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Types of Entrepreneurial Action and Societal Provision for the Future: An Inquiry

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1. Introduction

Let us explore the ways in which societal provision for the future is affected by different types of entrepreneurial action. While individuals provide for the future through the act of saving, private entrepreneurs employ the resources provided by savers to profitably maintain the resource base that makes future consumption possible.² The maintenance of this resource base represents capital maintenance on the part of entrepreneurs. Entrepreneurs are motivated to maintain capital by the urgency of sustaining of future enterprise income (Brätland 2006, 30). This income is earned through the competitive process of better serving consumers through the sale of desired goods and services. Moreover, entrepreneurial income is critical in providing the means by which salaries and wages are paid and, in this sense, represents a critical provision for society's future. This happy symbiosis is made possible by institutions that support private property and voluntary monetary transactions.

Can these fundamentally entrepreneurial institutions have broader potential implications in addressing society's concerns about the future quality of life? The entrepreneur can only function effectively in a market economy in which business enterprises are able to obtain secure rights of private property and in which transactions are conducted in a commonly accepted medium of exchange. To the extent that these conditions are realized, private entrepreneurial enterprises can play a critical and decisive role in (1) warding off what some see as global resource exhaustion, and (2) maintaining what is currently viewed as public infrastructure.

But with respect to replenishing exhausting resources and the maintenance of infrastructure, the operative institutions are not designed to support this entrepreneurial process of

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² A reviewer of this paper has noted the need to clarify the use of the term *resources*. In the first part of the paper dealing with extractive resources, the use of the term is refers to those extractive resources commonly thought to be 'exhaustible.' However, in the latter part of the paper dealing with issues bearing on infrastructure maintenance, the intended use of the term 'resources' could include strategic capabilities that may emerge from complementarity uses of factors of production (Mathews 1996, 88-92).

providing for society's future. This inquiry reveals that attenuated and constrained property rights represent impediments to resource renewal (Brätland 2006, 34-35). Also, governmental institutions and career oriented entrepreneurial activity on the part of legislators and bureaucrats can be detrimental to the attainment of infrastructure maintenance. Moreover, these latter institutions and activities are obstacles to the role that entrepreneurial action can play in their attainment.

The paper addresses the following question: can the private entrepreneur play a more decisive role in addressing society's long term concerns for the future? In answering this question, this paper explores the broader potential social benefits of private entrepreneurial capital maintenance activities and the institutional impediments that currently thwart the capacity of market activity to perform that beneficent role. Societal provision for the future is found to be contingent on the degree to which the relevant resources can become privatized income earning property. The monetized income stream assures their maintenance and replacement by private entrepreneurs.

2. Resource exhaustion or entrepreneurial capital maintenance?

The role of extractive resources in the economy has been obscured by a myth of exhaustion. By looking at resources from a global perspective, the certainty of exhaustion would seem to be self evident. Extractive resources must exist in fixed ultimate supply just as the crust of the earth itself is finite. However, viewed at the microeconomic level, different insights begin to emerge. Some writers have correctly noted that at the microeconomic level there is a replacement process that occurs as individual deposits are depleted. However, there has been little attention paid to the fundamentally entrepreneurial nature of this process and the way in which it is, in essence, a matter of capital maintenance for the individual extractive enterprise. A fuller understanding of this capital maintenance process highlights one of the ways in which the entrepreneur is critical to societal provision for the future. However, this understanding also reveals the extent to which man made institutions are impediments to this particular aspect of capital maintenance.

2.1 The neglected role of the entrepreneur in resource renewal

The entrepreneur does not appear in the economics of exhaustible resources. This absence is implicitly evident in the common assumption that a pre-defined global stock of a particular the extractive resource is fixed. Moreover, the economic theory of exhaustible resources is cast in an equilibrium mode in which the entrepreneur does not exist in any meaningful sense. But in reality, the economics of exhaustible resource availability is fundamentally entrepreneurial. In an entrepreneurial world, the notion of an aggregate fixed stock of a resource has no coherent meaning. Extractive enterprises are by definition entrepreneurial and the known extractive deposits under the enterprise's management are among the capital goods employed by the firm to maintain or increase the firm's income (Brätland 2008, 386-393). Hence, the feared phenomenon of aggregate exhaustion has no particular validity in a market environment in which entrepreneurs, with secure access to exploratory ventures seek to maintain enterprise capital by replacing depleting deposits through investments in exploration and development of new deposits. The efficacy of this process is demonstrated by the fact that proven reserves of virtually all extractive resources are higher

today than they were 50 or even 100 years ago. In those rare instances in which reserves have not increased, the reason is found in the fact that the resource is no longer demanded.

Entrepreneurial replacement of exhausting resources is one example of capital maintenance for the extractive enterprise (Brätland 2008, 376). It occurs routinely because gradual depletion of deposits reduces the operating revenue margins of extractive enterprises. Since capital maintenance is always about maintaining enterprise income, the firm is constantly replacing its depleting resource deposits through acquisition of exploration rights, discovery and development of new deposits. Hence, replacement of resource deposits is only contingent on the prospective profitability of doing so. In this sense, the process of resource replacement is not dissimilar from the conventional replacement of depreciated capital goods. But this reality means that anticipated shortages of extractive resources reflected in prices would be a principal inducement of deposit replacement. The means by which resources are replaced emerges out of the entrepreneur's judgment of how enterprise income is affected by alternative prospective replacement strategies. This resource-replacement process is fundamentally entrepreneurial and is dependent upon access to land and managerial flexibility in maintaining capital and entrepreneurial income.

