

Economic Calculation, Complexity, and Cyber-Communism: Bad News for the Austrian School

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Abstract: For the Austrian School, the problem of efficient allocation of scarce resources is not *computational* in nature (ability to collect and process data) but *economic-entrepreneurial* (human assessment and decision around new ends and means of productive activity), and that can only be resolved through exchanges and private property rights, thereby making the market an experimental and decentralized entrepreneurial process. This thesis has two variants: the Misesian emphasizes the role of economic calculation as an entrepreneurial appraisal made in conditions of uncertainty; and the Hayekian the coordinating role of entrepreneur in the face of the cognitive limits of agents (where omniscience is impossible). In this article, we show the inconsistency of this thesis in both its variants and argue that the theory of *cyber-communism* offers a solution that combines *technological* and *institutional* responses to the not merely computational complexity of the allocation problem.

Key words: economic calculation; complexity; economic planning; cyber-communism

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The Thesis on the Impossibility of Economic Rationality in Socialism

The Nature of the Economic Problem

The debate on economic calculation addresses the problem of the rational allocation of scarce resources in *complex* (with highly developed divisions of labor)

and *dynamic* economies (subjected to continuous changes in preferences, products, techniques, resources, and costs). Given scarce resources, decisions around the use of a factor must be compared with the alternative uses, and this requires some measure of allocative efficiency, that is, a measure that allows production costs to be compared—in order to choose the most efficient combination of factors—along with the satisfaction of preferences. It is, therefore, to use an economic calculation of costs and benefits to satisfy with greater efficiency (at the lowest possible cost) both the consumption preferences and the most urgent needs of a population, taking into account that each individual possesses a different scale of values and preferences that also changes over time. This allocative problem faced by any complex social system, whether capitalist or socialist, is known within the framework of this debate as *the fundamental economic problem*.

Thus defined, the economic problem is not merely *computational* in nature: it cannot be reduced to a simple technical problem of data processing and the optimization of resources that are considered given. This would be a static approach, typical of neoclassical theory and general equilibrium models, which take as given (i.e., known) the information on the *ends* and *means* of economic activity (what, how much, when, how, and where to produce and invest).

On the contrary, this is an essentially *economic* problem of human evaluation and choices around alternative uses of scarce resources to establish efficient social coordination and to promote economic development. This requires the recognition that, in productive activity, there is always a genuinely creative and experimental aspect to identifying new goals and the appropriate means to achieve them. In this sense, the productive decision is never limited to a framework of already given ends and means, as in the neoclassical approach, where the notion of efficiency presupposes that the task of identifying ends and means has been previously undertaken.

The Austrian Thesis

For authors of the Austrian School—whose arguments on this point are hegemonic, even on the academic and political left—only the market (based on private property rights and driven by the free exercise of entrepreneurship of the agents) is capable of solving this economic problem. Thanks to its decentralized structure and experimental operation, the market can *create* new information as well as the necessary incentives to achieve the *dynamic efficiency* of the economy, continuously widening the so-called production possibility frontier. Any attempt to go beyond market allocation would therefore be doomed in advance to failure. Consequently, socialism would constitute a logically inconsistent project, a mere “intellectual error” (Huerta de Soto 2010).

The proposals of the so-called “market socialists” of the 1930s (Lange, Lerner, Durbin, and Dickinson’s mathematical solution) would not be appropriate, because these are based on neoclassical general equilibrium models that take as given the information necessary to optimize the economy, and because they eliminate the driving force of the entrepreneur, who is guided by the incentives generated by property rights. Such authors would thus confuse an analytical tool for explaining in a simplified way how the process of market equilibrium operates with the design of a mechanism capable of supplanting the details of market real processes.

Likewise, the most current model of cybernetic planning proposed by Cockshott and Cottrell (1993) is unable to deal satisfactorily with the allocation problem, which is again misinterpreted as a mere computational problem of maximization under restrictions, technical in nature (Barbieri 2004).

In short, the key is to understand that this is not a question of optimization that can be solved like an engineering problem; rather, it is an entrepreneurial problem entailing knowledge, since we know neither the ends nor the means of productive activity in advance. The data usually taken as the basis in the various proposed models of socialism are not given, but are in fact the result of the creative operation of the market itself. In order to be viable, socialism would have to establish an alternative institutional structure capable of creating new information and appropriate incentives; however, the suppression of private property and market transactions would prevent this.

This conclusion also carries a decisive and current implication that is macroeconomic in nature. By rationally allocating at the micro level—and being a rational and spontaneous order planned by no one—the market would further allow aggregation and evolution solutions to diverse social problems at the macro level, also dealing with the biophysical limits of the planet and solving the current crisis of environmental sustainability (energy, minerals, raw materials). Thus, the market could continue to develop social complexity; or put into Marxist terms, the capitalist relations of production would not for the moment impose a social limit on the development of productive forces, because these relations would permit to deal effectively with the problem of finite natural resources.

Two Variants of the Austrian Thesis

The above argument can be taken as the common and general contemporary position of the Austrian School against socialism, a result of reinterpretation of the debate on economic calculation that this same School undertook in the 1970s and 1980s by way of works from Kirzner (1973, 1988) and Lavoie (1981, 1985). Since that time, however, and based on its common acceptance, the Austrian critique of the possibility of economic rationality in socialism has developed into two

progressively distinct variants, each associated with one of the School's two principal figures: the current that continues the original contribution of Mises on the specific problem of calculation, and the one that follows Hayek's later contribution on the problem of dispersed knowledge.

Misesian scholars believe that these are actually two kinds of criticism, and that Mises's original argument on calculation is logically prior to (and much more fundamental than) Hayek's argument based on dispersed knowledge, which some consider confusing and even wrong. Meanwhile, the Hayekians understand that these are two complementary and interrelated approaches, and that Mises's contribution should be seen as a particular application of Hayek's more general critique of social engineering.

In fact, this divide refers to methodologies and conceptions of society that were likewise differentiated, and this was consummated during the 1990s, when based on two influential interventions by Salerno (1990, 1993) followers of Mises promoted the "dehomogenization" of the contributions of Mises and Hayek to the problem of economic rationality in socialism. For the so-called praxeological wing descending from Mises, society constitutes a "rational order" deriving from the faculty of people to act consciously thanks to the price system, which allows for calculation of the result of a deliberate action within the social division of labor and, thus, the ability to make the most valuable use of resources. For the Hayekian wing, society is conceived as a "spontaneous order" whose fundamental institutions and norms are the result of social evolution, and the primary function of the monetary price system is to permit the articulation of "the knowledge of the particular circumstances of time and place" (Hayek 1945, 521)—a sort of knowledge necessary to ensure social coordination. In what follows, we present each variant separately, to later submit them to criticism.

Economic Calculation Problem (Mises)

Mises ([1920] 1990, [1949] 1998) and his followers (Rothbard 1991; Salerno 1990, 1993, 1994, 1996; Hoppe 1996; Klein 1996; Foss and Klein 2004, 2012; Hülsmann 1997; Bylund and Manish 2017) consider that the main problem of socialism—which condemns it in advance to failure—is the impossibility of its carrying out economic calculation in the absence of market processes.

