Title: Distinguishing ownership of resource flows from ownership of resource stocks clarifies debates about property bundles, resource overuse, and degrowth

Author: Tilman HARTLEY

Email: tilmanhartley@protonmail.com

For presentation at WINIR September 2017, Utrecht.

Abstract

Every discipline within the humanities and the social sciences has been host to debates about how ownership should be conceptualised. This provides richness, but also the potential for confusion. My main aim in this paper, then, is to trace the commonalities between the debates, helping to identify areas where one body of theory corresponds with the work of scholars in different disciplines, and to see where lacunas in one disciplinary debate might be filled by work done in others. A secondary aim is to argue that many longstanding debates about ownership are simply due to a neglect of the distinction between ownership of resource stocks and ownership of resource flows. The 'tragedy of the commons' thesis, for example, conflates the absence of stock ownership with the absence of flow ownership. Moreover, several commons scholars have started to move away from the 'bundle of rights' conception of ownership that assumes the paradigm of ownership to be of resource stocks. Similarly, recasting Heinsohn and Steiger's theory of interest in terms of flow ownership answers criticism that their theory cannot account for unsecured loans, and places greater focus on what motivates the transfer of resource flows.

Table 1: Classic two-by-two table categorising resource ownership institution by binaries of excludability and rivalry

	Excludable	Non-excludable
Rival	Private	Common
Nonrival	Club	Public

Resources are rival if one person's use increases the costs for other users, that is, if there is a marginal cost for providing it to each marginal user; nonrival resources are where marginal costs are zero (Farley 2012: 47-49). Excludability is often represented as a binary, but has more recently been argued to be more of a continuum depending either on how easy it is to exclude people or how many people are actually excluded (McKean 2000: 30, 36, Daly and Farley 2011: 73, Ostrom 2005).

1 Introduction

Ownership institutions are a fundamental link between the social and natural worlds and are central to ecological economic research, from the study of common pool resources to the allocation of tradeable rights to ecosystem services. Ecological economists have long emphasised the important difference between fund-services and stock-flow resources (Georgescu-Roegen 1971, Daly and Farley 2011: 71-73, Farley 2012: 45-50), a distinction that informs the categorisation of the private, public, common, and club ownership of goods (Ostrom 2005). However, the further distinction between the ownership of resource stocks, such as land, and ownership of resource flows, such as the harvest from that land, has long been neglected. In the classic analysis of ownership institutions, resource flows are, at best, identified as rival and excludable and so classified as 'privately owned'. But such a classification completely obscures the fundamental differences between individuals retaining the flows that they obtain, or transferring resources according to communal, command, or titled property institutions that enforce the transfer of ownership to others in the community, to those of higher status, or to those with legal title to those resources. In this paper, I argue how neglect of the fundamental distinction between ownership of stocks and ownership of flows lies behind debates about the conception of ownership as a 'bundle of rights', about the causes of resource depletion, and about the consequences of economic degrowth.

I begin in the next section, by setting out the distinction between fund-

services, resource stocks, and resource flows. In Section 3 I outline the debate among legal scholars about whether property can be conceived as a 'bundle of rights'. I suggest that though often left implicit, these debates tend to attempt to reduce all forms of ownership to ownership of resource stocks, particularly land, and that this results in neglect of the different institutions that govern resource flows. In Section 4, I suggest that theories of resource depletion inherited this assumption of land ownership as the paradigm form of ownership, and so similarly long neglected the distinction between stocks and flows. An illustrative example is the way in which Garrett Hardin's well-known 'tragedy of the commons' thesis mistakes the absence of rights to the stock of land for the absence of rights governing resource flows from it. I then note that the recent shift of some commons scholars, particularly those of the Bloomington School, towards a focus on individual actions implies a shift in their level of analysis away from collective ownership of stocks and towards individual rights to own flows. Similarly, in Section 5, I suggest that the 'property premium' theory of interest, of growing importance in the degrowth debate, similarly takes resource stocks as the paradigm form of ownership in the attempt to justify interest payments in terms of the recompense for no longer being able to use a resource stock as collateral. However, this theory has been criticised for being unable to account for interest on uncollateralised loans. Recasting the theory in terms of ownership of resource flows suggests that payment of interest motivates lenders to transfer their resources simply on the expectation of receiving more resources in return, whether or not the debtor has stock to collateralise. In section 6 I outline the implications of this analysis for the degrowth debate, in particular, the question of what changes are likely to the institutions that govern the ownership of resource flows in a nongrowing economy.

2 Fund-services, resource stocks, and resources flows

Different resources have different characteristics. A fundamental distinction has been made by ecological economists between stock-flow resources that are physically consumed by their use, and fund-service resources which are used without their physical consumption (Georgescu-Roegen 1971, Daly and

Farley 2011: 71-73, Farley 2012: 45-50). Fund-services are a specific configuration of resources; a car, for instance, is a specific configuration of glass, metal, plastic, and rubber. Though they may be worn out a little, fund-services are not physically transformed by their use, and there is a limit to the rate at which they can be used; a car, for example, cannot be used to carry more people than it can physically contain. Fund-services may be costly to provide initially, but since they are not transformed by their use, they can provide benefits to many different people.

