property vector appropriated by last owner of inputs (residual claimant)	$+ (Q,-K,-L)$	$+ (Q,-K,-L)$...	$+ (Q,-K,-L)$
= Net property vector accruing to asset owner who is <i>also</i> the residual claimant.	$= (Q,0,-L)$	$= (Q,0,-L)$...	$= (Q,0,-L)$

Orthodox capital theory then discounts the value of the net vectors $(Q,0,-L)$ [bottom row in table 1], often called the asset’s “quasi-rent,” back to the present to arrive as the “capitalized value of the asset” as if the right to the whole products [second row] had been part of the ownership of the assets.

“When a man buys an investment or capital-asset, he purchases the right to the series of prospective returns, which he expects to obtain from selling its output, after deducting the running expenses of obtaining that output, during the life of the asset”²².

But the appropriation of the whole products is contingent on a certain contractual fact-pattern, and it is not a violation of the ownership rights of the asset owner to have the asset hired out instead of labor being hired in. Thus the value

²² Keynes-1936, p. 135.

of the whole products (“profits”) might or might not go to the asset owner depending on the future pattern of the input contracts. The “capitalized value of the asset” is actually the value of the asset [discounted value of the (0,K,0) stream in the first row] plus the “goodwill” which is the discounted value of the stream of whole products [discounted value of the (Q,-K,-L) stream in the second row]—where the latter may or may not accrue to the asset owner²³.

5.3. Implications for Corporate Finance Theory

There is no legal necessity that the owner of the widget machine be the residual claimant (with respect to the widget making process), and the same holds when the machine-owner is a corporation. Yet corporate finance theory carries over the same capital-theoretic fallacy of interpreting the whole product as part of asset ownership. For instance, the discounted cash flow method of valuation routinely assigns to the corporation the present value of the net cash flows [e.g., from (Q,0,-L) on the bottom row of Table 1] from production rather than the present value of the cash flows from the services of the underlying corporate assets [e.g., from (0,K,0) on the top row].

“There, in valuing any specific machine we discount at the market rate of interest the stream of cash receipts generated by the machine; plus any scrap or terminal value of the machine; and minus the stream of cash outlays for direct labor, materials, repairs, and capital additions. The same approach, of course, can also be applied to the firm as a whole which may be thought of in this context as simply a large, composite machine”²⁴.

But in order to plausibly count the future whole products as part of the present property rights of the corporation, all the future input contracts would have to be made in favor of the corporation at the present time. Moreover, since contracts are generally not enforceable until one side performs, the corporation would have to have paid all future input contracts at the present time. Only then could the corporation have a plausible claim on the future whole products. Since those conditions would hardly be fulfilled, the usual discounted cash flow method of valuation does *not* value the property rights “of the corporation.” If we take corporation* to mean corporation plus contractual role of whole product appropriator, then corporate finance theory discounts the returns to the corporation* as the value of the corporation.

Corporate valuation theory takes the future whole products and their value, the future profits—with “goodwill” as the discounted value—as part of bundle of ownership rights in a corporation. Buyers of corporate shares might assume that future contracts will be written in the same way but no property right

²³ This critique of capital theory has nothing to do with the old Cambridge controversies—reswitching and all that.

²⁴ Miller/Modigliani-1961, p. 415.

backs up that expectation—and the unjustified practice of booking “purchased goodwill” as an “asset” (*i.e.*, a property right) changes nothing²⁵.

6. The Normative Theory of Appropriation and Transfers

6.1. The Methodology of the Paretian Criterion

The fundamental theorem for the competitive price mechanism proves a correspondence between the descriptive or positive notion of a competitive equilibrium and the normative notion of Pareto efficiency. The fundamental theorem for the market mechanism of appropriation has the same logical form of a correspondence between a descriptive situation and a normative principle of appropriation.

The normative principle of appropriation used here is the responsibility principle: assign *de jure* (or legal) responsibility in accordance with *de facto* (or factual) responsibility. Since this principle is used in the interventions of the visible hand of the law, *i.e.*, legal trials, it is natural to see under what conditions the invisible hand mechanism of the property system follows the same principle. That is the main justification for using the responsibility principle in normative property theory.