These scholars argue that, when the market is suppressed, it becomes impossible to determine the value of the different alternatives of possible productive action, thereby annulling rational choice. In a complex economy, given the enormous variety of available techniques (because each means of production has an infinity of possible uses), the value of the different alternatives cannot be judged directly. Rather, this process requires the use of a *unit of measurement* in which the value of the different alternatives can be expressed in order to make them

comparable. In capitalist economics, monetary prices allow economic calculation to be carried out when comparing the benefits generated by an activity with the costs of the resources used. But, without a market or money, Mises writes, one “cannot reduce to a common denominator the items of various materials and various kinds of labor to be expended,” so that one cannot when “comparing costs to be expended and gains to be earned, resort to any arithmetical operation” (Mises [1949] 1998, 694); consequently, it is impossible to choose the most efficient technique.

Now, for the Misesian authors, economic calculation is not a technical phenomenon nor a matter of engineering but rather a strictly economic task consisting of appraisal and entrepreneurial decisions made under uncertainty. It involves the entrepreneurial forecast of losses and profits of an investment by estimating future prices in order to allocate the means of production (the “capital”) to the most profitable uses and so satisfy the most urgent consumption preferences of the population. If an entrepreneurial judgment made on a certain investment turns out to be correct, then the agent obtains a profit; if the judgment has been incorrect, the agent will incur losses. From this point of view, private property (property rights) and monetary prices are the only institutions that permit the calculation of costs and benefits and, therefore, the rational action of agents. In the absence of these, socialism simply cannot calculate or distribute the means of production efficiently.

For all of these reasons, the Misesians conceive of the market as a dynamic entrepreneurial process based on calculation whose driving force is the capitalist entrepreneur who forecasts, evaluates, and faces risk in the midst of uncertainty, seeking profits and avoiding losses.

Knowledge and Complexity Problem (Hayek)

On their part, for Hayek (1945) and his followers (Kirzner 1973, 1988; Yeager 1994; Boettke 2005; Horwitz 2010; Huerta de Soto 2009, 2010; Stalebrink 2004; Barbieri 2004), the fundamental problem of socialism lies in the impossibility for the planning body to centralize the dispersed or local knowledge required to establish economic coordination in society.

From this perspective, ensuring the optimal use of resources in a large economy requires the use of knowledge disseminated among agents (which Hayek calls “knowledge of the particular circumstances of time and place”). This sort of knowledge is largely tacit, and the productive decision depends upon such to permit quick adaptation to the continuous changes that characterize complex economies. This then becomes a matter of dealing with the complexity inherent in trying to coordinate individual plans while recognizing the limits of human knowledge.

Thus, the Hayekian problem of knowledge refers to the complexity of social coordination in economies with a highly developed division of labor.

For the Hayekians, the complexity of the allocation problem—which exceeds the cognitive capacity of the agents—is resolved in either an unconscious or planned way through the market, which makes capitalist society a “spontaneous order” (Hayek 1982, 1988). Being a decentralized structure, the market is subject to processes of error correction and learning that allow the agents to adapt through continuous feedback and, in this way, to test the various “entrepreneurial hypothesis” in play. Here the price system acts as a mechanism for information transmission (“telecommunications system”) that eliminates the need for omniscience, since no participant or organism needs to know all the details of the allocation problem in order to achieve social coordination.

From this perspective, the result of the economic calculation carried out by entrepreneurs (as analyzed by the Misesians) would be precisely “the use of knowledge in society” that characterizes Hayek’s “spontaneous order.” Therefore, the complexity of the economic problem despite the limits of human knowledge can be treated only in a decentralized way through the monetary price system; and as no planning body is omniscient, none could possibly solve it.

In accordance with all of the above, the market in the Hayekian perspective is conceived as a “discovery procedure” where the concept of “entrepreneurship” is one of “alertness” in the face of opportunities for profit that arise amid the imbalances inherent to continuous economic change.

The following table summarizes and compares the main characteristics of these two approaches.

Table 1. Two Variants of the Austrian Critique of Socialism

<i>Author</i>	<i>Problem</i>	<i>Methodology/ Epistemology</i>	<i>Society conception</i>	<i>Market conception</i>	<i>Price system</i>
Mises (Rothbard, Salerno, Hoppe, Hülsmann, Klein, Foss)	Economic calculation	Praxeology Methodological individualism	Rational order	Entrepreneurial appraisal and judgment procedure	Result of the entrepreneurial action
Hayek (Kirzner, Yeager, Horwitz, Boettke, Barbieri, Soto)	Disperse and tacit knowledge Social coordination and complexity	Evolutionism	Spontaneous order	Entrepreneurial discovery and learning procedure Alertness	System of telecommunications

Critique of the Two Variants of the Austrian Thesis

Now we shall proceed to evaluate whether the Austrian thesis on the impossibility of socialism is sustained or not, examining to this end the consistency of the two variants described, the Misesian problem of calculation and the Hayekian problem of knowledge. We will observe that the former is based on a circular argument without relevant implications for calculation under socialism, since what is considered necessary for calculation (essentially: entrepreneurial judgment under uncertainty) already presupposes a market framework; also pertinent here is the fact that today it has become technically possible to exhaustively estimate costs in labor terms, including for the extraction of natural resources. For its part, the Hayekian problem of dispersed knowledge can today be technologically resolved via cybernetic coordination of the economy, and through processes of automation that tend to nullify tacit knowledge, and also due to the fact that existing institutional formulas are capable of encouraging entrepreneurial experimentation in a decentralized manner within a framework of social ownership of the means of production.

For each variant of the Austrian thesis, we first set out the core of our critique and then examine it in the light of well-known textual references from the Austrian authors themselves.

Critique of the Misesian Argument

As we have noted on other occasions (Nieto and Mateo 2020; Nieto 2022), the Misesian argument is based on purely circular reasoning, given that it defines economic calculation on the basis of the characteristics adopted in a market framework, to derive from there, tautologically, that without a market there can be no rational calculation.

In this way, Mises and his followers tell us that the market (which they have defined as a competitive process based on the economic calculation carried out by entrepreneurial owners) is necessary so that these same entrepreneurs can calculate within the market. Quite a discovery.

Nevertheless, evaluating under conditions of uncertainty the costs and benefits of investing private resources based on an estimation of future prices is obviously something that must be done if we are already operating within a market framework. This type of entrepreneurial appraisal is inherent to acting in the market. By definition, if production is atomized and resources are private, then each individual owner must necessarily make entrepreneurial judgments and risky decisions in the midst of uncertainty, seeking gains and trying to avoid losses so as not to be swept away by the competition. In short, everything that the Misesians tell us is needed for calculation (entrepreneurial appraisal of private resources) presupposes

that we are already in the market; therefore, logically, this has no bearing on the viability of socialism as an alternative economic order.