2.2 Strategies of capital maintenance by extractive enterprises

Social concern over so called exhaustible resources has been conditioned by the notion that there is a global stock that once depleted is gone forever (Bradley 2007, 87). However, in reality, the idea of an existing global stock of an extractive resource is really meaningless. The actual relevance of depleting stocks is found in the actions and strategies of entrepreneurs to maintain enterprise capital. Alternative strategies to maintain entrepreneurial capital would include a comparison of the expected present worth of income that may accrue over differing time horizons. In making these comparisons, the entrepreneurial enterprise would make subjective judgments of the respective risks and uncertainties associated with each strategy. At any moment in time, the extractive firm has numerous investment opportunities that involve immediate efforts to explore, develop and extract resources. The following investment strategies would be a form of capital maintenance that reflects societal provision for the future:

1. Engage in entrepreneurial delay with respect to (a) acquisition of additional exploration rights (leases), (b) additional exploratory efforts on owned leases,³ (c) investment in development on owned leases, and (d) production of the resource from developed leases already owned by the extractive enterprise (Brätland 2008, 390).
2. Extract deposits but maintain capital by reinvesting proceeds in competing capital goods offering a greater rate of return but which *may not* be directly related to the extraction of resources (Brätland 2008, 392).

As noted, these strategies for capital maintenance involve an uncertain time profile of prospective revenues and financial outlays which means that choices made from among these options will involve due allowance for time preference and uncertainty. Moreover, opportunity costs of these alternatives will be subjective and unique to the individual

³ An exploratory effort can be viewed as successful if the firm making the discovery considers it to be a realistic candidate for eventual development and production.

extractive firm. In fact, for the extractive firm making a choice of one of these strategies, the opportunity costs will necessarily include a subjective reckoning of the entrepreneurial income thought to be obtainable from the next most profitable relinquished strategy (Buchanan 1969, 49-50).

A few additional words of clarification may be important with respect to these options. Firms engaged in extraction are always in search of new and more profitable deposits to replace depleting extractive-resource deposits. In choosing a capital maintenance strategy, the extractive firm compares the marginal expected opportunity cost of finding, developing and exploiting *new* deposits with the marginal expected opportunity cost of developing and extracting an *existing* known deposit. If the former costs are less than the latter, a decision to find new deposits promises a greater yield in terms of entrepreneurial income. The extractive firm would be inclined to pursue this strategy if the quality (lower cost) of new deposits were superior to those already under the firm's immediate control. One important aspect of this strategy is that it would reflect a decision on the part of the extractive firm to deliberately delay exploration or development of the property and resources to which it already has access on existing leases. In other words, the firm would be exercising entrepreneurial latitude in the timing of exploration or development on its existing leases. Also the extractive firm could purchase from other firms leases containing discovered but undeveloped deposits and then immediately embarking upon development and extraction of these deposits. But again, such a strategy may reflect a decision to exercise entrepreneurial delay with respect to prospects on leases already under the firm's control. Deposits already under the firm's control may be low-quality, high-cost properties in which case delay may well be the best course of action.

Delay as noted in strategy (1) would commonly be premised on an expectation that the capital value of a project would be greater if it were delayed until some time in the future. While such deliberate delay could be based on expectations of longer-term rising trends in the price of the resources itself, it may also reflect the extractive enterprise's efforts to manage costs of a prospective project. Delay may enhance the income of the extractive enterprise by lowering the opportunity costs associated with the respective stages of investment in a planned project. In particular, such delay may be helpful in avoiding cost increases from bottlenecks that are likely to be encountered in regulatory efforts to expedite exploration and development.⁴ In the context of capital maintenance by the extractive firm, any reduction in cost may significantly enhance prospective entrepreneurial income and in the process make provision for the future by conserving resources. But again, in a disequilibrium setting, such delaying actions would be undertaken strictly on the basis of entrepreneurial judgments.

⁴ As this insight applies to production in general, see Alchian (1959, 23-40). Alchian's observation is borne out in the research on leasing of Federal offshore lands on the Outer Continental Shelf (OCS); Walter Mead and his colleagues note the following:...

"If development of the resource is required in a short period of time, bottlenecks would surely develop in acquiring the skilled labor and specialized capital equipment ... by allowing more time for lease development, the labor and capital equipment markets can respond to increased demand for these inputs with increased production at prices lower than those that would prevail under more pressing time constraints" (Mead et.al. 1985, 110-112).

But an extractive enterprise may choose delay for reasons bearing largely on volatility in the price of the resource. The different stages of the production process accord ownership of successive series of capital goods each of which represents a type of investment 'option.' Ownership of any investment option represents a right but not an obligation to proceed further with the next in a sequence of investment opportunities. In this case, this sequence of capital goods includes (a) exploration rights for particular lands, (b) discovered resources (c) developed resources, and (d) extracted resources ready to be sold. Each of these capital goods has a market value. Volatility in the price of the resource itself would be reflected in volatility in the market worth of each of these capital goods. The volatility in the price of the resource would enhance the market value of each of these four capital goods but this increase in value is contingent on the extractive firm's ability to delay action on each next phase of investment. For example, in undertaking investment in exploration, the capital good sought would be *discovered resources*. These discovered but undeveloped resources are marketable and have a price and represent a type of option to acquire developed resources. And, in turn, by committing to subsequent investment in development, the entrepreneurial enterprise would be seeking capital goods in the form of *developed resources*. At each successive stage, the extractive firm will find it advantageous to delay any further commitment to the project until evolving market conditions reveal more information about the future and the potential profitability of the next investment option.⁵ This advantage is reflected in an enhanced market value of each of the capital goods and the extraction project as a whole (Dixit and Pindyck 1994, 4; Cowen 1997, 26). Hence, decisions to delay are critical in maintaining the capital value of the extractive firm and in conserving affected resources.