However, there is another reason that might be of interest to economists, namely the principle follows—in its own way—the same methodology as the Paretian criterion. That methodology has two components: 1) the definition of a normative notion by identification with a certain special descriptive notion, and 2) the restriction of that definition to persons.

In the case of the Paretian criterion, a Pareto efficient state is one that is a vector maximum of individual welfares: no person’s welfare can be increased without decreasing the welfare of another person. The normative notion of a person’s welfare is defined by identifying it with the person’s preferences.

“The matter can be put somewhat formally by saying that a person’s welfare map is defined to be identical with his preference map—which indicates how he would choose between different situations, if he were given the

²⁵ Accounting correctly does not treat (unpurchased) goodwill (present value of future whole products) as a present asset but then it buys into the fundamental myth when goodwill is said to be “purchased” by then booking it as an asset. But some accountants have correctly argued that “purchased goodwill” is only an “anticipation,” not a property right, and thus that it should be booked as a charge to equity to be replaced if and when the future whole products are appropriated, *i.e.*, when the anticipated future earnings are realized. “The amount assigned to purchased goodwill represents a disbursement of existing resources, or of proceeds of stock issued to effect the business combination, in anticipation of future earnings. The expenditure should be accounted for as a reduction of stockholders’ equity.” [Catlett/Olson-1968, p. 106]

opportunity for choice. To say that his welfare would be higher in A than in B is thus no more than to say that he would choose A rather than B, if he were allowed to make the choice”²⁶.

Secondly this type of identification is restricted to persons even though one can define the (revealed) preference map of rats, insects, and other animals and perhaps even for inanimate objects.

In the normative theory of appropriation of assets and liabilities, the task is to define the normative (de jure or legal) notion of responsibility for the imputation of the assets and liabilities. The first methodological principle would define that de jure responsibility in terms of de facto or factual responsibility. And by the second principle, the definition would be restricted to persons—as in fact the law does.

There is an old literary metaphor (a version of the pathetic fallacy) where natural forces are pictured as being “responsible” for certain consequences. Economists sometimes indulge these picturesque images as when an asset is imagined as producing a product (*e.g.*, some versions of the fundamental myth) or when natural forces and human actions are coupled together as if both were de facto responsible. “Together, the man and shovel can dig my cellar” and “land and labor together produce the corn harvest”²⁷. However since the demise of primitive animism, the law has only recognized persons as being capable of being responsible. The responsibility for the results of using tools or assets is imputed back through the things to the human users. For instance, a description without the pathetic fallacy would be that a man is responsible both for using up the services of a shovel and for thereby digging a cellar (note the positive and negative side of responsibility)—or that labor uses up the services of land in the production of the corn harvest.

There is certain ambivalence, if not incoherence, in conventional economics about the treatment of human preferences on the one hand and the human actions that express those preferences on the other hand. Human preferences are singled out over the revealed preferences of animals and things for special treatment in normative economics. Anyone who defined Pareto efficiency using a vector ordering that included the (revealed) preferences of shoes, ships, sealing-wax, and cabbages as well as persons would be considered somewhat daft. Yet the standard practice in economics is to list the services of things and animals along side responsible human actions in an undifferentiated list of “inputs” as in the generic production function $y = f(x_1, x_2, \dots, x_n)$. Any prosecutor who hauled the instruments of a crime into court along with the alleged perpetrator and charged them all with the crime—would also be considered somewhat odd or perhaps as having taken too many economics courses. In any case, the responsibility principle in jurisprudence singles out persons as being the sole source of responsibility, and that is the legal theory modeled here.

After the Paretian criterion of efficiency, normative economics faces a fork in the road. One path is welfare economics, and that is the path usually taken. For instance, one standard path beyond the Paretian criterion is to use the Kaldor-

²⁶ Graff-1967, p. 5.

²⁷ Samuelson-1976, pp. 536-537.