Stock-flow resources are physically transformed by their use, for example when a tree is transformed into ash, heat, and smoke by combustion. Because they are physically transformed by their use, stock-flow resources are used up in the act of production; in economic jargon, they are said to be subtractable and depletable. The rate at which stock-flow resources are used is not determined by their physical characteristics: a forest can be cut down very quickly, or can be harvested at a very slow rate. Analogous to the relationship between capital and income, a resource stock can output resource flows but if the flow is at too high a rate for the stock to be replenished then it will be depleted. Of course, a thing used primarily as a stock may also be used for its fund-service aspects: a stock such as a lake may provide the opportunity for swimming as well as a flow of drinking water from it. And a fund-service resource can be converted into a stock-flow resource if it is used, not for the services provided by its configuration, but by transforming the physical materials that the resource provides, for example when the material from a car is reused as a stock-flow resource in a scrap yard, with the rubber and plastic even burnable as fuel (Daly and Farley 2011: 71-73, Farley 2012: 45-50).

Crucially, there is also an important distinction between the stock and the flow of a stock-flow resource. Whilst stocks output resource flows, flows themselves do not have any outputs. So no matter how large a quantity of resource flow such as meat or bread, it does not consitute a resource stock since it is not capable of producing further resource flows, whereas a pasture of grazing animals or a field of wheat does constitute a stock resource since it produces a flow of outputs.

According to the classic two-by-two table, resource flows are privately owned since their use is inherently rival and everyone except the user is excluded. This is perhaps most obvious in the case of resources used for their energy:

Table 2: Flows, stocks, and fund-services

	Output a constituent part?	Transformed by use?
Flow	-	Yes, often even consumed
Stock	Yes	Maybe, if overextracted
Fund-service	No	No, but may become worn

Flows are the output from stock resources and are transformed during their use. Stocks may be depleted by over-extraction because the ouput flows are a constituent part of them. Outputs from fund-services are not a constituent part of fund-services and so, though they may become worn, fund-services are not transformed or depleted in the course of their use. (Adapted from Daly and Farley 2011: 71-73, Farley 2012: 45-50).

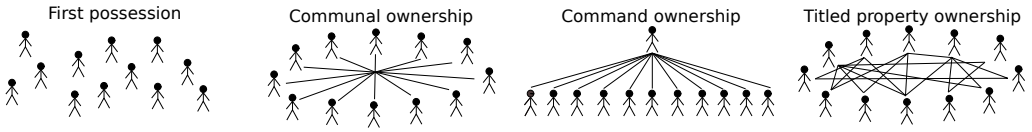
when somebody eats an apple, nobody else can eat it and everybody is forever prevented from eating it ever again. But to simply classify all resource flows as 'privately owned' obscures the fundamentally different kinds of rules that actually govern who is entitled to use such resource flows. Four kinds of rules governing resource flows are readily identifiable. The first of these, first possession[1] is where resource flows are retained by their possessor; under communal ownership each community member is entitled to acquire flows from others in the group; under command ownership resources flow to those of higher status; and under titled property ownership flows are transferred to whomever holds a legal title to them. To classify these very different ownership institutions merely as 'private ownership' obscures these fundamental differences between them.

3 Bundles of rights

Ownership of resource stocks, particularly land, has long been taken to be the paradigm form of ownership. Dating from the Middle Ages the most

[1]My use of the term 'first possession' here is consistent with others across various disciplines (for example, Rose 1985, Lueck 1995, 1998, Libecap 2007, Kanngiesser et al. 2015) and should not be confused with Heinsohn and Steiger's usage of the term 'possession' to mean 'nonproperty', which for them includes communal and command ownership institutions. Similarly, I use the term 'titled property' where Heinsohn and Steiger use 'property'; this helps to avoid confusion with those who use the term 'property' without Heinsohn and Steiger's specific connotation, discussed below.

Figure 1: First possession, communal, command, and titled property ownership: four institutions governing resource flows



First possession, typical of many nonhuman animal species, is where resource flows are retained by their first possessor. Communal ownership, typical among hunter-gatherers, is where each community member is entitled to acquire flows obtained by others in the group. Command ownership, for example in societies with slavery or serfdom, allocates resource flows to those of higher status. Titled property ownership transfers flows according to whomever holds a legal title to them. (Adapted from Heinsohn and Steiger 2008: 190-191).

usual and simplest form of ownership in the English legal system had been that of fee simple absolute, whereby the king or queen granted an owner dominion over some piece of land as a kind of delegated sovereignty. Then, the word 'property' referred to some thing, typically land but sometimes some other form of tangible object, owned by an individual (Klein and Robinson 2011: 193-194). This view of ownership has been described in many ways (Honore 1961: 107, 147, Underkuffler 2003: 12, Katz 2008: 275, 281, Singer 2008, Klein and Robinson 2011: 194), often with reference to the famous description by eighteenth century legal scholar William Blackstone of property as "the sole and despotic dominion which one man claims and exercises over the external things of this world, in total exclusion of the rights of any other in the universe" – though those who quote him sometimes omit to mention that Blackstone immediately suggests that nothing has actually ever been owned in such an absolute manner (Blackstone 1765–1769: 2.1).

Indeed, by the end of the nineteenth century, the idea that ownership could be conceived of as absolute 'dominion' began to be ever more criticised. In its place, the notion that ownership should instead be better understood as a 'bundle of rights' became popular amongst scholars following the English common law tradition, with this 'bundle' a metaphor for the multiple rights specifying what the owner of a thing was allowed to do with it. This change in the understanding of the concept was provoked by the practical problem that the 'dominion' conception of ownership was not very useful for explaining how numerous different people could have rights to a single piece of land. In