Strategy (2) emphasizes the point that capital maintenance for all entrepreneurial enterprises requires investment in those capital goods that offer the greatest likelihood of attaining or maintaining profitability. The strategy highlights the reason that cost minimization in the replacement of physical capital goods is not necessarily equivalent to capital maintenance. The real motivation for investment to maintain capital is not to minimize cost of replacing particular capital goods but to increase income (Hayek 2007 [1941], 277-278). In the case of strategy (2), the two may be quite different since 'cost' minimization (or expense minimization) does not take into account returns that could be achievable by investment in capital goods that may not be directly related to the firm's historical specialization.

Such a shift in the physical composition of capital goods sought in capital maintenance could be prompted by newly revealed changes or previously unrecognized entrepreneurial opportunities in other markets. F.A. Hayek captures the entrepreneurial motivations for such shifts in investment: "... when we proceed to consider in detail the reaction of capitalists to unforeseen changes, ... we go back to the *rationale* of maintaining capital intact, the quantity of capital drops right out of the picture as a directly relevant magnitude. Its place is taken by a direct consideration of the size of the income streams that may be expected at different dates" (Hayek. 2007 [1941], 280): italics in the original text). It is in this sense that a focus on the physical replacement of resource deposits conveys a misleading interpretation of the investments necessary to maintain capital for the extractive firm. But the converse of these preceding observations is that investment by all firms, within or

⁵ Interestingly enough, each successive stage of investment in the project imparts a successively higher market price to the project itself since these properties are traded between firms.

outside of the extractive industries, will be sensitive to any anticipated higher returns that may be achievable as a consequence of anticipated scarcities of particular extractive resources.

The extractive firm may be constrained in its choice of replacement investments by realities of 'capital-good complementarity.' An extractive enterprise's grouping of capital goods would normally be in the form of resource deposits or assets related to the extractive activity such as processing or transportation. If the enterprise were to invest in capital goods not necessarily related to extraction, it would be mindful of the degree to which such capital goods were complementary to assets comprising its existing operations. The most important issue would not necessarily be an issue of physical complementarity of capital goods. Expected profitability would always establish *economic* complementarity and would supersede issues that may bear on physical complementarity of capital goods already within the enterprise. The central concern for the enterprise is the extent to which the particular investment alternative promises the largest addition to entrepreneurial income for the enterprise as a whole (Brätland 2008, 393). But while the individual enterprise is focused on future income, the societal consequence is that resources are conserved for the future.

2.3 Impediments to entrepreneurial capital maintenance by extractive firms

Although capital maintenance refutes the exhaustion myth, this refutation hinges on access to lands, entrepreneurial latitude in managing resources, and secure rights of private property. But institutions of governmental control and jurisprudence hinder entrepreneurial actions of extractive firms striving to maintain capital. These hindrances include: (a) foreclosure of land access because of government control of mineral lands; (b) curtailment of entrepreneurial latitude arising from court-imposed covenants that define and enforce obligations to surface owners; and (c) in the case of petroleum, the extractive firm's inability to acquire full control and ownership of reservoirs that it has discovered. The first of these impediments bears on access to land and the latter two impede extractive firms' ability to manage resources as capital assets.

- Land access by entrepreneurs foreclosed by government ownership

Maintenance of entrepreneurial income requires a replacement of the capital goods critical to continued operation within the same industry. This entrepreneurial process requires that the firm have access to new resources that may be extractible at lower cost. Resource replacement is usually dependent upon leasing arrangements between surface owners and entrepreneurial firms seeking to find and develop new deposits. Through an unhampered market process, resources tend to gravitate to their highest valued use. The one obstacle facing the entrepreneurial extractive firm in its efforts to maintain capital is that properties are controlled by landowners that totally foreclose access rights to extractive firms. These owners are invariably governments that have merely nationalized lands through acts of political power without any actions establishing legitimate ownership (Bradley 1996, 76). Once these lands are under the political control of governments, access is established through a political process. In modern democracies, this conflict is manifested in political struggles to marshal the power of legislatures to assure certain politically popular uses of lands and foreclose less popular uses.

This political selection of popular uses of nationalized lands is one of the more pernicious features of democratic processes. Once lands are nationalized, alternative uses of these lands are chosen with the intent of appeasing 'stakeholders.' For the purposes of this inquiry, the important question is: who is a stakeholder with respect to the use of public lands? Unfortunately, political self-selection is the only criterion used to establish who has a legitimate 'stake' in decisions on alternative uses of government lands. Stakeholders are voters with diverse and subjective views on what for them constitutes an environmental amenity and the way in which they are affected by its presence or absence. But this political process takes the focus off legitimate environmental issues and, instead, motivates allocative decisions on the basis of the political placation of certain self-selected political constituencies (Bråtland 2004, 528-532). This participatory process has little to do with rational environmental policy or the commitment of resources to their highest valued use.

Political advocates of policies that foreclose access are unencumbered by the opportunity costs of such sanctions. In this sense, choosing and hence forsaking the value of the next most highly valued opportunity never impinges upon the actions of non-owning bureaucrats, politicians or environmentalists seeking to foreclose certain uses of government lands. Problems of resource exhaustion and a failure of firms to replace resources deposits can arise from the fact that the weighing of opportunity costs by political constituencies plays virtually no role in foreclosing lands to exploration and development. In bearing little of the opportunity costs of political foreclosure of access, self-selected stakeholders have incentives to become extremists in exaggerating preferences and overstating claims. Whatever the benefits of foreclosing exploration and development may be, these benefits are provided as 'free goods' through the process of political control that forecloses actions that provide for the future.