Hicks criterion (a potential Pareto improvement where the gainers could but don't necessarily compensate the losers) to modernize the Marshall-Pigou tradition of welfare economics. A proposed social change satisfying the KH criterion is parsed into an increase in a monetized social pie ("social wealth") and a redistribution of the pie. The welfare economist can supposedly recommend the increase in "social wealth" as an increase in "efficiency" while the redistributive part of the change is a separate question of "equity" outside of the bailiwick of the professional economist. This methodology is the basis for the standard economic treatment of the law (Chicago wealth-maximization school of law and economics) and for cost-benefit analysis.

However, the author [2004] has elsewhere shown that this attempt to travel the road beyond the Paretian criterion in the direction of welfare economics falls apart under a simple numeraire-reversing redescription of the proposed change. That redescription of exactly the same proposed change reverses the "efficiency" part and the "equity" part of the Marshall-Pigou-Kaldor-Hicks analysis—so any "professional" economic policy recommendations based solely on that faulty logic would also be reversed²⁸.

The alternative and less traveled road beyond the Paretian criterion is a rights-based theory that takes seriously the incommensurability of individuals and that eschews any notion of social welfare. The normative property theory developed here uses the "Paretian" methodology (as explained above) and then takes the rights-based path.

6.2. Rights-Based Normative Economics

The normative property theory developed here moves beyond the Paretian criterion by applying the same methodology outlined above to other attributes of human subjects that just preferences. As noted, the responsibility principle applies the same methodology to responsibility; the normative notion of responsibility is to be identified with de facto responsibility of persons²⁹.

If the responsibility principle governs the appropriation of assets and liabilities—the beginning and end points in the life cycle of a property right—then what is the principle to govern the transfers in between? The same methodology yields the obvious solution, the principle of consent. The legally permitted transfers in property rights of a person are to be those that have the subjective permission or consent of the owner. "Consent is the moral component that

²⁸ There is another path to welfare economics, namely the postulation of a given "social welfare function" in the Bergson-Samuelson tradition but the only agreed-upon properties are those already implicit in the Pareto criterion. Thus it is unclear how it is an "advance" aside from the postulation.

²⁹ "[This] is itself a principle about natural responsibility, and so, as a guide for adjudication, unites adjudication and private morality and permits the claim that a decision in a hard case, assigning responsibility to some party, simply recognizes that party's moral responsibility." [Dworkin-1985, p. 288]

distinguishes valid from invalid transfers of alienable rights”³⁰.

With the consent principle in hand, the Paretian criterion of efficiency can now be reinterpreted in the rights-based approach. In the context of social welfare economics, the Paretian conditions are interpreted as necessary conditions for a maximum (“bliss point”) of social welfare. Since a rights-based approach would have no notion of an a priori given social scalar quantity that morally ought to be maximized (“social welfare”), it is important to give a rights-based rendition of Pareto efficiency. Sometimes writers in welfare economics seem to only consider individual welfare as only having any moral weight as it applies to one’s “own affairs.” Preference spillovers to other people’s affairs are not treated as having the same moral weight. In any case, such preference externalities are ruled out when the notion of Pareto efficiency is put to work in the fundamental theorem about the Pareto efficiency of a competitive equilibrium.

On a rights-based approach, the tendency to give more weight to preferences about one’s own affairs is a hidden reference to the domain of one’s rights. Preferences are realized by consent to changes that affect one’s rights, and spillover preferences about the affairs of others are outside of one’s rightful sphere of consent. Thus a rights-based rendition of Paretian efficiency is that an allocation of rights is efficient if there are no mutually voluntary reallocations of rights that are desired by anyone. Assuming that a person would not consent to a reallocation that made the person worse off, then this rights-based notion would agree with the usual Paretian notion in the absence of preference spillovers.

Property theory as modeled here is about the appropriation and transfers of property in production and consumption in an on-going market economy. The theory is silent on any initial endowment of property rights. The Lockean idea that one should appropriate the fruits of one’s labor applied to the commons is an application of the responsibility principle. But one’s labor also had the negative fruits of using up some portion of the commons and the same principle implies that one ought to hold that liability. The question of endowment is about to whom that liability for using up the fruits of nature should be owed. Is it “society” as organized in the state? Is it some version of past, present, and future humanity? Is it humanity in one’s own person so that no external liability is owed? The normative theory given here does not specify an endowment point; it simply assumes one so that we may model the appropriations and transfers in the normal production and consumption activities of a private property market economy.