It is a logical fallacy to seek to prove that rational calculation requires the market (private property, entrepreneurial judgment, and competitive price formation) on the premise that economic calculation is itself market-based. The monumental tautology is clear: economic calculation is defined from the market, and, in a circular fashion, the market is defined from economic calculation. The result is that the market forms of economic operation are projected onto any type of society, accepting them as valid in an ahistorical sense, as if they were the only possible forms, and it is thus further certified that where there are no market processes—as with socialism—then there can be no economic rationality. In short, the Austrian authors take the features of a specific social order, such as the capitalist one, for general conditions that would define any complex social order.

It should be noted that the circularity of the Misesian argument is an inevitable result of the methodological individualism upon which the Austrian School (and particularly the Mises-inspired current) is based. This perspective takes as a premise of social analysis what it really should take to explain: the existence in a certain historical society (capitalism) of human actions of an entrepreneurial nature. However, entrepreneurial action can never be taken as a legitimate basis to explain (by aggregation of individual behaviors) the nature and functioning of capitalist society, because far from being a trait of human nature (as postulated by the Misesian *praxeology*), it is a particular type of action that the capitalist competitive framework imposes on the agents. In fact, all the attributes that the Misesians identify as belonging to entrepreneurs (appraisal and judgment, decision under uncertainty, risk management, etc.) are actually demands and characteristics derived from the market framework of private production, where competition, opacity, and uncertainty are all systemic traits.

In Misesian methodological individualism, the cause of the market order is taken as its effect—the entrepreneur action—meaning a specific way that individuals must relate to one another within a certain historical framework; in this way, they reverse the explanatory causality between social rules and human behavior. The most obvious and decisive consequence of this analytical inversion is that it naturalizes the mercantile social environment¹ and prevents the conception of alternative social orders by projecting on such the characteristics of the capitalist mode of production. Below are some textual references.

von Mises

From his seminal 1920 article onward, Mises ([1920] 1990) bases his entire critique of socialism on the alleged impossibility of calculating the cost of productive inputs without markets. In *Human Action*, he offers the example of building a

house and points out that the director of this project is presented with a wide variety of options. Nevertheless,

[h]e cannot reduce to a common denominator the items of various materials and various kinds of labor to be expended. Therefore, he cannot compare them. He cannot attach either to the waiting time (period of production) or to the duration of serviceableness a definite numerical expression. In short, he cannot, in comparing costs to be expended and gains to be earned, resort to any arithmetical operation. (Mises [1949] 1998, 694)

Without entering into an assessment of the effectiveness of the rudimentary methods of calculation and allocation used in Soviet-type economies, the truth is that, under current technological conditions, it is already perfectly possible to carry out an exhaustive calculation of labor costs (both direct and indirect, in the form of *vertically integrated labor coefficients*, and reducing the different levels of qualification to a common denominator) for the different goods and services, and also to process all this information in real time (Cockshott and Cottrell 1993; alternative method in Daprich 2020). This calculation can also be extended to natural resources—which Mises denied—using marginal labor time as a measure of cost, and this permits accounting for the increasing difficulty of extracting non-reproducible resources (Cottrell and Cockshott 1993). Likewise, the computational complexity of the calculations necessary to plan a developed economy, including optimization solutions for non-linear functions, is already technologically feasible (Cockshott and Cottrell 1993; Härdin 2021, 2022).

In passages from the same book frequently cited by his followers, Mises considers that the motor of the market process is the entrepreneur-capitalist, who performs an entrepreneurial function, and not the corporation manager, who performs a mere managerial function. He writes:

The market of the capitalist society also performs all those operations which allocate the capital goods to the various branches of industry. The entrepreneurs and capitalists establish corporations and other firms, enlarge or reduce their size, dissolve them or merge them with other enterprises; they buy and sell the shares and bonds of already existing and of new corporations; they grant, withdraw, and recover credits; in short they perform all those acts the totality of which is called the capital and money market. It is these financial transactions of promoters and speculators that direct production into those channels in which it satisfies the most urgent wants of the consumers in the best possible way. (Mises [1949] 1998, 704)

And he adds:

The speculators, promoters, investors and moneylenders, in determining the structure of the stock and commodity exchanges and of the money market, circumscribe the orbit within which definite minor tasks can be entrusted to the manager's discretion . . . Our problem does not refer to the managerial activities; it concerns the allocation of capital to the various branches of industry. The question is: In which branches should production be increased or restricted, in which branches should the objective of production be altered, what new branches should be inaugurated? . . . Those who confuse entrepreneurship and management close their eyes to the economic problem . . . The capitalist system is not a managerial system; it is an entrepreneurial system. (Mises [1949] 1998, 704)

Our first response is that none of this has to do with the problem of calculating costs (with some unit of measurement) for adoption of the most efficient techniques, which was the original and explicit problem of Mises in his work ([1920] 1990) and in the famous earlier example of the house. Second, these paragraphs only tell us that it is “entrepreneurs and capitalists” and not “corporation managers” who “allocate the capital goods to the various branches” in “the market of the capitalist society” (and not in another!); we do not know what objection such triviality could pose to a socialist economy where it is society that controls investment (through procedures that can be quite varied), and to which the demands of a competitive business environment need not apply. What would be the true logical and institutional impediment to distributing the means of production among the branches and satisfying consumption preferences in other ways? It is only if we locate ourselves within a market framework that the action of speculators and private investors would be required, with the proviso that those who act are actually contracted agents and not the direct shareholders (that is, the capitalists), who carry out a wholly rentier-oriented and parasitic role.

Joseph Salerno

This author points out as an essential feature of economic calculation the appraisal under uncertainty that entrepreneurs undertake in order to embark on projects that may be profitable and to avoid those that will incur losses:

. . . I conceive appraisal as neither knowledge nor arithmetic, but as something new under the sun, introduced into the world only when the institutional prerequisites of a market economy are fulfilled. The social process of appraising thus transcends the purely individual operations of knowing and computing at the same time that it complements them in creating the indispensable conditions

for rational choosing by entrepreneurs and resource owners cooperating in the division of labor. (Salerno 1994, 113–114)

Therefore, according to his own words, “only when the institutional prerequisites of a market economy are fulfilled” can there be “appraisal,” and tautologically such “appraisal” creates “the indispensable conditions for rational choosing by entrepreneurs and resources owners,” that is, the conditions for rational action in a “market economy” (which is where there are “entrepreneurs and resource owners”). Thus, appraisal depends on the market and serves to act within what it depends upon. Here the obvious question is what all this has to do with the viability of socialism. What this author considers to be the key or necessary condition (the active entrepreneur who commits resources while evaluating future prices, driven by the search for profit) certainly is one, but not for economic calculation in general, in any social system, but only for calculation and action within a capitalist environment based on private property and competition.