- Entrepreneurial latitude foreclosed by obligations to surface owners

The preceding discussion also highlights the fact that the extractive firm must have ample timing latitude if resource replacement is to be successful. But an early juridical declaration of surface owner rights has tended to preclude this entrepreneurial latitude in maintaining capital. An interpretation of the land surface owner's rights to subsurface minerals was first enunciated by the British jurist, William Blackstone: "land hath also, in its legal specification, an indefinite extent, upwards as well as downwards....downwards, whatever is in direct line between the surface of any land and the center of the earth....if a man grants all his lands, he thereby grants all mines of metal and other fossils. This [principle of ownership] is incorporated in the fundamental law of the land" (Blackstone. 1983, 18; also quoted in Bradley 1996, 70).

The modern day implication of this interpretation of the surface owner's rights is that the surface owner is entitled to a fixed percentage royalty on the gross proceeds from the sale of the extracted mineral.⁶ But under this entitlement, the surface owner and the extractive enterprise are confronted with mutually and fundamentally incompatible objectives.

⁶ Usually the surface owner is the also the owner of royalties; however, situations exist in which royalty streams are sold as investment assets. In other instances, the surface owner's property rights may not include mineral rights in which case presumptive royalty obligations are owed to the owner of those rights.

Uncertainty and economic change mean that entrepreneurial latitude is always critical in managing capital goods including mineral leases. The management of mineral leases as capital goods requires timing of lease activities so that capital value of entrepreneurial income is maximized. However, the fixed percentage royalty on gross proceeds to which the surface owner is 'entitled' means that present value of royalty income is almost always diminished by entrepreneurial timing decisions on the part of lessees. Hence, any the surface owner will want to see the extraction operation managed so that royalty revenue is captured as quickly as possible (Brätland. 2001, 694-695).⁷ In brief, entrepreneurial timing of activity on the part of the lessee is critical to the maintenance of capital but is anathema to surface-owner interests. But the surface owner's financial rights are protected by court-imposed implied covenants that foreclose any action or lack of action that delays or diminishes the surface owner's receipt of royalties. Hence, by not allowing entrepreneurial latitude in the timing of these activities, the covenants reduce the net present value of mineral resources and impede the ability of the extractive enterprise to maintain capital and conserve the resource for future use (Brätland 2001, 694).

- Blockage to entrepreneurial ownership of petroleum discoveries

The Blackstone declaration of surface ownership rights presented difficulties in its application to *in situ* petroleum and the unusual characteristics of petroleum deposits. The migratory nature of petroleum means that resources can be extracted from the reservoir in a manner that draws the resource from beneath the land of several different surface owners. Hence, a *rule-of-capture* has evolved such that a discovered reservoir *never becomes a capital good to be managed by the entrepreneurial firm*. The rule of capture applies irrespective of the fact that the petroleum resources may have migrated from beneath another surface owner's property.

In the case of petroleum lands, the application of Blackstonian Principles has not meant that the owner of the surface also owns subsurface petroleum (Bradley 1996, 60-62). However, it does mean that the surface owner is always entitled to a percentage share of gross production or a percentage share of the gross sales proceeds of production. Again, to this end, the courts have imposed the covenants mentioned above to protect the financial interests of the surface owner. The consequence of the covenants is that the royalty-owning surface owner essentially precludes the management of petroleum leases as capital assets which, in turn, retards the entrepreneurial replacement of the resource. In so doing, the implied covenants dissipate entrepreneurial income by compelling exploration, development and production on expedited schedules that may be inconsistent with the conservation of the resource. Moreover, mandates to undertake these activities at an earlier moment in time means that the opportunity cost associated with these activities will, in almost all cases, be increased (Mead, et. al. 1985, 110-112). Under circumstances unimpeded by the covenants, a decision to expedite exploration or development would only be made if expediting these investments were to increase the estimated capital value of the project. The corrected sentence should read: Clearly any attempt to impose artificial schedules on decision makers can only create confusion, chaos and economic waste.

⁷ The surface owner's economic interests are defined by the attainment a rate of revenue recovery that maximizes the present value of the royalty-receivables revenue stream. Delay only diminishes this present value (Brätland 2001, 694-695).

The conflict, ethical breeches and implied covenants devolving from current property law would not exist if the discovered petroleum deposit were to become the sole, exclusive property of the extractive enterprise making the discovery. In this latter case, ethically and functionally legitimate ownership would be achieved by applying the principle of 'original appropriation;' this principle would supplant the Blackstonian perspective on the scope of the surface owner's property rights.⁸ Of course, in this situation, some consent to surface access would still be required from a surface owner to make exploration possible.⁹ Court-imposed covenants would no longer impinge on the discovering firm's ability to engage in entrepreneurial timing in the scheduling of investments in the project. In this case, the surface owner would have no contingent claim on production. This situation would represent the normative ideal from both an allocative and ethical perspective.

Secure access to exploratory prospects is impeded that by governmental regulation and control of lands. While governmental constraints on land use are rationalized as actions required to serve the environmental interest of the public, their imposition is a key stumbling block to this entrepreneurial role of resource replacement. With full rights of private property, those parties motivated by environmental concerns could pay a competitive price for committing lands to alternative uses. Such parties may purchase lands in question or may pay owners of resource properties to refrain from exploration and development. In either case, the party pursuing environmental objectives would be paying an amount at least equal to the opportunity cost of forsaking development (von Mises 1998, 650-651). In essence, secure property rights are critical to a rational provision for the future.

3. Governmental v. private entrepreneurship in infrastructure maintenance

One of the fallacies of infrastructure maintenance is the implicit presumption that a major part of this infrastructure must be publicly controlled and maintained by government.¹⁰ Having made the financial outlay for the facilities that comprise public infrastructure, government takes on the responsibility of maintaining public infrastructure. Unfortunately, there appears to be a pattern of historical inevitability to the neglect of public infrastructure that is endemic to its governmental provision and management. The American economist, Felix Rohatyn, has noted the widespread phenomenon of public infrastructure decay (Rohatyn 2009, 1-5). But, save for the occasional business failure, there is clearly no such pattern of neglect with respect to *private infrastructure*. What accounts for the contrast in patterns of maintenance? One answer may lie in the unexamined presumption that the

⁸ This proposal was first put forward by Murray Rothbard (1998 [1982], 71-72). A version of the Rothbard proposal has been provided by Robert Bradley (1996, 69-74).