By the consent principle, the normatively permitted transfers of property right between parties³¹ are the transfers voluntarily agreed to by the parties. Usually this consent would take the form of reciprocal conditional-consent or *contract*: “I consent to transfer X to you if you transfer Y to me” on the one side with the complementary conditional consent on the other side: “I consent to transfer Y to you if you transfer X to me.” A legal system accepting this consent

³⁰ Barnett-1986, p. 270.

³¹ A “party” is here a person or a set of persons who have joint ownership of a property right.

definition of which transfers are to be made would then try to have all and only those transfers—the legal contracts—made.

There are exactly two ways this might go wrong: 1) if a property transfer was made without any voluntary contract, which will be called a “property externality” or simply an *externality*, or 2) if a contract was not fulfilled by the actual transfers, namely, a *breach*. For instance, a legal system would typically not accept that a contract has been made until one side delivered, *e.g.*, X was delivered from one party to the other. If Y was not delivered in the opposite direction, then the condition on the conditional transfer of X was not fulfilled, so that transfer of X without consent constitutes the rights violation or breach of the contract by the non-delivery of Y.

In this simple model of the property system, the legal system has two normative tasks: to implement the responsibility principle in the production and consumption activities of the parties, and to implement the consent principle in mutually voluntary transfers between parties. The responsibility principle is concerned with the internal activities of the parties whereas the transfer contracts deal with the external relationships between parties. But in a market system, the two tasks are related. The key result, the fundamental theorem, is that if the legal authorities just ensure that the contractual machinery works correctly in the external relationships between parties—no externalities and no breaches—then the market mechanism of appropriation will indeed satisfy the responsibility principle in the internal activities of the parties.

It is useful to put historical tags on the external condition about transfers and on the internal condition about appropriation. The conditions on transfer—no externalities and no breaches—will be called “Hume’s conditions” because of his emphasis on “*transference by consent, and of the performance of promises*”³². The responsibility principle concerning appropriation will be called “Locke’s principle”³³. The fundamental theorem then takes the form: “Hume implies Locke.”

7. The Fundamental Theorem for the Property Mechanism of the Market

Our task is to give the correctness theorem for the market mechanism of appropriation—to show that if the market contractual mechanism works correctly (no breaches or externalities), then the imputation mechanism operates correctly in terms of the responsibility principle. Each party has a certain set of commodities (goods and services) within the party’s possession and control which we might call

³² Hume-1978 (1739), Book III, Part II, Section VI, p. 526.

³³ These historical tags are not intended as an explication of Hume’s or Locke’s thought. Indeed, I have argued elsewhere [1992] that Locke’s theory was quite ambiguous and that he might not be a “Lockean” in the sense of adhering to the responsibility principle.

the party's *possessions*.

In the one-period individual consumption problem of maximizing utility $U(x_1, \dots, x_n)$ subject to a budget constraint $p_1x_1 + \dots + p_nx_n = B$, there are several (often implicit) assumptions that relate the x_i 's that occur in the utility function to those that occur in the budget constraint. If five pounds of meat are purchased but then accidentally spoil, then the same five pounds will not appear in the utility function representing consumption. Or there might be vicarious consumption of commodities in some other party's possession. Both these possibilities are ruled out in the optimality theorem for the price mechanism (i.e., that a competitive equilibrium is Pareto optimal), and we must make similar assumptions about the property mechanism.

This motivates the set of assumptions that relates the party's de facto responsible actions to the internal changes³⁴ in a party's possessions. Just as it is conventionally assumed that consumer goods do not accidentally spoil or get destroyed but are deliberately consumed, so we must rule out accidents by assuming that the internal changes in a party's possessions are made by the party's de facto responsible actions. And the analogy of "no vicarious consumption" is the locality or no-action-at-a-distance principle that de facto responsible action can only operate on commodities in the party's possession or control (i.e., responsibility implies causality). By these no-accident and locality assumptions, the positive and negative results of a party's de facto responsible actions are exactly equal to the internal changes in the party's possessions. We could abbreviate this as:

"de facto responsibility = internal changes in possessions."