reality, rather than a piece of land being used only by a single owner, in many cases all or part of the land could be leased for a certain length of time, whilst licences could grant access only to certain parts of it, and many other varied permissions and easements could give other people one or more rights to it. This was troublesome for the 'dominion' view of ownership, but ownership conceived as a 'bundle of rights' allowed a much clearer explanation of how such rights could be unbundled and how different rights to the same object could be held by different people (Klein and Robinson 2011). There were also other benefits of the view that ownership could be conceived as a 'bundle of rights', with one early and influential contributor, Wesley Newcomb Hohfeld, making much of the distinction between *in rem* rights held by a person with respect to a thing and *in personam* rights held by a person with respect to another person (Hohfeld 1913: 16, 1917: 710). With ownership no longer conceived as being the absolute ownership by an individual of a thing but as a 'bundle of rights' held by various different people, Hohfeld argued that it made sense to view ownership as rights held with respect to other people, and not as the relation between a person and an object. Nevertheless, the underlying assumption that the paradigm case of ownership is real estate has remained strong. Indeed, underlying the 'bundle of rights' view there remains a conception that ownership of resource stocks such as land is the paradigm case of ownership, with the 'bundle' defined in terms of the different rights that individuals have to that stock. As Carol Rose puts it, for modern legal scholars, "'property unmodified' still means land" (Rose 1998: 614).

Around the end of the twentieth century, however, some theorists began to express dissatisfaction with the 'bundle of rights' view on the grounds that it turned ownership into a set of possible social relations, and so failed to distinguish ownership from any other kinds of rights. Scholars such as James Penner (1997), Richard Pipes (1999), and Larissa Katz (2008) made various attempts to resurrect the notion of ownership rights in terms of *in rem* rights held over an object. An earlier argument by Robert Ellickson had suggested that any position which took ownership to be an *in rem* right over an object could easily be translated into a set of *in personam* rights with regard to other people (Ellickson 1991: 115, 1993: 1315, 1362-1363). In this manner, *in rem* rights began to be interpreted as rights "against the world" in which by default the rights granted by ownership were considered to amount to a complete bundle of rights which prevent everyone other than the owner from doing anything whatsoever with that thing. An alternative

to the attempts at resuscitating the *in rem* view was the approach proposed by scholars such as Carol Rose (1994, 1998), and Gregory Alexander (1997), who argued that these problems could be remedied by amalgamating the two opposing views into a position whereby ownership is seen as a relation both between people and with respect to things; that this approach became the orthodoxy is nicely illustrated by the fact that the American Law Institute came to define 'property' as "legal relations between persons with respect to ... things" (quoted in Underkuffler 2003: 12). In support of this approach, Gregory Alexander found that very few theorists had ever actually held solely *in personam* or *in rem* views, as most found it necessary to include both relations between people and relations between owners and objects in their accounts (Alexander 1997). Similarly, John Meyer recently noted that the attempts by legal theorist Thomas Grey and environmental philosopher Gary Varner to articulate a non-absolute conception of ownership were hampered by their historically inaccurate assumption that things had, once, been owned absolutely (Meyer 2009: 112-116).

However, whilst arguably applying to resource stocks like land, the conclusion that nothing has ever been owned absolutely certainly does not apply to resource flows, which are transformed or even consumed by the person using them. After all, when the use of an object by its owner entails its destruction, the exercise by an owner of their right to use such a resource really does represent a Blackstonian right 'over the external things of this world, in total exclusion of the rights of any other in the universe'. When somebody eats an apple or a fish, or burns a piece of wood or lump of coal, then every other person is forever prevented from ever making any use of that thing ever again. So the 'bundle' view can be seen as an attempt to account for the multiplicity of rights to use resource flows and to use the fund-service aspects of a resource, by interpreting these rights as a collection of all the different rights that may be held in relation to the assumed paradigm: ownership of some stock of land. In some circumstances this may be an adequate approximation. But, I suggest, for ecological economists the result has been neglect of the different ways in which individuals acquire rights to resource flows, and confusion over the causes of resource overuse and the consequences of degrowth.

4 Overuse tragedies

Commons scholars initially inherited the assumption that the paradigm form of ownership was of a resource such as land, with commons typically described in terms of the co-ownership of resource stocks. A useful illustration of the kinds of problem that results from neglect of the distinction between stocks and flows is the confusion that surrounds theories of ownership and resource depletion. The most infamous of these, the so-called 'tragedy of the commons' thesis advanced as a general argument by Garrett Hardin in 1968, places private ownership of stocks in sharp distinction with common ownership of stocks, and asserts that common ownership results in the overuse of resources, concluding that the only two ways to prevent overuse are either state or private ownership (Hardin 1968). Despite the article's popularity, it has been widely criticised for lacking clarity over terminology and for being unable to account for the many successful commons found throughout the world; George Appell concisely summarises critics by describing the thesis as "conceptually flawed and empirically wrong" (Appell 1993: 5), and Hardin himself eventually acknowledged that he had mistitled the phenomenon he had described (Hardin 1991). But the confusion is not due to a simple mix up in terminology: the real cause is neglect of the crucial difference between ownership of stocks and of flows. Under a commons regime different users hold ownership rights to extract resource flows, yet it may be that nobody asserts any claim to own the resource stock at all. To borrow Helmut Haberl's phrase, though we may often speak in terms of land ownership, what such commoners actually own is "not land but rather its function for biomass production" (Haberl 2015: 424). If the rights to appropriate the flow from the stock are unregulated then overuse is a likely outcome. Irrespective of the status of the ownership or nonownership of the stock, in reality resource stocks have been maintained without risk of depletion, often for centuries, provided that the ownership of flows is adequately governed (Hoskins and Stamp 1963, Ostrom 1990, Cole and Ostrom 2010).