Salerno also recognizes that the entrepreneurial process of evaluation would not be necessary if the economy moved in a “proximal equilibrium” in which there is no “genuine uncertainty,” since in this case the “current prices are an approximately correct guide to the future prices” (Salerno 1994, 116) and are thus suitable for allocating resources. Precisely this sort of a situation of “proximal equilibrium” would be representative of a cybernetically planned economy, where there is neither competition nor market uncertainty (Cockshott and Cottrell 1993; Cockshott and Nieto 2017; Härdin 2021, 2022; Nieto 2022). Only in an atomized economy such as the capitalist is uncertainty systemic and reproduction turbulent, with chaotic and spiral dynamics, speculation, and very strong price fluctuations. Thus, according to Salerno’s own criteria, overcoming the capitalist market would make unnecessary the competitive process of entrepreneurial evaluation under uncertainty, along with the forecast of future prices for optimal decisions around allocation.

Murray N. Rothbard

Following Mises ([1949] 1998) and Salerno (1990), Rothbard likewise highlights the central role of the entrepreneur in performing economic calculation by evaluating future prices in uncertainty:

... the knowledge conveyed by present—or immediate “past”—prices is consumer valuations, technologies, supplies, etc. of the immediate or recent past. But what acting man is interested in, in committing resources into production and sale, is *future* prices, and the present committing of resources is accomplished by the entrepreneur, whose function is to *appraise*—to anticipate—future prices, and to

allocate resources accordingly. It is precisely this central and vital role of the *appraising entrepreneur*, driven by the quest for profits and the avoidance of losses, that cannot be fulfilled by the socialist planning board, for lack of a market in the means of production. Without such a market, there are no genuine money prices and therefore no means for the entrepreneur to calculate and appraise in cardinal monetary terms. (Rothbard 1991, 66)

This paragraph is a magnificent example of the Misesian tautologies that we denounce: it tells us that “what acting man is interested in, in committing resources into production and sale”—that is, what interests the person already acting *within a market framework*—are the “future prices,” and that the function of the entrepreneur “is to appraise—to anticipate—future prices, and to allocate resources accordingly”; to then affirm, in a circular fashion, that this specific “appraising entrepreneur,” which has been defined as the central feature of performance in the market, cannot be performed by “the socialist planning board” . . . in an economy where no market exists! But it should be evident that if we do not operate within a market system and are therefore not “committing [private] resources into production and sale,” then logically we don’t need the “*appraising entrepreneur*, driven by the quest for profits and the avoidance of losses.” Future prices, which are the result of the appraising entrepreneur, only “exist” and make sense as entrepreneurial speculation within the capitalist market itself. Outside of this framework, the allocation of resources requires no estimation of future prices of any type (but perhaps the future evolution of certain relative productivities, which does not depend on the existence of any market).

Aside from future prices that only private investors would need to calculate, Rothbard acknowledges that the knowledge conveyed by prices of the present (or immediate past) are things like “consumer valuations,” “technologies,” or “supplies”—information that under current technological conditions can be transmitted without problem, and even more quickly and efficiently (without short circuits or distortions by private investors) in a planned cyber-economy.

N. Foss and P. G. Klein

Following the ideas of Knight (1921) on uncertainty and of Mises ([1949] 1998) on the entrepreneurship, these authors emphasize the role of entrepreneurial judgment in the process of appraisal on which economic calculation would depend. They link the concept of entrepreneurship-as-judgment with the theory of the firm and contracts (transaction costs and property rights). They write:

Judgment primarily refers to the process of businessmen forming estimates of future events in situations in which there is no agreement or idea at all on

probabilities of occurrence. Judgment is learned and tends to have a large tacit component. Entrepreneurship represents judgment that cannot be assessed in terms of its marginal product and which cannot, accordingly, be paid a wage. This is particularly because entrepreneurship is judgment about the most uncertain events, such as starting a new firm, defining a new market, and the like... Judgment thus implies asset ownership, for judgmental decision-making is ultimately decision-making about the employment of resources. (Foss and Klein 2004, 9)

Regarding entrepreneurial judgment, what has already been said applies here equally: such judgment refers directly and exclusively to a market framework based on “businessmen” and only makes sense within it, since the type of uncertainty to which these authors refer is the uncertainty derived from the private production of commodities. In any case, in modern companies (and more clearly with institutional investors, venture capital, etc.) the entrepreneurs who decide on the use of resources are usually not the owners (shareholders) themselves. Rather, the rights of proximate or practical control of resources are delegated to non-owners in the framework of a principal/agent relationship. This is why private property merely represents a legal relationship that permits the appropriation of income without fulfilling any function in business life (assessment, decision, and allocation of resources).

They further point out that “most assets have unspecified, not-yet-created or not-yet-discovered attributes, and an important function of entrepreneurship is to create or discover them” (Foss and Klein 2004, 15). However, shortly afterward, they openly recognize that property rights are neither an incentive nor an essential condition for this, since such creative work and discovery of the best use of resources can equally be carried out by a “franchisee,” an “employee,” or a “CEO” (19). Contradicting their central thesis, they conclude that “we here use the term ‘entrepreneurship’ more broadly than before, referring not only to decisions made by resource owners (entrepreneurship in the strict sense), but also to decisions made by employees, acting as proxy decision-makers for the resource owners” (19). Clearly, there is nothing here that cannot be replicated in a socialist economy.

Ultimately, these inconsistencies are the inevitable result of the Misesian approach to the problem of economic calculation. Elsewhere they write:

In any environment, then—socialist or not—where a factor of production has no market price, a potential user of that factor will be unable to make rational decisions about its use. Stated this way, Mises’s claim is simply that efficient resource allocation in a market economy requires well-functioning asset markets. To have such markets, factors of production must be privately owned. (Klein 1996, 8)

But by definition, “market prices” can only exist in a market environment, not “in any environment.” If we want to speak of “any environment,” then the allocation cannot imply a particular characteristic (“market prices”) of a particular environment. Thus, the form (commercial) is here confused with the content (cost), since each economic system has its own particular ways of determining costs and rationally allocating resources. Eventually, the authors state that in order to function properly, a “market economy” needs “asset markets.” Here again the question becomes: what has any of this to do with socialism?

I. Băltătescu and P. Prisecaru

These authors reformulate Murphy’s (2006) argument based on Cantor’s theorem to point out the limits of computability in socialism. They seek to show that, in order to plan, it is necessary to have an “infinite uncountable list of prices.” This is the case not only because if you want to imitate the market, then “the list of goods to be produced is always an open one,” since “it is necessary to take account of all possible future goods and commodities that can appear on the market (all possible fiction books, movies, services and also all the intermediate goods)” (Băltătescu and Prisecaru 2009, 1403), but also because the values are subjective (depending on who evaluates, and in what situation) and therefore the possible valuations would be infinite.

Thus, the response of Cottrell, Cockshott, and Michaelson (2007, 2009), who stated that the number of all commodities is necessarily countable, would not be valid here, since “every commodity is produced from a discrete and finite amount of other commodities.” The reason would be that “[f]rom this perspective [subjective value theory], it cannot be sustained that there is a one-to-one correspondence between the set of physical units of the commodities and the set of their possible prices” (Băltătescu and Prisecaru 2009, 1405).