Now we turn to the legal system's task of enforcing the rules about the external changes, the changes due to transfers with other parties. In the consumption example, the purchased x_i 's that appear in the budget constraint might not be delivered (a breached purchase contract), and there might be some commodities "delivered" from another party which were not purchased as in an externality (e.g., a theft or conversion). The enforcement of Hume's no-breach and no-externality conditions means that the external changes in each party's possessions are precisely those made by the legal contracts with other parties. When the same commodity is bought and sold by a party (and transferred in and out), then it nets out so the external changes (always in net terms) in a party's possessions are those indicated by the first-sale and last-purchase contracts (netting out pure transfer contracts). We could abbreviate the enforcement of the no-breach and no-externality rules as:

"external changes in possessions = first-sale and last-purchase contracts."

³⁴ These "internal changes" are as "trades with Nature" as opposed to trades with other parties.

We previously saw that in the market mechanism of appropriation, the invisible judge imputes legal responsibility according to the first-sale and last-purchase contracts. We could abbreviate this mechanism as:

“legal responsibility = first-sale and last-purchase contracts.”

To complete the theorem, it only remains to note the mathematical result that: “internal changes in possessions = external changes in possessions.” In graph theory, this is the “divergence principle”³⁵ which is the discrete version of the fundamental theorem of calculus and its various higher dimensional generalizations such as the divergence theorem. For an intuitive picture, think of a fluid flowing into and out of a closed region in the plane. Fluid is also coming out of sources inside the region with a sink counting as a negative source. The divergence principle is that the net amount flowing out across the boundary of the regions (external changes) equals the net amount flowing out of the sources within the region (internal changes)³⁶:

“internal changes in possessions = external changes in possessions.”

Under the assumptions, we may put all the parts together to have the:

Fundamental theorem for the property mechanism (“Hume implies Locke”):

If there are no breaches and no externalities in the market contractual mechanism of transfers, then the market mechanism of appropriation imputes legal responsibility in accordance with de facto responsibility, i.e., operates correctly in terms of the responsibility principle.

Proof:

Legal responsibility =	(by the market mechanism of appropriation)
first-sale and last-purchase contracts =	(by enforcing no-externality and no-breach rules)
external changes in possessions =	(by divergence principle)
internal changes in possessions =	(by no-accident and locality assumptions)
de facto responsibility ³⁷ .	

Enforce the contractual rules between the parties and then the invisible judge will make the right imputations to the parties. In the contrapositive form (Not-Locke implies Not-Hume), the theorem states that if there was a misimputation by the

³⁵ Rockafellar-1984, p. 55

³⁶ The one-dimensional continuous version is the fundamental theorem of calculus. For example, consider a one-dimensional “tube” from point a to point b along the x -axis with the amount of the flow in tube at point x given by $F(x)$. At each point between a and b , there is a flow source of strength $F'(x) = dF/dx$ so by the divergence principle, the sum (integral) of all the sources within the region or interval from a to b is equal to the out-flow minus the in-flow to the tube.

³⁷ The proof is easily formalized using vector flows on graphs.

invisible judge, then it would have to show up publicly as a property externality or a breached contract. This is the property-theoretic refutation of Marx's charge that there could be exploitation in the "hidden abode of production" while the sphere of exchange "is in fact a very Eden of the innate rights of man"³⁸. Marx's cleverness ran afoul of the cunning of the divergence principle.

Some of the descriptive implications this theory of property for economics were outlined above along with the fundamental theorem, but the other normative implications would carry us well beyond the scope of the present paper³⁹.

³⁸ Marx-1967 (1867), p.176.

³⁹ Ellerman-1992.