Nevertheless, commons scholars have long engaged in analysis in terms of collective ownership of resource stocks. For example, ecological economists still refer to S. V. Ciriacy-Wantrup and Richard Bishop's classic definition of common property as the "distribution of property rights in resources in which a number of owners are co-equal in their rights *to use* the resource" (Ciriacy-Wantrup and Bishop 1975: 714, emphasis in the original, cited in

Calvo-Mendieta et al. 2017). However, though some scholars have continued to usefully analyse commons institutions in terms of collective ownership of resource stocks (McKean 2000, Calvo-Mendieta et al. 2017), others have begun to move away from this conception of the ownership rights of commoners as a kind of fragmented ownership of a resource stock, instead theorising ownership of commons in terms of the actions that individual commoners have a right to take (Ostrom 2005, 2011, McGinnis 2011)[2]. This framework, however, remains couched in terms of rights to perform actions regarding a resource stock. Again, whilst for many purposes this will often be adequate, for theorists of depletion and of degrowth it seems important to at least distinguish between ownership of stocks, of their flows, and of their fund-service aspects.

5 The 'property premium' theory of interest

Economists Gunnar Heinsohn and Otto Steiger similarly suggest that excessive emphasis has been placed on the "traditional dichotomy" between individual and collective ownership, and instead argue that increased attention should be paid to the more fundamental difference between merely possessing a resource and having a legal property title to that resource (Steiger 2006: 184). The mere possession of resources, they argue, at most entails the right to physically use those resources, whereas 'property' consists of the creation of legal titles which allow the holder of those titles to burden assets when creating credit and to encumber them as collateral for securing loans (Steiger 2006, Heinsohn and Steiger 2008, 2013). They conceive resources in terms of stocks capable of generating returns, and theorise that interest payments are compensation for the loss of the ability to burden and collateralise those stocks.

According to Heinsohn and Steiger, whenever a legal title to property is created, there is simultaneously created a 'property premium' which consists of "the potential to burden assets to create and loan money or to borrow

[2]Compare to Ronald Coase's suggestion that "We may speak of a person owning land and using it as a factor of production but what the land-owner in fact possesses is the right to carry out a circumscribed list of actions" (Coase 1960: 44).

it" (Heinsohn and Steiger 2008: 194). For example, say that the legal title to some area of land is created and that land becomes the property of a given proprietor. Along with the creation of that title is the lawful ability to burden the land as an asset. This means that the proprietor of the land can create money-notes, which Heinsohn and Steiger call 'notified titles' to the property (Heinsohn and Steiger 2008: 192). The proprietor can use this money to acquire things through trade and will only be required to exchange something of actual value later, because the holder of the money effectively holds a 'notified title' to a portion of the proprietor's land, acting as a kind of guarantee that the proprietor will eventually complete the exchange with something of real value. The proprietor can also lend the money. Heinsohn and Steiger state that "the debtor too must burden assets" as collateral which will remain untouched by the creditor as long as "the borrower fulfils their obligations" (Heinsohn and Steiger 2008: 193). According to Heinsohn and Steiger, the borrower pays interest to compensate the proprietor for the loss of their property premium, that is, the loss of the proprieter's "potential to burden assets to create and loan money". This, they argue, is the answer to "economic theory's key question: *what is the loss that must be compensated by interest?*" (Heinsohn and Steiger 2008: 184, emphasis in original).

This key question has an intellectual history going back millennia. The Hebrews inherited from the ancient Mesopotamians a distinction between interest on consumption loans which was periodically forgiven and interest on commercial loans which was not (Lemche 1979, Hudson 2002). This tradition, along with Roman law and the philosophy of Aristotle, influenced the Church's distinction between a legitimate 'interest' charged as recompense for losses suffered by lenders making a loan and unlawful 'usury' which represented a charge merely for the use of a thing (Noonan 1957). In the terminology of this paper, if a loan is of a fund-service that is worn out a little by the borrower then the lender can legitimately ask to be paid for the loss they have suffered, but if the loan is of a resource flow which is consumed by use then it can only be repaid by replacing it or by paying the lender something of equivalent value. The logic of the Church, inherited from the early Roman *mutuum* loan contracts (Storck 2009: 449-450), was that since repayment of an amount that has been borrowed is consideration for precisely the amount that has been borrowed, any payment in excess of that principal can only be justified if it is compensation for some other loss suffered by the lender. In times where money would literally be put into storage if unused, the divi-

sion between 'interest' and 'usury' was in principle reasonably clear: had the lender not made the loan then the money would simply have stayed in their store cupboard, so as long as the debtor repaid the principal the lender had not suffered any loss. As early as the thirteenth century, however, an argument was being made that *lucrum cessans* or 'foregone profits' incurred by a creditor when making a loan should be recompensed by debtors as legitimate interest (Munro 2003: 511-512, Graeber 2011: 440). The eventual ubiquity of money markets ultimately meant that any interest-free loan would imply a loss to the lender, since money was no longer kept in store cupboards but invested, and in the absence of making the loan the lender could always have lent the money elsewhere and earned interest upon it. So a key task for economic theorists became to find some normative justification for the interest charged in those money markets. This is why Heinsohn and Steiger identify economic theory's key question to be 'what is the loss that must be compensated by interest?' Arguing against the neoclassical view that interest is payment for the temporary loss of goods as suggested by neoclassical economists, and against the Keynesian view that it is for the temporary loss of money, Heinsohn and Steiger's argument, set out above, is that the lender suffers the loss of the 'immaterial yield' from the 'property premium' that they have burdened (Steiger 2006: 184-185).