According to these authors, this would be manageable in the market—that is, it would not be necessary to take into account all possible prices, as individuals operate within a finite domain—because:

The individuals express their preferences in relation with the properties they possess. The preferences of the individuals are expressed in the exchanges they make on the market. But they cannot make an infinite number of exchanges, because they possess only a definite amount of things that can be exchanged. From this perspective, the set of preferences of the individuals on the market is a finite set. In a society based on collective forms of property, the preferences of the individuals are not really limited. They may express how many preferences they want to, and a central planning unit must take into account all these preferences

... [T]he central planning unit has to take into account all possible preferences and all possible prices in its planning activity. (Bălătescu and Prisecaru 2009, 1405)

Honestly, an initial reaction to this approach is to wonder whether it isn't a joke. Can it really be believed that, in order for socialism to be viable, the planning authorities would have to take into account the price of "all possible future goods" that they can imagine, including flying brooms powered by nuclear micro-reactors? Are these authors also implying that under conditions of social property each individual would have different preferences about how to combine *all* the means of production in the economy, and that the planning board would have to take these into account? Can this be seriously considered a real objection to socialism?

Without delving deeper into the inconsistencies of the subjective theory of value on which this argument is based, it should be recalled that planning is not a question of anticipating individual preferences, nor of trying to harmonize them to establish a happy Arcadia, but rather to regulate the economic process in a conscious, rational, and democratic way. Toward that end, nothing that these authors propose is the least bit necessary.

In any case, it is obvious that in socialism, the resources available to agents are also limited, and their preferences are also expressed in relation to the resources they manage. These authors explicitly recognize this idea in the case of consumers, whose resources would be limited according to their contribution to production, and (as in capitalism) only those preferences expressed through purchasing decisions would be taken into account. But then following Mises, they add that the distribution of the means of consumption by preferences cannot save socialism, because the real problem is with the investors (the planning bodies in charge of deciding the allocation of resources), due to social property. However, this makes no sense. The organizations in charge of investing under socialism also manage (that is, assess and decide upon) those limited resources assigned to them by the Strategic Plan (see Section 3). And the cost of the different investments can be calculated perfectly in terms of labor. In short, the ability to calculate is completely unrelated to whether the available resources are subject to private property rights or not.

Critique of the Hayekian Argument

Regarding the Hayekian problem of dispersed knowledge and its relationship with social complexity, we can affirm that this no longer presents a real impediment to resolving it, in either *technological* or *institutional* terms.

On the one hand, the development of ICT (Information and Communications Technology) has made possible, for the first time in history, a true cybernetic

planning of the economy that would allow all information scattered among producers and consumers to be articulated and processed in real time. Moreover, this can be done in a much more efficient way than through the rudimentary mechanism of monetary prices: more rapidly, without short circuits in information flows derived from the uncertainty and opacity typical of private production; and with more detailed and multi-dimensional information (not only related to price variations). The infrastructures and scientific-technical procedures to carry this out are already operating widely within the framework of today's large capitalist corporations. If the price system constitutes a "telecommunications system," as Hayek asserts, then we can certainly replace it with a more technologically advanced one. Today it is definitely technologically possible to manage and balance a complex economy, subject to continuous changes in preferences and offers, without the need for a monetary price system. It also happens that a good portion of the tacit knowledge that Hayekians speak of (skills, experience) is being rapidly overcome by automation processes that codify by way of computer software all the knowledge necessary to organize the technical division of labor in each company (industry 4.0). And in any case, that tacit knowledge which could also subsist in socialism, would be recorded in the form of different efficiencies, costs, or qualities of the products obtained.

On the other hand, from the institutional point of view, there is no formal or consubstantial property inherent to a planned economy that would prevent it from promoting a creative, decentralized, and experimental process to develop new ends and means of productive activity. To do this, it would only be necessary to design a plural and multi-level institutional structure, capable of distributing responsibilities among very different actors and equipped with an adequate system of incentives, including formulas to encourage entrepreneurial talent on new productive projects ("entrepreneurial hypotheses," subject to trial and error), all within a framework of social ownership of the means of production and without commercial relations. We have already proposed a design of this type in Nieto and Mateo (2020) and Nieto (2022). We will return to this topic in Section 3.

It is not the case, therefore, that planning authorities would have to be "omniscient" in order to coordinate an economy, or that "data" on new ends and means of productive activity must be taken as "given," gathered into "a single mind" (or super-computer, or central artificial intelligence). All of this is absurd, and the Hayekian critique of so-called "social engineering" is simply a straw man.

Let us recall that for Hayek (1967) and his followers, the degree of complexity of a phenomenon refers to the minimum number of elements necessary to allow it to be described satisfactorily. The fundamental difference between the study of simple and complex phenomena lies in the fact that the relationships between individual elements do not matter in explanation of the former, while such

relationships are essential to explaining the latter. The impossibility of foreseeing details of a complex pattern due to lack of knowledge would imply the impossibility of centrally building and controlling such a system (Barbieri 2004, 21). Hayek calls these complex structures “spontaneous orders,” one of the characteristics of which is an internal mechanism for information-feedback and error correction; examples could include natural selection in biology, or the market mechanism of supply and demand.

But as we have already noted, a cybernetically planned economy is not only compatible with an information-feedback mechanism capable of mobilizing and articulating dispersed information, but it can make such a mechanism more fully functional than market economies, for two main reasons: i) *institutional*, because it would permit the involvement of more actors, decision levels, and control variables in monitoring the economy; and ii) *technological*, because the coordination of production would have a scientific-technical (cybernetic) basis that eliminates opacity and allows real-time processing of a greater volume of multi-dimensional information (economic, ecological, social, geographic)—well beyond the reach of the primitive system of monetary prices, which compresses into one number (a price: a single dimension) the complex (multi-dimensional) information on the “particular circumstances of time and place” involved in the production of each commodity.

The error of the Hayekians consists in thinking that socialist planning means or intends to “foresee” economic details of future or individual consumption preferences, when in fact its intention is to democratically set development objectives and to rationally adapt the means necessary to achieve its goal. Below are some textual references.

F. Hayek

In his polemic against the “market socialists” of the 1930s, Hayek admitted that the alleged impossibility of rationally allocating resources under socialism was not theoretical or logical, as Mises had argued, but rather practical. The problem as he saw it was in the huge volume of information needed to perform calculations, and in the difficulty of solving millions of equations, which would exceed the power of algebraic analysis. This included the impossibility of effectively adapting to continuous changes in economic variables. Shortly afterward, in his “knowledge articles,” Hayek also rejected the notion that a planning authority could centralize all the relevant data to calculate and allocate resources efficiently. He wrote:

The knowledge of the circumstances of which we must make use [to calculate] never exists in concentrated or integrated form, but solely as the dispersed bits of incomplete and frequently contradictory knowledge which all the separate individuals possess. (Hayek 1945, 519)

Thus, the real problem that Hayek points out is strictly *practical* in character, which is to say *technological*. But if the system of monetary prices makes it possible to transmit information and to socially articulate the dispersed knowledge of agents, why could current ICTs not do this as well or better in an economy without private property? What sort of knowledge related to the “particular circumstances of time and place” could not be transmitted in a network system such as cybernetic socialism? Consumption preferences, relative shortages, variation in stocks, costs, production decisions? Obviously, all of these aspects can be communicated in real time. Hayek’s argument depends on *the use of decentralized knowledge*, which technological developments now would fully permit in a socialist environment, as Misesians have openly recognized (for example, Hoppe 1996). In any case, every human organization within capitalism—public institutions, companies, families, associations—constantly centralizes and makes use of dispersed knowledge. If it were the case that knowledge could not be centralized in any way, then by *reductio ad absurdum* we must be living in a social framework of simple individual atoms, which is clearly not the case.