References

- Barnett, R. (1986)** A Consent Theory of Contract. *Columbia Law Review*. Vol. 86, n°2, pp. 269-321.
- Barzel, Y. (1989)** *Economic Analysis of Property Rights*. New York: Cambridge University Press.
- Catlett, G. & N. Olson (1968)** *ARS No.10: Accounting for Goodwill*. New York: American Institute of Certified Public Accountants.
- Coase, R. (1960)** The Problem of Social Cost. *Journal of Law and Economics*. Vol. 3, pp. 1-44.
- Cooter, R. & T. Ulen (2004)** *Law and Economics*. Fourth ed. Boston: Pearson Addison-Wesley.
- Demsetz, H. (1967)** Toward a Theory of Property Rights. *American Economic Review*. Vol. 57 (May 1967), pp. 347-359.
- Dworkin, R. (1985)** *A Matter of Principle*. Cambridge: Harvard University Press.
- Ellerman, D. (1992)** *Property & Contract in Economics: The Case for Economic Democracy*. Cambridge: Blackwell. [Out-of-print with rights reverted to the author so the full text is available at: www.ellerman.org]
- Ellerman, D. (2004)** *On a Difficulty in Welfare Economics: The Reversibility of the "Efficiency" and "Equity" Distinction in the Marshall-Pigou-Kaldor-Hicks Tradition of Non-Paretian Welfare Economics*. Working paper. 35 pages. See: www.ellerman.org
- Furubotn, E. & S. Pejovich, Eds. (1974)** *The Economics of Property Rights*. Cambridge: Ballinger Publishing Company.
- Furubotn, E. & R. Richter (1998)** *Institutions and Economic Theory: The Contributions of the New Institutional Economics*. Ann Arbor: University of Michigan.
- Gierke, O. von (1958)** *Political Theories of the Middle Age*. Trans. F. W. Maitland. Boston: Beacon Press.
- Graff, J. de V. (1967)** *Theoretical Welfare Economics*. Cambridge: Cambridge University Press.
- Hart, O. & J. Moore (1990)** Property Rights and the Nature of the Firm. *Journal of Political Economy*. 98: 1119-59.
- Holmstrom, B. & J. Tirole (1989)** The Theory of the Firm. In *Handbook of Industrial Organization Vol. I*. R. Schmalensee and R. Willig Eds. Amsterdam, North-Holland, pp. 61-133.
- Hume, D. 1978 (1739)**. *A Treatise of Human Nature*. Oxford: Oxford University Press.
- Keynes, J. M. (1936)** *The General Theory of Employment, Interest, and Money*. New York: Harcourt, Brace & World.

Locke, J. 1960 (Orig. 1690). *Two Treatises of Government*. New York: New American Library.

Marx, K. 1967 (1867). *Capital: A Critique of Political Economy. Volume I*. S. Moore and E. Aveling trans. New York: International Publishers.

Menger, A. (1899) *The Right to the Whole Produce of Labour: The Origin and Development of the Theory of Labour's Claim to the Whole Product of Industry*. Trans. M.E. Tanner. Intro. by Herbert S. Foxwell. London: Macmillan and Co (Reprinted by Augustus Kelley).

Miceli, T. J. (1999) Property. In *The Elgar Companion to Law and Economics*. Ed. by J. Backhaus. Cheltenham UK: Edward Elgar, pp. 121-35.

Miller, M. H. & F. Modigliani (1961) Dividend Policy, Growth, and the Valuation of Shares. *The Journal of Business*. 34 (October 1961), pp. 411-433.

Montias, J. M. (1976) *The Structure of Economic Systems*. New Haven: Yale University Press.

Putterman, L. (1996) Ownership and the nature of the firm. In *The Economic Nature of the Firm*. L. Putterman and R. Kroszner Eds. Cambridge, Cambridge University Press, pp. 361-369.

Putterman, L. & R. S. Kroszner, Eds. (1996) *The Economic Nature of the Firm*. 2nd edition. Cambridge: Cambridge University Press.

Rockafellar, R.T. (1984) *Network Flows and Monotropic Optimization*. New York: John Wiley & Sons.

Umbeck, J. (1981) Might Makes Right: A Theory of the Formation and Initial Distribution of Property Rights. *Economic Inquiry*. Vol. 19 n°1, pp. 38-59.