⁹ In most cases, a single surface owner would not be able to extort a royalty concession from an exploring entrepreneur establishing ownership of a subsurface discovery. Directional drilling would be permitted such that a particular subsurface structure could be accessed from a multiplicity of surface locations. Competition between surface owners would weaken the bargaining power of any single surface owner (Bradley 1996, 72).

¹⁰ The assumption of government's maintenance responsibility no doubt arises from the notion that the services these facilities yield are public goods that cannot be provided privately. However, evidence suggests that public infrastructure's services can be provided through private entrepreneurial undertakings Niskanen 1971; Wollstein 1974; Foldvary 1993, 1-15; Rothbard 2004, 1029-41; Hoppe [1993] 2006, 7; Block 2009, 232).

facilities comprising public infrastructure can be viewed as *public capital* and that a government can act in a sufficiently unified, coordinated way to somehow mimic the action of private entrepreneurs in maintaining this 'capital.' If not, a compelling case be made that that this public capital should be privatized and maintained by private entrepreneurs. But a second answer is that legislators and bureaucrats who are instrumental in providing and expending funds for infrastructure maintenance may employ their own entrepreneurial strategies in assuring the attainment of their own career (Loasby 1976, 190). These entrepreneurial actions may well divert attention and resources away from infrastructure maintenance. These officials include legislators and bureaucrats who view their own capital maintenance as those entrepreneurial actions that strengthen and promote their own careers.

3.1 Viability of government action to mimic entrepreneurial maintenance

Assume that the government is able to act as a unitary entity making maintenance decisions with the intent of 'maintaining total public benefits.' The adjective 'unitary' is used here simply to mean that the government's plans are formulated and undertaken as though prompted by one mind. In other words, the assumption is made that the government *is not* comprised of individual bureaucrats and legislators with self-seeking but frequently conflicting aspirations. Rather, the government is assumed to act in a unified way to maintain public infrastructure on the basis of *some attempted imputation of the net benefits that accrue to the public*.¹¹ The emphasis on maintaining net public benefits is critically important because it represents *the only* legitimate analogue of the entrepreneur's income.

Given the above assumptions, can public infrastructure be legitimately viewed as a form of 'public capital?' Is this label apt? In an economic sense, the legitimate concept of capital is premised on the ability of an acting entity to manage a *combination of resources* with the intent of earning an income for an *enterprise as whole*.¹² Private property and monetary exchange afford the entrepreneur this ability. Hence, the aptness of the label, 'public capital,' hinges directly on the extent to which public infrastructure can be managed in a way that is functionally analogous to the maintaining of private capital. For the private entrepreneur, capital maintenance is ultimately about actions undertaken to maintain or enhance expected enterprise income. But what would be the counterpart of enterprise income for a government in attempting to establish requisite maintenance of public infrastructure?

¹¹ This assumption is only made for purposes of discussion and not with the intent of defending its legitimacy or feasibility. The assumption represents what Ludwig von Mises refers to as 'hypostatization. He notes: "The worst enemy of clear thinking is the propensity to hypostatize, i.e., to ascribe substance or real existence to mental constructs or concepts. ... Only individuals act." See: Ludwig von Mises ([1962] 2006, 70-71) [1962].

¹² Joseph Schumpeter observes: "capital is then an agent in the exchange economy. A process of the exchange economy is given expression in the capital aspect, namely the transfer of productive means to the entrepreneur. There is therefore in this sense only private and no 'social' capital" ([1934] 1959, 122-23). Schumpeter's use of the word "social" in this context would be more accurately read as "public." Although Schumpeter's reference to social capital does not necessarily refer to public infrastructure as such, his intent is clearly to emphasize the idea that capital is inherently in the province of the entrepreneur who functions in an environment of private property and implied freedom of exchange.

Metaphorically, the income counterpart would be the total benefits yielded by all components of infrastructure *as a totality*. The maintenance issue arises from the fact that the benefits of infrastructure yield no appropriable sales revenue that would serve as guide to maintenance.¹³ Hence, the absence of a comprehensive and appropriable future monetary income means that the government is left without a unified guide in planning maintenance expenditures for the disparate facilities under its purview.¹⁴ The government is left with no means of reckoning a rational tradeoff between maintenance projects. Another aspect of this problem is that there is a 'disconnect' between marginal intended use of infrastructure by the public and any planned maintenance that may be considered by the government. Users of individual facilities in public infrastructure and the governmental entity responsible for maintenance are necessarily different acting entities. To summarize, the following inferences highlight the inability of governments to mimic entrepreneurial maintenance and, hence, underscore the misleading nature of the 'public capital' label for public infrastructure:

- No non-political means are available for a government to weigh the relative tradeoffs of investment in *new* total infrastructure and maintenance of *existing* infrastructure as a whole.
- Also, the benefits of total infrastructure maintenance are not appropriable by those bearing the economic burden of total outlay.
- Means are unavailable to reckon the changing tradeoffs between current investment in infrastructure, as a whole, and the prospective future benefits.
- In general, means do not exist for government decision makers to reckon the *relative* tradeoffs between maintenance of some existing facilities of public infrastructure as opposed to maintenance of other facilities.
- Maintenance decisions for public infrastructure are based largely on physical deterioration with little rational reckoning of benefits or opportunity costs involved; the result is that some complementary facilities are neglected that should be maintained while other facilities that should be abandoned are maintained.