I. Kirzner

Kirzner (1973, 1988) follows Hayek in posing the problem of knowledge as one of coordination in complex societies. He understands coordination as a systematic process of adjustment in which agents mutually acquire information and knowledge that is increasingly complete and accurate in regard to their respective plans. Moreover, he believes that the driving force behind this process of adjustment is the figure of the entrepreneur, who must demonstrate “alertness” in order to take advantage of any profit opportunities discovered in economic imbalances. From this perspective, as in Hayek, competition is conceived as a process of “discovery” and “learning” that promotes social progress.

From the conception of entrepreneurship as “alertness to profit opportunities,” it follows that entrepreneurs need not possess assets to fulfill their balancing function, because appropriate incentives are enough. This alertness of entrepreneurship is therefore an “economic function” that can be performed by anyone capable of discerning a profit opportunity; it is not attached to a category of employment (i.e., self-employment) nor a type of firm (i.e., a startup). It is sufficient that the entrepreneur convinces persons with capital to invest in an idea. Kirzner writes:

Ownership and entrepreneurship are to be viewed as completely separate functions . . . The discovery of a profit opportunity *means the discovery of something obtainable for nothing at all*. The profit opportunity requires the investment of capital. But it is still correct to insist that the entrepreneur *qua* entrepreneur requires no investment of any kind. If the surplus (representing the

difference between selling price and buying price) is sufficient to enable the entrepreneur to offer an interest payment attractive enough to persuade someone to advance the necessary funds, it is still true that the entrepreneur has discovered a way of obtaining pure profit, without the need to invest anything at all. (Kirzner 1973, 47–49; emphasis in the original)

This conception of entrepreneurship as one of alertness and discovery (from which its coordinating function derives) has a decisive implication for socialism. While it may be true—as the Misesians warn—that the conception is insufficient or inadequate to describe the competitive market process, for that very reason it is (ironically) quite adequate to illustrate how entrepreneurship would work (and fulfill its coordinating function) in a planned economy where there is no private ownership of assets. Indeed, if the entrepreneur need not be a capitalist, as no assets are required to perform his or her coordinating role (only incentives), then both the entrepreneur and his or her social function can easily be adopted in a socialist economy. In this case, funds would be provided to the entrepreneur to develop a project not by a private investor but by a sectorial Investment Council accountable to society (see Section 3). In short, this vision would help enormously in designing entrepreneurial formulas for non-market frameworks, and thus can deal with the not merely computational part of the allocation problem.

We thus arrive at a devastating outcome for Austrian theory: in the Misesian approach to entrepreneurship—speculative judgments around private investment under uncertainty—we find pure tautology, without implications for the viability of socialism; while in Kirzner’s vision—alertness to profit opportunities without the need of assets—we have a rather poor description of the functioning of the capitalist economy, but for this very reason it is very useful for organizing and promoting economic creativity in socialism.

S. Horwitz

This author tries to reconcile the contributions of Mises and Hayek through the figure of Kirzner’s entrepreneur, who “provides a Misesian solution to a Hayekian problem” of coordination (Horwitz 2010, 98). Horwitz considers:

The economic problem is the coordination among producers and consumers that drive prices to costs. What Hayek argues needs further explanation is how the learning necessary to bring about that equilibrium . . . Kirzner’s work offers a solution to that problem in the form of the Misesian entrepreneur . . . [who] can, by seeing what has been previously overlooked and shifting the “given” means-ends framework, creating the knowledge necessary for people to make decisions that better align with the facts of the world and the expectations of other actors. (Horwitz 2010, 99; italics in the original)

But we have already said that balancing a complex economy and processing the changing information of “producers” and “consumers” in real time is perfectly possible with current information technologies. In the model of Cockshott and Cottrell (1993), consumer goods are valued with two types of “prices”: those that reflect their exact labor content, and those that allow a balancing of supply and demand, which fluctuate based on individual preferences. As regards the question of creating new knowledge about the means–ends to achieve economic coordination, nothing would prevent a generalized creative process from developing in a planned economy, as we have concluded elsewhere (Nieto and Mateo 2020; Nieto 2022) and will return to in Section 3.

F. Barbieri

This author reformulates Hayek’s problem of knowledge in terms of K. Popper’s evolutionary epistemology, where the key to dealing with the cognitive limits of agents in the allocation of resources would be the falsifiability of “entrepreneurial hypotheses.” Each entrepreneurial hypothesis (or entrepreneurship) requires different data analysis, and it is through competition that the different hypotheses are tested, thus ensuring by a selective process of conjecture and refutation the development of the knowledge necessary for efficient economic coordination, in what could be considered a variant of the mechanism of natural selection which operates in biology. As Barbieri argues:

In order to assume a learning process in a complex economic system, we must explain how the different hypotheses are generated as regards the changing local economic conditions (variation), how the process of correcting wrong hypotheses occurs (selection), how the knowledge acquired is preserved and transmitted (inheritance), and how these elements are related. A proposal for an alternative economic model or other learning process composed of these elements must at least replicate the complexity and richness of details found in real markets. (Barbieri 2004, 253; author’s translation)

Therefore, the complexity of the problem of allocation derives from the fact that the knowledge possessed by agents is always fallible and conjectural, alluding to the nature of the necessary knowledge rather than to the ability to collect and process data (a computational problem). However, no one is proposing that all productive projects be decided at a “center.” In our model (Nieto and Mateo 2020; Nieto 2022), the three necessary elements indicated by Barbieri are present: “variation,” or decentralized formulation of diverse business hypotheses; “selection,” or the mechanism for correcting failed hypotheses; and “inheritance,” or the transmission and preservation of acquired knowledge. Barbieri further affirms that it is

within the stock market that rival plans of businesspeople are debated; in our model, that role is played by Investment Funds and sectorial Investment Councils. In short, our proposal is not a form of “managerial socialism” that elides the decentralized experimental initiative; rather it is one that contemplates through concrete institutional formulas the participation of very diverse actors with well-defined responsibilities and incentives.

Cyber-Communism: The Answer to the Allocation Problem

Fundamentals

From the debate on economic calculation it became clear that the complexity of the allocation problem refers not only (or mainly) to the ability to process information already given—which would constitute a merely computational concern that could be solved as an engineering problem—but instead points to an essentially “economic” problem of human *evaluation* and *decision* around the *ends* and *means* of productive activity. For the Austrians, such complexity can be addressed only through exchanges and property rights, two institutions that make the market a creative and experimental entrepreneurial process. Any attempt to overcome such institutions would inevitably lead to lower stages of social development.