It is worth noting, since I have yet to find this stated in the literature, that Heinsohn and Steiger's account is a normative theory to justify the charging of interest, to the effect that interest is justifiable up to any rate that the market will bear. Since they argue that interest compensates a proprietor for the loss of their 'property premium' which consists of "the potential to burden assets to create and loan money", the next logical question to ask is: how much is this 'property premium' worth? Since the value of the property premium derives from the ability of the proprietor to create money to lend to others, its value derives from the ability of the proprietor to charge interest on the money they lend. So, if interest is paid to compensate a proprietor for the loss of their ability to create a sum of money, then the precise value of this loss is the interest that they would have been able to charge on loans of that money elsewhere. As such, the normative conclusion of their argument is fairly similar to the conclusion of the *lucrum cessans* argument eight centuries ago: that the precise value of interest that can legitimately be charged to one debtor is exactly equal to the value of interest that could legitimately be charged to another. That is: interest can be charged at whatever rate the

market will bear.

Moreover, critics have also raised empirical concerns with Heinsohn and Steiger's account, since in practice loans are often precured without collateral (Lau and Smithin 2002: 9, Strunz et al. 2015: 13). In an early account, Heinsohn suggests that in the case of uncollateralised loans the debtor's collateral is merely not specified since the "quality of assets belonging to him or her is beyond doubt" (Heinsohn and Steiger 2000: 83), but this argument could not explain the many examples of loans where collateral is totally unspecified, such as completely unsecured loans (Strunz et al. 2015: 13) and lending to businesses that hold negligible assets (Lau and Smithin 2002: 9). Later, both Heinsohn and Steiger acknowledge the existence of unsecured loans, noting their role in financial crises (Heinsohn and Steiger 2008: 217) and citing research from 1992 that 70 per cent of commercial and industrial lending in the US was secured (Steiger 2006: 204 n11). Of course, this figure implies that 30 percent of commercial and industrial lending was uncollateralised, to which can be added the many consumer, student, and other personal loans that are all unsecured. Moreover, Heinsohn and Steiger identify subsistence loans as an alternative to the social safety net provided in societies with communal and command ownership institutions (Heinsohn and Steiger 2008: 190-191), yet their assumption that all loans are collateralised somewhat obscures the fact that those without anything to collateralise are those most likely to procure subsistence loans in this way. It may be that Heinsohn and Steiger think all unsecured loans are to be considered deviant or illegitimate, but this would be a normative claim considerably stronger than their empirical statements that secured loans are "a fundamental necessity" in highly developed economies (Steiger 2006: 204 n11), or that insufficient collateral can lead to higher interest rates (Steiger 2006: 204 n13) and financial crises (Heinsohn and Steiger 2008: 217).

Consistent with the analysis in this paper, I interpret the underlying issue with Heinsohn and Steiger's account to be that their focus is the ownership of resource stocks, rather than of resource flows. Fundamentally, a creditor makes a loan of some resource in expectation of receiving a larger value of resources from the debtor in return – as Heinsohn and Steiger have themselves noted (Heinsohn and Steiger 2008: 190-191). Where the debtor can provide some collateral as a guarantee then this may reduce the risk that the debtor will default, but it does not change the fact that what the creditor hopes to acquire is a flow of income from the debtor. This explains the many

cases where lenders are satisfied that they are likely to receive their expected flow of income, even in the absence of any pledged collateral. After all, those who own no resource stocks can still acquire resource flows, whether in exchange for their labour or in the successful realisation of their business plans. Fundamentally, the right to future income flows is precisely the title that is acquired by a creditor in a loan agreement; what matters to a creditor is that they receive the flow of income for which they have contracted. So recasting titled property ownership in terms of entitlement to resource flows rather than as 'notified titles' to some fragment of resource stock not only serves as a response to the criticism that so many actual loans are unsecured, but also suggests that financial crises might usefully be understood less as the surfeit creation of unsecured money-notes and rather in terms of the overoptimistic expectations of lenders with regard to the future flows they are likely to receive. Though some lenders may sometimes want collateral to insure against default, this is far from universal. And indeed, even where some stock is collateralised, its collateralisable value depends upon its capacity to produce income flows. To paraphrase Thorstein Veblen,[3] ownership of the stock is only valuable at all to the extent that it entitles ownership of the income from it, and what determines the collateralisable value of some resource stock is the income that can be expected to flow from it.

The normative problem remains: what is the loss that must be compensated by interest? Despite the attention that has been paid to this key question, a persuasive answer remains elusive. It may, then, be appropriate to leave the search for a normative justification for interest for now, and to approach the issue in a more empirical way. Such empirical enquiry might begin with the question: why do debtors consent to pay interest, despite the fact that it is far from obvious that they receive any consideration in return, nor compensate the lender for any loss? An answer, suggested by Heinsohn and Steiger's work, is that whilst communal and command ownership institutions govern transfers between individuals through reciprocity and custom or status and coercion, under titled property institutions transfers are motivated by an expected return (Heinsohn and Steiger 2008: 190-191). Debtors consent to pay interest on loans because it is this payment that motivates a lender to lend to them in the first place; moreover, in the absence of a social safety net

[3]Veblen writes "the earning-capacity which in this way affords ground for the valuation of marketable capital ... is not its past or actual earning capacity, but its presumptive future earning capacity" (Veblen 1904: 152-153).

they may not have all that much choice. Perhaps some normative explanations can be constructed to justify those interest payments, though the fact remains that creditors and debtors have long engaged in these transfers even in the absence of any post hoc justification by economic theorists. In short, what matters for an empirical theory of interest is that debtors pay interest because otherwise creditors would not lend to them.