As these inferences suggest, an implicit concern is the maintenance of the functional complementarities that exist between different components of the infrastructure. If tolls are not collected for each such facility, the government is left with an imputation problem that would tend to preclude a balanced maintenance that preserves these complementarities. No calculational means of charging tolls that would account for the complementarities existing between the services yielded by groupings of such facilities. The critical issue is the fact that even with the collection of user fees or tolls on *some* facilities, physical deterioration would be the only inducement for the maintaining complementarities (Brätland 2010, 41-42).

¹³ In his *Wealth of Nations*, Adam Smith wrestled with the practical aspects of financing and maintaining public infrastructure. He was well aware of the importance of privatization as a means to infrastructure maintenance. But Smith seems to have been unable to arrive at a consistent and coherent perspective with respect to public policy. In having discussed the requisite incentives for maintenance achievable by privatizing a canal in France, he then proceeded to discuss the incentives for neglect that would be consequent to a similar policy with respect to 'high roads' in England (Smith 1982 [1976], 724).

¹⁴ While in some narrow instances, tolls can be collected for marginal use of some facilities, the problem of imputing maintenance tradeoffs for all components of public infrastructure still remains.

Hence, there is no reason to believe that government could ever mimic the actions of private entrepreneurs in the maintenance of infrastructure.

3.2 Neglect arising from bureaucratic and political entrepreneurship

If governments, considered as institutions, are unable act as unified decision making entities in maintaining infrastructure, how effective are the actions of individual legislators and bureaucrats in achieving this objective? Evidence suggests that legislators and bureaucrats act in an entrepreneurial manner in fostering their own careers (Brätland 2010, 42-43). In other words, for legislators and bureaucrats, careers become the capital they maintain or enhance by the personal strategies they pursue. But what are the consequences of such behavior for the maintenance of infrastructure? Since bureaucratic and political entrepreneurs are endemic to the workings of government institutions, the maintenance of bureaucratic and political capital becomes a source of infrastructure neglect.

- Perverse consequences of political entrepreneurship by legislators

For the legislator, entrepreneurship refers to the time-structured strategies employed in pursuit of political careers. "Capital maintenance," in this context, refers to the actions that legislators take to maintain their power, influence, and job satisfaction. In maintaining this metaphorical capital, legislators may direct their actions toward objectives largely or totally divorced from public-infrastructure maintenance. In their pursuit of personally chosen ends, they must husband tools or metaphorical capital goods to implement their plans. The metaphorical capital goods that legislators must employ depend directly on the respective constituencies they must serve and on their own career objectives. These capital goods may be intangibles that involve subjective judgments about the future actions required to achieve career ends.

Neglect of public infrastructure may arise from the legislator's failure to consider the complementarities between the two political capital goods—power and re-electability (Brätland 2010, 45). This neglect may be reflected in the legislator's failure to assure budget funding for the maintenance of existing public infrastructure in his district. For example, such neglect may be prompted by a legislator's focus on the construction of *new* infrastructure. Although the legislator may neglect budget funding for *existing* infrastructure maintenance, he may have established sufficient power and re-electability to remain in office and pursue legislative objectives unrelated to infrastructure maintenance. But such neglect may also arise from the legislator's shortage of power, reflecting his failure or inability to generate support in the legislature for budgets that will finance infrastructure maintenance in his home district. This power shortage may be manifested in a failed logrolling negotiation or a lack of sufficiently strong alliances in the legislature. The consequence may be the neglect of highways, streets, sewerage systems, and bridges in the legislator's home district. If the legislator lacks seniority in the legislature, this neglect may occur even though he is a well-intentioned champion of efforts to maintain these infrastructure facilities.

A legislator's time preference is also critical in the timing and allocation of his two political capital goods—power and re-electability. One consequence is that any time structured resource allocation for maintenance that derives from his actions may be totally divorced

from any time cycle of deterioration or loss in usability that the public infrastructure facilities may experience (Brätland 2010, 46). Hence, in the absence of an overt threat to his reelection, the legislator's actions over time may well result in chronic neglect of such facilities.

- Bureaucratic entrepreneurship as source of infrastructure neglect

Like political capital, bureaucratic capital is a metaphor that can shed light on public officials' entrepreneurial actions or inaction over the course of time. The entrepreneurial bureaucrat of concern here is the senior executive with some direct or indirect responsibility for public infrastructure and with the power to affect how a bureau allocates its resources. As in the case of the legislator whose capital takes the form of a career, in this case the metaphorical capital in question is the bureaucrat's career. The bureaucrat's view of his career may take into account several subjectively defined sources of appeal.¹⁵ In any case, the career is the overarching metaphorical capital that governs the bureaucrat's entrepreneurial actions and the use of the resources at his disposal. This metaphorical capital suggests a time structure of maintenance that may be at odds with concerns over the maintenance of public infrastructure.

Although the bureaucrat is not an elected official, he must realistically face his own benefactors, constituencies, and power blocs in managing the capital defined by his own career aspirations. These parties include: appointing officials to whom the bureaucrat reports; sponsoring legislators; subordinates in the bureau;¹⁶ that segment of the public most sensitive to the bureau's activities (that is, self-selected "stakeholders"); and prospective future nongovernmental employers. The latter group in this list would especially concern appointed executive bureaucrats whose long-term career objectives may lie outside of government.¹⁷ The bureaucrat's ability to deal with and satisfy these constituencies' determines the nature of the metaphorical capital goods he must employ in managing the capital represented by his own career.

What are these metaphorical capital goods? The question pertains to the resources he must employ to succeed. The capital goods required to give the bureaucrat at least the appearance of success include: (1) budgets, (2) reputation, and (3) control. Although these aspects of

¹⁵ William Niskanen mentions salary, perquisites of office, public reputation, power, patronage, the bureau's output, ease of making changes, and ease of managing the bureau (1971, 38). Anthony Downs gives a similar list, including power, income, prestige, security, convenience, loyalty, pride in work, and desire to serve the public interest (1967, 2). Both of these economists take a rather static approach to defining the arguments of a utility function in that they do not emphasize the time-structured strategies that may define the bureaucrat's actions.