However, we have seen that the Austrian argument—whether in its Misesian or Hayekian variant—does not hold: it is based either on tautologies or on problems overcome by current technological development, or else on problems for which there already exist institutional formulas capable of providing a solution in a planned economy.

The certain fact is that today, for the first time in history, the necessary scientific-technical conditions have already been met to carry out effective cybernetic planning of the economy that allows for the comprehensive and real-time management of resources. We have termed this proposal for computer-assisted democratic planning *cyber-communism* (*cyb-com*), and it combines *technological* and *institutional* responses to the Austrian challenge around the (not merely computational) complexity of the allocation problem (Cockshott and Nieto 2017; Nieto 2022).

The first thing to be clarified about the nature of this project is that communist planning means nothing more than *conscious*, *rational*, and *democratic* regulation of the economy, as opposed to the blind, inefficient, and anti-democratic regulation that a mercantile economy implies. In this sense, cyber-communism is anything but an “algorithmic economy” or “government by algorithms.” On the contrary, it is a type of economy where, unlike in capitalist plutocracies, the processes of individual assessment and decision and those of democratic deliberation run throughout the entire economic operation: from the personal choice of

profession or means of consumption to the democratic definition of economic and social development objectives, passing through social control of investment, promotion of personal talents, and undertaking new productive projects. It is not the case, therefore, that a “super-computer” or “central artificial intelligence” attempts to “guess the desires and preferences of individuals,” “predict the future,” or “program social life.” Quite the contrary: what is proposed here is precisely to broaden the horizon of individual autonomy and democratic participation with the help of scientific-technical advances within a framework of social equality and full individual freedoms.

In this sense, the *cyb-com* economy would function as a network system, simultaneously centralized and decentralized and possessing an iterative information-feedback mechanism based on incentives that would allow actors to mutually adjust their behavior (a similar idea in Laibman [2020]). The purpose is to create a robust system where the daily actions of agents express and consolidate the principles and forms upon which the system itself is based, linking individual interest with economic and institutional self-reproduction. To establish general economic coordination, our model would combine two superimposed resource-allocation circuits or procedures that perform different but complementary functions (Nieto 2022). One of these manifests the *technological* response to the allocation problem and the other the *institutional* response: i) *scientific-technical coordination*: calculation in-kind and in labor time, mathematical optimization techniques, and input-output methodology, making use fundamentally of already given information (Cockshott and Cottrell 1993; Cockshott 2019; Hardin 2021, 2022); and ii) *experimental coordination*: design of an institutional structure to generate new information on the ends and means of productive activity, including the promotion of entrepreneurial talent (formulation of “entrepreneurial hypotheses”).

Next, we turn specifically to the second circuit to see how economic creativity and entrepreneurial talent can be freed from the shackles of private property rights.

Institutional Structure

The entire Austrian argument against socialism is based on an absurd and hyperbolic idea—a true straw man that the followers of this School continue to employ today, but which had its origin in Mises: “[In socialism] the employment of all factors of production is directed by one agency only. One will alone chooses, decides, directs, acts, gives orders [*sic*]. All the rest simply obey orders and instructions” (Mises [1949] 1998, 692).

Obviously, in a socialist economy, the ends and means of productive activity are not given, and they are not decided by “one will alone.” They must be created, and unlike under capitalism this is the responsibility of society as a whole, in a general, complex, and multi-level process involving extremely varied actors. It is

not (nor can it be) an algorithmic process, or one of engineering. To deploy this creative and experimental task in a socialist environment, it is necessary to design an institutional structure that specifies *who* (actors) determines those ends and means at each moment, along with *where* (level) and *how* (procedures and criteria) they are to be determined. In this design, the overcoming of private property and mercantile logic presents decisive advantages, since it allows: i) establishment of a *plural* structure of actors for evaluation/decision; ii) utilization of *multi-dimensional* criteria (economic, technological, social, ecological) for evaluation/decision, as opposed to the reductionist price system that collapses into a single number the complex information on “the particular circumstances of time and place” that pertain in each case; and iii) better distribution and definition of responsibilities, with segmentation of risks. In capitalism, this occurs in a completely distorted way, given the dominance of externalities and situations of “moral hazard” (where third parties bear the consequences of risks assumed by powerful actors) as well as common phenomena of contagions (bubbles, panics), crisis, or the socialization of losses that dilute individual responsibilities; moreover, incentives to act with a global and long-term vision are insufficient.

Without claim to exhaustive analysis, but with the sole intention of challenging the Austrian fallacy of “one will alone,” Table 2 presents a general outline of the institutional structure that in *cyb-com* would be in charge of creating new information about the purposes and means of productive activity.

In general, the deliberative and democratic procedures (at their different levels) refer to the *ends*, while assessments and decisions around the *means* to be used (how a good is produced, what inputs are required, etc.) are fundamentally technical and carried out by engineers, academics, economists, and entrepreneurs.

Table 2. Institutional Structure for the Creation of New Information

<i>Level</i>	<i>Actor</i>	<i>Procedures</i>	<i>Investment criteria</i>
Macro	1. Society whole	Democratic	Economic
	2. National authorities	deliberations	Social
	3. R+D+i centers and academia	Political decisions	Ecological
	4. Consumer councils	Technical decisions	Technological
Meso	5. Ministries	Democratic	Economic
	6. Industrial clusters and technological institutes	Political	Social
	7. Sectorial Investment Councils	Technical	Ecological
	8. Local and regional authorities		Technological
Micro	9. Productive units (industrial design departments)	Technical	Economic
	10. Startups and entrepreneurship	Entrepreneurial	Social
	11. Cooperatives and autonomous workers	Decentralized	Ecological
	12. Micro-patronage	citizen investment	Technological

Table 2 lists 12 different types of actors. We now refer very briefly to two of these, numbered 10 and 12, as they represent completely decentralized forms of investment and entrepreneurial experimentation (replicating formulas that operate in current capitalist economies) and provide a direct response to the problem of entrepreneurship highlighted by the Austrians. The institutional formula for type 10 has been developed by Nieto (2022), while the formula for type 12 is a new proposal first presented here.

Type 10: Startups and Entrepreneurship

The Strategic Plan decides the distribution of productive investment throughout the sectorial structure of the economy. Subsequent allocations to specific projects within each branch are carried out through two complementary channels: direct (centralized) allocation by the authorities to specific projects and programs; and indirect (decentralized) allocation through the sectorial Investment Councils (ICs), which are in charge of selecting and financing proposals presented by entrepreneurs in what constitutes a principal/agent relationship with incentives. More precisely, the resources assigned to each sectorial IC are managed by different teams (constituted as Investment Funds) that compete for optimal selection of the projects presented by entrepreneurs.