6 Consequences for the degrowth debate

Independently of their normative theory, Heinsohn and Steiger also advance an important argument that the interest that accrues upon loans is a key driver of an increase in economic activity. They write that "The demand for a rate of interest forces upon [the debtor] a value of production, expressed in terms of quantity, time, money or price, which must be greater than the money proper advanced as capital. This demand thus necessitates a value surplus in the production of commodities, the rate of *profit*" (Heinsohn and Steiger 2003: 511, emphasis in original). As ecological economists have long argued, the production of commodities requires a throughput of matter and energy flows, and though up to a point efficiency measures can increase outputs without increasing inputs, beyond that point any increase in production to service interest repayments must be accompanied by an increase in resource flows (Daly 1974, Daly 2013). The requirement to service interest payments beyond what is possible through efficiency measures implies a continual increase in the material throughput of resources. Aggregated across a non-shrinking population, the service of interest payments by increasing throughput implies exponential growth of the use of resources and the production of waste across the economy. Several ecological economists have recently contributed to the analysis to changes in ownership that might accompany degrowth (Steppacher and van Griethuysen 2008, van Griethuysen 2012, J.-F. Gerber and Steppacher 2017, J.-D. Gerber and J.-F. Gerber 2017). In light of the analysis presented above, I end this paper by contributing three important points to that debate.

The first point, consistent with Heinsohn and Steiger's argument, is that collective ownership does not necessarily imply the end of an imperative for growth: collectives can become indebted just as individuals can become

indebted, and the demand for interest payments on those collectively held loans would aggregate into an imperative for growth of the economy just as it would if the debts were held by individuals. For instance, Gerber and Gerber (2017) recently provided illuminating examples of collective non-property ownership such as cooperative housing, state forests, and municipal land. But it is important to emphasise that, to the extent that their argument follows Heinsohn and Steiger's work, these ownership institutions help to prevent commodification of the resources they govern, not due to the fact they are collectivised, but because none of the owners have used the resources to secure debt. To be clear: a relationship between collective ownership and the prevention of commodification may well exist, but any such relationship relies on a further explanation of how collectives either avoid or manage indebtedness in ways that individual owners do not. Moreover, collectives such as cooperatives, states, and municipalities do in fact frequently take on debt, and the resources governed by them may become commodities traded in order to provide the income flows with which to service that debt (see Sanchez Bajo 2011, Dove 2014, Kirkpatrick 2016 for example). So the relationship between ownership, commodification, and growth rests not on whether the owner is a collective or an individual, but on how owners avoid or manage debt.

A second point, diverging from Heinsohn and Steiger, is that since loans may be procured even without collateralisation, the incentive to repay interest-bearing debts is not exclusively due to the desire to avoid loss of collateralised resource stocks. These motivations include the desire to be considered creditworthy in the future and the desire to avoid paying further interest. The imperatives imposed upon debtors, which Steppacher and Pascal van Griethuysen insightfully identify and discuss in terms of solvency, profitability, and time pressure (Steppacher and van Griethuysen 2008, van Griethuysen 2012), might be stronger when defaulters are at risk of dispossession, but nevertheless remain present when debts are unsecured. The earlier that a debt is repaid, the less the debtor must pay. Indeed, a debtor's motivation to repay may be particularly acute when interest is compounded, as the exponential growth of compound interest can quickly accumulate into amounts many multiples of the original debt. Moreover, if the value of a debt is limited to the value of the resource stock that secures it, then debtors would actually be incentivised not to continue paying debts that had accumulated above the value of that collateral, and to simply surrender the collateral instead. So

though the pressures of avoiding dipossession of stocks and the processes of accumulation by dispossession of those stocks are undoubtedly an important features of the current economic system (van Griethuysen 2012, J.-F. Gerber 2014), they are an incomplete picture of the underlying motivations behind a growth imperative. Upon the analysis suggested in this paper, the characterisation of titled property in terms of resource flows which debtors are prepared to pay interest to borrow, rather than in terms of resource stocks that can be burdened and encumbered, provides a fuller picture of the motivation behind creditors lending to debtors both with and without collateral and of the diverse incentives that debtors have to repay the loan at interest. It is these motivations and incentives, aggregated across a non-shrinking population, that drives the imperative for economic growth.

Third, and perhaps most importantly for the degrowth debate, there remains the central issue of what the institutions of a society without a growing economy might look like (J.-F. Gerber and Steppacher 2017, J.-D. Gerber and J.-F. Gerber 2017). Fundamental to that issue, I suggest, is the question of which institutions will govern the ownership of resource flows. On the analysis of this paper, transfers under titled property institutions are motivated by a desire by the creditor to receive a flow of income as a return on their loans. In a nongrowing economy, potential creditors will less reliably expect returns and so have less motivation for transferring resource flows to others. It may be that a decline in titled property will coincide with the emergence of communal institutions in which people give freely without expectation of return, providing according to their abilities and receiving according to their needs. But this is not the only alternative to titled property, and may not be the most likely; indeed, across the world and throughout history resource flows have frequently been governed by command ownership institutions where transfers are motivated by deference to status and the threat of direct coercion. To better understand the consequences of degrowth, we need a clearer picture how first possession, communal, command, and titled property ownership institutions governing resource flows have evolved, and the circumstances in which they can be maintained.

7 Conclusion

I have argued that there is a fundamental distinction between the ownership of resource stocks and the ownership of resource flows, a distinction neglected due to the oft implicit assumption that the paradigm form of ownership is of a resource stock such as land. I have further suggested that ownership of resource flows cannot usefully be subsumed under a single category of 'private ownership', not least since there are important differences in the way that individuals aquire rights to resource flows: under first possession flows are retained by the initial possessor; under communal ownership each community member is entitled to acquire flows from others in the group; under command ownership resources flow to those of higher status; and under titled property ownership flows are transferred to whomever holds a legal title to them. Grouping these different institutions together as 'private ownership' or merely dividing between 'property' and 'nonproperty' institutions obscures the important differences between them.