¹⁶ Although the bureaucrat has managerial authority over subordinates, he is unlikely to experience sustained success in his position if he ignores the career aspirations of those under his organizational control.

¹⁷ James Q. Wilson observes that the appointed bureaucrat's career may involve relatively brief stints in a particular government position. For the executive bureaucrat, longer-term career goals would no doubt involve employment in the private sector and perhaps in academic institutions. Even though the appointed official's actions may not directly affect the interests of such prospective employers, the official must at the same time be sensitive to reputational issues connected with his actions in public office (1989, 209).

employment do not necessarily include everything that the bureaucrat might want in a particular governmental position, they comprise the resources required to establish the appearance of success. These metaphorical capital goods present the bureaucrat with both complementarities and trade-offs in defining and constraining the actions that best enhance his longer-term career aspirations (Brätland 2010, 46-47). In considering these actions, how will infrastructure maintenance weigh into the bureaucrat's employment of these metaphorical capital goods? The bureaucrat will employ these capital goods to foster the maintenance of public infrastructure if such action maintains or enhances the prospects of attaining the goals that define his career ambitions. Otherwise, passive neglect of infrastructure may well be 'rational' for the bureaucrat.

But there would be mitigating concerns for the bureaucratic entrepreneur. The bureaucrat must be sensitive to the general public in considering programs of infrastructure maintenance that the bureau might undertake. Infrastructure neglect might conceivably draw unfavorable press, affecting the bureaucrat's reputation among the general public. However, unless the affected infrastructure involves roads or bridges, public reaction to neglect may well be tepid or nonexistent. In short, given the bureaucrat's possible motivations, larger government and expanding public budgets do not necessarily imply the availability of more resources for maintenance of depreciating infrastructure. If the relative neglect of infrastructure occurs without significant negative feedback from the public, the bureaucrat may perceive greater career advantage in pursuing ventures that are more likely to draw favorable reaction from appointing officials and sponsoring legislators. For example, new infrastructure may offer the bureaucrat more reputation-enhancing ways of dealing with his constituencies.

Although new infrastructure projects find favor with the constituencies that the bureaucrat must please, they tend to crowd out funding for maintenance of existing infrastructure. The bureaucrat may not be particularly concerned with the net social benefits of one infrastructure project as opposed to another competing project (Brätland 2010, 48). He will not reckon opportunity costs in terms of forgone or relinquished social benefits associated with another, competing project. Moreover, as he chooses his action, he is **unlikely** to employ a planning horizon congruent with the realization of any benefits afforded by publicly supported maintenance projects.

3.3 The possible role of private entrepreneurs in maintaining infrastructure

Entrepreneurial privatization of infrastructure would have several *implicitly interrelated but critically distinct features*. For example, entrepreneurial enterprises would not be dependent on the vagaries of governmental appropriations in attempting to allocate investment funds for maintenance of facilities. Also, private enterprises would not have maintenance plans stifled by officials beholden to political pressures and aspirations of public officials. Choices between competing investments in infrastructure would not be prompted by the influences of certain politically powerful constituencies. Moreover, schedules of infrastructure maintenance would not be disrupted by the legislative and bureaucratic delays common in political decision-making.

We can glean an important insight into public-infrastructure maintenance from the process by which a business firm maintains its own infrastructure. Private property and monetary exchange would enable the entrepreneurial enterprise to use market prices to subjectively

evaluate the prospective opportunity costs and benefits associated with alternative schedules of maintenance for its privatized infrastructure facilities.¹⁸ Implicit in this reckoning would be the entrepreneur's ability to distinguish capital and income. Income is a way of looking at capital in terms of its expected return over the entrepreneur's planning time horizon. At the same time, capital, as the enterprise's judgment of net present worth, is a way of looking at the totality of future income from the point of view of the entrepreneur's reaction to market uncertainty and of his time preference, or rate of discount. For the enterprise, income would be the amount that could be consumed within a definite period without lowering the expected or desired investment worth of capital as reckoned by the entrepreneurial enterprise (Friedman 1957, 10; von Mises [1949] 1998, 261; Hayek [1941] 2007, 277-78).

For the entrepreneurial enterprise, investment in maintenance would not necessarily be focused on particular resources, but rather on how the entire complementary combination of facilities would affect the enterprise's profitability (Mathews 1996, 88-90). The resources at the business entrepreneur's disposal would be capital goods that could take the form of buildings, equipment, tools, goods of any kind and order, claims, receivables, cash reserves (von Mises [1949] 1998, 262). The critical distinction is that specific infrastructure facilities (its capital goods) would not in themselves constitute capital, and their existence would not necessarily assure income or imply anything with respect to their maintenance of affected facilities. These things would become an aspect of capital only when they were owned, deployed, and maintained in the coherent pursuit of a single, unified plan undertaken by a specific entrepreneurial enterprise. Hence, for the enterprise, capital would emerge as the entrepreneurial reckoning of the net present monetary worth of its own plan to employ its own facilities (Lachmann [1956] 1978, 13).