Type 12: Micro-Patronage

We propose an institutionalized citizen-crowdfunding formula to finance new business projects. This is about raising funds in a decentralized way through digital platforms that directly connect “citizen-investors” with startups, inspired by current forms of “decentralized venture capital” or “decentralized finance” (DeFi). Each individual would have a certain number of *labor bonuses*² that would not be available for their own direct personal consumption but that can be assigned to a business-productive project freely chosen from among all those proposed by the entrepreneurs. Thus, for example, practitioners of a certain minority sport might be interested in financing a project dedicated to manufacturing new specific sports equipment. The objective of this form of decentralized and free-choice investment is to prevent minority preferences of the population from being marginalized.³

We believe that development of the institutional structure shown in Table 2, and particularly of those procedures involving actors 10 and 12, would provide a complete response to the allocation problem pointed out by the Austrians. However, certain followers of this School such as Wang, Espinosa, and Peña-Ramos (2021), seeking to respond to ideas expressed by Nieto (2020) and Nieto and Mateo (2020), continue to insist that (private) property rights would be a necessary condition for entrepreneurship and dynamic efficiency. Nevertheless, in our estimation, none of our arguments have been adequately refuted. In the first

place, their answers have been a mere confirmation of the same circular reasoning and tautologies that we have already exposed: they insist on defining calculation and dynamic efficiency by the properties that they adopt in a market framework (property rights, competition) in order to (circularly) prove that without a market, there can be no calculation or efficiency. Thus, it is not surprising that they have failed to refute any of the many examples of tautological thinking that we have extracted from Austrian texts. Second, and revealingly, these authors avoid entering directly into our institutional formula for non-market entrepreneurship. Third, they attribute creative powers to a legal relationship (property rights), when under capitalism a good part of business activity is in fact delegated to hired agents (Denis 2017). Fourth, their text is full of false imputations: i.e., we do not at any point claim—indeed it would contradict all our arguments—that ICTs can replace human creativity, or that it is “feasible and efficient cultivation of dynamic efficiency and economic development through the current technological development, such as big data, artificial intelligence, machine learning, and supercomputers” (Wang, Espinosa, and Peña-Ramos 2021, 8). Moreover, bizarre ideas abound: “All human actions demand scarce means, but if all actions and means are co-owned, then no individual could say or do something without the approval of the rest of the community” (Wang, Espinosa, and Peña-Ramos 2021, 11).

In any case, regarding property rights as a supposed necessary condition for entrepreneurship, let other Austrians respond to our critics, most specifically P. Bylund, one of the most recognized specialists in the field. In a note published by the Mises Institute (with Hastings and Packard) on September 3, 2021, this author asserts something about incentives and entrepreneurship with which we could not agree more, and which invalidates the entire Austrian critique of the possibility of entrepreneurship without private property rights.

Why do individuals choose entrepreneurship? . . . money magnitudes do not express much of entrepreneurial motivation. Subjective values of purpose, meaning, achievement, personal fulfillment and others are primary. These cannot be captured in salaries, bonuses, awards, promotions and titles. The firms that master subjectivist motivations will be able to attract the best talent.⁴

Complexity and Ecological-Social Crisis

The development of social complexity is only possible in environments with high energy capacity and where the fundamental natural resources upon which society depends are guaranteed (Tainter 1988; Cockshott 2019). This is a restriction that is biophysical in nature and which no social system can avoid. The current crisis of environmental sustainability, especially as connected to the depletion and use

of fossil fuels, has been caused by the predatory logic of capitalism and threatens its very survival as a historical system, thereby questioning the current stage of development of the division of labor. Added to this is the congenital inability of this mode of production to generally meet the basic needs of populations.

The market thus reveals itself in an absolute way as a profoundly inefficient form of economic organization that prevents addressing the biophysical limits of the planet and preserving the levels of social complexity reached by humanity. The reasons are well-known: i) blind operation—based on profitability and compulsive accumulation—that prevents a rational social metabolism with nature; ii) turbulent reproduction, with periodic crises and imbalances of all sorts that generate a colossal waste of resources; iii) continuous increases in transaction costs and “unproductive” expenses (bureaucracy, marketing, advertising, lobbies, evaluation agencies); iv) increases in speculation through all kinds of assets; v) the generation of very poor information, transmitted slowly and in distorted ways; and vi) the prevention of long-term strategic action, which would require a general mobilization of resources, which is incompatible with private property rights.

All this has been translating over recent decades into a slowdown of technical progress, accompanied by a significant slowdown in the growth of labor productivity. In this scenario, as our global social and ecological crises worsen, the bourgeoisie will need to increase expenses related to maintaining its dominion (private security, bureaucracy, etc.), withdrawing more and more resources from productive activity and further slowing social progress. Diminishing marginal returns in production may be a physical law, but they affect a privately based economy subject to the blind logic of profit in a very different way than they would a democratically planned economy that can prioritize investments (Cockshott 2019). Thus, humanity is now facing a crucial dilemma: i) persevere in market forms of economic organization, which will lead to progressive social disintegration and may cause a return to more primitive forms of civilization; or else ii) advance to a higher social order in terms of both economic efficiency and real freedom and democracy (impossible to achieve under the autocracy of capital).

The *cyb-com* model we have outlined articulates the *technological* and *institutional* response to the problem of allocation.⁵ Furthermore, it allows free producers to “govern the human metabolism with nature in a rational way” (Marx 1991, 959), since democratic economic planning implies foresight, deliberation, concerted action, and economic accounting in-kind (not monetary) in order to account the total costs of the production processes, including the replacement costs of renewable resources. Only a *cyb-com*-type economy, definitively liberated from the chaotic and predatory dynamics of market production, will be able to deal effectively with the planet’s biophysical restrictions and at the same time preserve complex forms of human civilization that are truly emancipatory.

Notes

1. From this perspective, the entire history of humanity would be interpreted as the uneven deployment of mercantile reason—as the process toward increasingly full realization of the forms of capitalist social organization which would have been operating in some fashion since prehistory, where primitive hunters of bison might be regarded as among the first entrepreneurs exercising their entrepreneurship.
2. The form that economic accounting would take in *cyb-com*, for both costs and income (Cockshott and Cottrell 1993).
3. This formula is similar to that proposed by the Association for the Design of History (“Principles of a Post-Capitalist Economy”; Cibcom.org) to satisfy minority public consumption preferences (cultural, sports, recreational, etc.). In this way, consumption decisions would be neither strictly individual in nature (for the means of consumption) nor majority/democratic in type (for the organization of public services such as education, health or transport) but would instead be decisions made in proportion to the people concerned.
4. See “Radically Reshaping Business Thinking via Subjective Value.” <https://mises.org/library/bylund-and-mark-packard-radically-reshaping-business-thinking-subjective-value>.
5. The economic and institutional details of this model (labor organization and remuneration, political participation, etc.) can be seen in Cockshott and Nieto (2017) and Nieto (2021) or at www.cibcom.org (Spanish and South American-based group dedicated to studying and diffusing the ideas of cybernetic communist planning).

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