Just as the examination of private, public, common, and club institutions has been instrumental in guiding research into the governance of resource stocks, an important avenue for future research will be to examine how the first possession, communal, command, and titled property ownership institutions that govern resource flows have evolved, and in what circumstance they can be maintained. Most pressing of all for the degrowth debate is whether a decline in titled property transfers is likely to be accompanied by an increase in first possession, an increase in communal ownership, or an increase in command ownership. The better we understand the circumstances in which each of these ownership institutions has evolved and been maintained, the better we will understand the institutional consequences of degrowth.

References

Alexander, G. S. (1997). *Commodity and Propriety: Competing Visions of Property in American Legal Thought, 1776-1970*. Chicago, IL: University of Chicago Press.

Appell, G. N. (1993). *Hardin's Myth of the Commons: The Tragedy of Conceptual Confusions*. Working paper 8. Social Transformation and Adaptation Institute.

Blackstone, W. (1765–1769). *Commentaries on the Laws of England*. 4 vols. New Haven, CT: The Avalon Project at Yale Law School.

Calvo-Mendieta, I., O. Petit, and F.-D. Vivien (2017). "Common Patrimony: A Concept to Analyze Collective Natural Resource Management. The Case of Water Management in France". *Ecological Economics* 137, pp. 126–132.

Ciriacy-Wantrup, S. V. and R. C. Bishop (1975). "'Common Property' as a Concept in Natural Resources Policy". *Natural Resources Journal* 15.4, pp. 713–727.

Coase, R. H. (1960). "The Problem of Social Cost". *Journal of Law and Economics* 3.1, pp. 1–44.

Cole, D. H. and E. Ostrom (2010). "The Variety of Property Systems and Rights in Natural Resources". In: *Elinor Ostrom and the Bloomington School of Political Economy*. Ed. by D. H. Cole and M. D. McGinnis. Vol. 2. Lanham, MD: Lexington Books, pp. 123–160.

Daly, H. E. (1974). "Steady-State Economics versus Growthmania: A Critique of the Orthodox Conceptions of Growth, Wants, Scarcity, and Efficiency". *Policy Sciences* 5.2, pp. 149–167.

Daly, H. E. (2013). "A Further Critique of Growth Economics". *Ecological Economics* 88, pp. 20–24.

Daly, H. E. and J. Farley (2011). *Ecological Economics: Principles and Applications*. 2nd ed. Washington, DC: Island Press.

Dove, J. A. (2014). "Financial Markets, Fiscal Constraints, and Municipal Debt: Lessons and Evidence from the Panic of 1873". *Journal of Institutional Economics* 10 (01), pp. 71–106.

Ellickson, R. C. (1991). *Order Without Law*. Cambridge, MA: Harvard University Press.

Ellickson, R. C. (1993). "Property in Land". *Yale Law Journal* 102.6, pp. 1315–1400.

Farley, J. (2012). "The Economics of Sustainability". In: Cabezas, H. and U. Diwekar. *Sustainability: Multi-Disciplinary Perspectives*. Sharjah: Bentham Science, pp. 40–64.

Georgescu-Roegen, N. (1971). *The Entropy Law and the Economic Process*. Cambridge, MA: Harvard University Press.

Gerber, J.-D. and J.-F. Gerber (2017). "Decommodification as a Foundation for Ecological Economics". *Ecological Economics* 131, pp. 551–556.

Gerber, J.-F. (2014). "The Role of Rural Indebtedness in the Evolution of Capitalism". *Journal of Peasant Studies* 41.5, pp. 729–747.

Gerber, J.-F. and R. Steppacher (2017). "Basic Principles of Possession-Based Economies". *Anthropological Theory* 17.2, pp. 217–238.

Graeber, D. (2011). *Debt: The First 5000 Years*. Brooklyn, NY: Melville House Printing.

Haberl, H. (2015). "Competition for Land: A Sociometabolic Perspective". *Ecological Economics* 119, pp. 424–431.

Hardin, G. (1968). "The Tragedy of the Commons". *Science* 162.3859, pp. 1243–1248.

Hardin, G. (1991). "The Tragedy of the Unmanaged Commons: Population and the Disguises of Providence." In: *Commons without Tragedy: Protecting the Environment from Overpopulation – a New Approach*. Ed. by R. V. Andelson. London: Shepheard-Walwyn, pp. 162–85.

Heinsohn, G. and O. Steiger (2000). "The Property Theory of Interest and Money". In: *What Is Money*. Ed. by J. Smithin. New York, NY: Routledge, pp. 67–100.

Heinsohn, G. and O. Steiger (2003). "The Property Theory of Interest and Money". In: *Recent Developments in Institutional Economics*. Ed. by G. M. Hodgson. Cheltenham, UK: Edward Elgar, pp. 484–517.

Heinsohn, G. and O. Steiger (2008). "Collateral and Own Capital: The Missing Links in the Theory of the Rate of Interest and Money". In: *Property Economics*. Ed. by O. Steiger. Marburg, Germany: Metropolis.

Heinsohn, G. and O. Steiger (2013). *Ownership Economics*. Ed. and trans. by F. Decker. Abingdon-on-Thames: Routledge.

Hohfeld, W. N. (1913). "Some Fundamental Legal Conceptions as Applied in Judicial Reasoning". *Yale Law Journal* 23.1, pp. 16–59.