Within this calculational context, the entrepreneurial enterprise would be able to make rational choices to maintain its capital as reflected in changes in the enterprise's prospective worth. Hence, for the entrepreneurial enterprise, depreciation would be always a matter of entrepreneurial judgment with respect to its effect on future capitalized income (Lachmann 1986, 66-67; Osterfeld 1992, 23-30). Maintenance of capital would focus on a desired stream of future income. Therefore, depreciation would always be judged within the context of the complementarities between various facilities. Maintenance decisions would always be on a facility's effectiveness in serving the complementary function of attaining the desired level of current and future profitability. Each maintenance decision ultimately would relate to the most profitable complementarity within a chosen combination of facilities employed in pursuing an entrepreneurial plan (Hayek [1941] 2007, 277-282; Lachmann 1986, 63; von Mises [1949] 1998, 512). Hence, with respect to maintenance, the privatization of infrastructure would have the following implicitly interrelated but critically distinct features:

- Prospective monetary benefits of maintenance would be appropriable by the entrepreneurial enterprises undertaking the maintenance of the infrastructure facilities that it owns (that is, costs and monetary benefits would be borne by the same entity).

¹⁸ The task of economic calculation for the individual, according to Mises, "is to adjust his actions as well as possible to his present opinion concerning want satisfaction in the future." Mises also notes: "The question . . . is whether a certain course of conduct increases or decreases the productivity of our future exertions" ([1949] 1998, 232, 511).

- Business entrepreneurs would be able to evaluate the anticipated, yet uncertain, monetary trade-offs between current investments in maintenance and the desired future income return earned by providing infrastructure services.
- The entrepreneurial enterprises would be able to integrate plans for the maintenance of their infrastructure facilities into a comprehensive business plan focused on the maintenance of a desired time profile of future net revenue earned from the provision of services (Hayek [1941] 2007, 277).
- Physical deterioration of a particular infrastructure facility would be of concern only to the extent that the enterprise judged it to reduce the future monetary income yielded by the complementary combination of facilities that it owns.
- Business entrepreneurs would be able to rank maintenance priorities and assess the extent to which total revenue productivity of its infrastructure facilities as a complementary combination is affected.
- Maintenance plans for particular facilities would be unique to individual entrepreneurial enterprises, reflecting the enterprise's market expectations and the particular complementarities that would be sought in its chosen combinations of infrastructure facilities.
- Because maintenance would be tied to a monetary income, the enterprise would be able to link its maintenance investments to the demand for its infrastructure services as expressed by its transactions with customers (Lachmann 1986, 67–71).

Privately held infrastructure would be maintained by profitable entrepreneurial business enterprises that own them. With the elements of public infrastructure in private hands, entrepreneurial owners would be able derive an income stream from the provision of their services? Maintenance of this privatized income stream would constitute capital maintenance for the firms owning infrastructure facilities. Individual entrepreneurial enterprises owning infrastructure would be acting on their own behalf but in the process would be serving the interest of society as a whole in undertaking the maintenance of its own capital. These judgments of entrepreneurial success would be made with a degree of rationality that would be impossible in the absence of private property and monetary exchange. The success of private-infrastructure maintenance would be reckoned only in the context of individual entrepreneurial efforts to profitably serve users of owned infrastructure facilities. Hence, the success of infrastructure maintenance would be a judgment that each enterprise would make in assessing the profitability of its own business plan.

4. Conclusion

Resource exhaustion and infrastructure neglect are perennial social concerns that do not have workable governmental solutions. However, the institutions most capable of dealing with these issues are to be found in the incentives that are faced by private entrepreneurs availed of privatized resources. Extractive resource renewal and infrastructure maintenance are activities that could become routine by according private entrepreneurs a less regulated role in societal provision for the future. For extractive enterprises, the entrepreneurial efforts to maintain capital could result in the systematic and orderly replacement of exhausting resources. However, this process is stymied by the institutional constraints imposed by government. These institutional constraints include foreclosure of land access, regulatory

encumbrances to entrepreneurial management of resources, and, in the case of petroleum, an inability to acquire full property rights in resources discovered by the entrepreneurial enterprise. While the entrepreneur is crucial to warding off resource exhaustion, these impediments mean that the entrepreneur's role in resource replacement is only partially fulfilled.

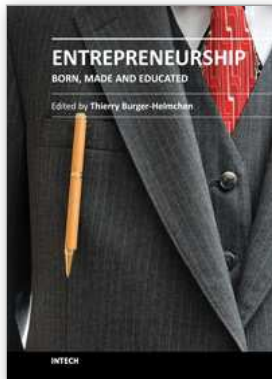
Neglect of what is labeled public infrastructure seems to be endemic to government's assumed responsibility with respect to maintenance. First the absence of secure ownership rights and the nonexistence of an integrated revenue stream from the sale of services mean that governments are unable to mimic the actions of private entrepreneurs in maintaining capital through the maintenance of private infrastructure. The reason is that although public infrastructure ostensibly yields benefits, the absence of secure ownership and an integrated income stream mean that governments cannot implement a coherent program of maintenance as could be implemented by the private entrepreneur. Second, career oriented entrepreneurial behavior on the part of legislators and bureaucrats undermine the governmental function of maintaining infrastructure. While maintenance of public infrastructure may, in some instances, be congruent with the career aspirations of legislators and bureaucrats, other goals may intervene in the allocation of public funds.

Governmental failures with respect to infrastructure maintenance offer grounds for privatizing what has been public infrastructure. As private property, the services of infrastructure would be marketed thus placing the process of maintenance under the discipline of entrepreneurial capital maintenance. The marketing of infrastructure services would allow the owning enterprise to focus on the maintenance of an integrated income stream.

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Entrepreneurship has a tremendous impact on the economic development of a country. As can be expected, many public policies foster the development of self- entrepreneurship in times of unemployment, praise the creation of firms and consider the willingness to start new ventures as a sign of good fortune. Are those behaviours inherent to a human being, to his genetic code, his psychology or can students, younger children or even adults be taught to become entrepreneurs? What should be the position of universities, of policy makers and how much does it matter for a country? This book presents several articles, following different research approaches to answer those difficult questions. The researchers explore in particular the psychology of entrepreneurship, the role of academia and the macroeconomic impact of entrepreneurship.

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