Hohfeld, W. N. (1917). "Fundamental Legal Conceptions as Applied in Judicial Reasoning". *Yale Law Journal* 26.8, pp. 710–770.

Honore, A. M. (1961). "Ownership". In: Guest, A. G. *Oxford Essays in Jurisprudence*. Oxford: Clarendon Press, pp. 107–147.

Hoskins, W. G. and L. D. Stamp (1963). *The Common Lands of England and Wales*. London, England: Collins.

Hudson, M. (2002). "Reconstructing the Origins of Interest-Bearing Debt". In: *Debt and Economic Renewal in the Ancient Near East*. Ed. by M.

Hudson and M. Van de Mieroop. Bathesda, MD: Capital Decisions Limited, pp. 7–58.

Kanngiesser, P., F. Rossano, and M. Tomasello (2015). "Late Emergence of the First Possession Heuristic: Evidence From a Small-Scale Culture". *Child Development* 86.4, pp. 1282–1289.

Katz, L. (2008). "Exclusion and Exclusivity in Property Law". *University of Toronto Law Journal* 58.3, pp. 275–315.

Kirkpatrick, L. O. (2016). "The New Urban Fiscal Crisis: Finance, Democracy, and Municipal Debt". *Politics and Society* 44.1, pp. 45–80.

Klein, D. B. and J. Robinson (2011). "Property: A Bundle of Rights? Prologue to the Property Symposium". *Econ Journal Watch* 8.3, pp. 193–204.

Lau, J. Y. and J. Smithin (2002). "The Role of Money in Capitalism". *International Journal of Political Economy* 32.3, pp. 5–22.

Lemche, N. P. (1979). "*Andurarum* and *Masarum*: Comments on the Problem of Social Edicts and Their Application in the Ancient near East". *Journal of Near Eastern Studies* 38.1, pp. 11–22.

Libecap, G. D. (2007). "Assigning Property Rights in the Common Pool: Implications of the Prevalence of First-Possession Rules for ITQs in Fisheries". *Marine Resource Economics* 22.4, pp. 407–423.

Lueck, D. (1995). "The Rule of First Possession and the Design of the Law". *Journal of Law and Economics* 38.2, pp. 393–436.

Lueck, D. (1998). "First Possession". *The New Palgrave Dictionary of Economics and the Law* 2, pp. 132–144.

McGinnis, M. D. (2011). "An Introduction to IAD and the Language of the Ostrom Workshop: A Simple Guide to a Complex Framework". *Policy Studies Journal* 39.1, pp. 169–183.

McKean, M. A. (2000). "Common Property: What Is It, What Is It Good for, and What Makes It Work". In: *People and Forests: Communities, Institutions, and Governance*. Ed. by C. C. Gibson, M. A. McKean, and E. Ostrom. Cambridge, MA: MIT Press, pp. 27–55.

Meyer, J. M. (2009). "The Concept of Private Property and the Limits of the Environmental Imagination". *Political Theory* 37.1, pp. 99–127.

Munro, J. H. (2003). "The Medieval Origins of the Financial Revolution: Usury, Rentes, and Negotiability". *International History Review* 25.3, pp. 505–562.

Noonan, J. T. (1957). *The Scholastic Analysis of Usury*. Cambridge, MA: Harvard University Press.

Ostrom, E. (1990). *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge, England: Cambridge University Press.

Ostrom, E. (2005). *Understanding Institutional Diversity*. Princeton, NJ: Princeton University Press.

Ostrom, E. (2011). "Background on the Institutional Analysis and Development Framework". *Policy Studies Journal* 39.1, pp. 7–27.

Penner, J. E. (1997). *The Idea of Property in Law*. Oxford, England: Oxford University Press.

Pipes, R. (1999). *Property and Freedom: The Story of How through the Centuries Private Ownership Has Promoted Liberty and the Rule of Law*. New York, NY: Alfred Knopf.

Rose, C. M. (1985). "Possession as the Origin of Property". *University of Chicago Law Review* 52.1, pp. 73–88.

Rose, C. M. (1994). *Property and Persuasion: Essays on the History, Theory, and Rhetoric of Ownership*. Boulder, CO: Westview.

Rose, C. M. (1998). "Canons of Property Talk, or, Blackstone's Anxiety". *Yale Law Journal* 108.3, pp. 601–632.

Sanchez Bajo, C. (2011). *Capital and the Debt Trap Learning from Cooperatives in the Global Crisis*. New York, NY: Springer.

Singer, J. W. (2008). *Entitlement: The Paradoxes of Property*. New Haven, CT: Yale University Press.

Steiger, O. (2006). "Property Economics versus New Institutional Economics: Alternative Foundations of How to Trigger Economic Development". *Journal of Economic Issues* 40.1, pp. 183–208.

Steppacher, R. and P. van Griethuysen (2008). "The Differences between Biotic and Mineral Resources and Their Implications for the Conservation-Climate Debate". *Policy Matters* 16.

Storck, T. (2009). "Is Usury Still a Sin?" *Communio: International Catholic Review* 36.3, pp. 447–474.

Strunz, S., B. Bartkowski, and H. Schindler (2015). "Is There a Monetary Growth Imperative?" *UFZ Discussion Papers* 5/2015.

Underkuffler, L. S. (2003). *The Idea of Property: Its Meaning and Power*. Oxford, England: Oxford University Press.

Van Griethuysen, P. (2012). "*Bona Diagnosis, Bona Curatio*: How Property Economics Clarifies the Degrowth Debate". *Ecological Economics* 84, pp. 262–269.

Veblen, T. (1904). *The Theory of Business Enterprise*. New York, NY: Charles Scribner's Sons.