What is capitalism?

Setting the scene

"Capitalism" has manifestly come under considerable attack in recent times. The attack appears to be especially acute in the UK, where it has few defenders apart from its practitioners. The Conservative Party, which has formed the government for the past 12 years, and which has been traditionally the party of the capitalists, has in recent years enacted many policies, such as high taxation, which are hostile to traditional capitalism. But what is capitalism?

The need for capital

Any human activity, progressing beyond the most primitive types of hunting–gathering, or subsistence agriculture, requires capital. The farmer requires seeds to plant in advance of harvesting them weeks or months later. The gatherer requires baskets if what is gathered is not immediately eaten. Manufactured weapons will make hunting far more efficient. The shirtmaker, apart from the tools of the trade, needs cloth and a supply of food to last for the duration of the making. It was noticed that the efficiency of production—i.e., productivity, here defined as the output per person—could be greatly increased by the quantity and quality (i.e., incorporating ever more ingenuity) of tools, or implements. Ultimately these tools were developed further into machines, or automata, which could, through not requiring human beings at all for their operation, raise productivity as defined above almost illimitably.[1] Clearly, the more sophisticated the machine, the more capital it embodies, not only for its actual making, but for the study, discovery and ingenuity that has gone into its design. It should also be noted that the greater the scale of production, generally the greater the need for capital; and much production is not worth undertaking unless it is at a great scale.

This need for capital is universal wherever a society is progressing, regardless of its social system, which could be "capitalist" (the term is misleading insofar as all progressive systems require capital), "socialist" (again, the term is misleading because all human society is social; Belloc[3] prefers the term "collectivist"), or something else.

Most human activities require land. Hunter-gatherers, whose population was mostly very small relative to the natural resources they had at their disposal,[4] did not need to "own" any land; that is, have exclusive rights over its use; ownership in essence means putting some kind of boundary around what is owned or possessed, delineating it as a system.

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[1] Illich[2] has delineated the difference between tools (or implements), which are acted on by a human agent, and machines, which can operate autonomously.

[2] I. Illich, *La convivialité*. Paris: Seuil (1973).

[3] H. Belloc, *The Servile State*. London & Edinburgh: T.N. Foulis (1913).

[4] Nevertheless, it is well known that quite a few species of birds (such as the dodo, the moa and the passenger pigeon) and mammals have been driven to extinction by hunting, even in primitive societies.

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How to satisfy the need for capital

The simplest method is saving. The hunter–gatherer puts aside a portion of the least perishable food, for consumption while making a weapon, for example. The farmer does not eat the entire crop, but puts some aside for the subsequent sowing. Note that this method usually requires the activity to already be under way.

Forward selling is more sophisticated: the purveyor of goods sells them in advance of their delivery. On a small scale it could be done by an individual order, e.g. for a shirt. On a larger scale, forward selling can be organized through exchanges.[5]

Borrowing, or the creation of credit, which is equivalent,[7] requires other people to have previously saved.

Investment: those who have previously saved can buy a share of the business. This is similar to borrowing, except that the mechanism of reward and the risks are slightly different.

The last two methods would be impracticable without the institution of money. And clearly the creation of credit could not work if absolutely everyone was working at subsistence level.

The question then is, what form of social organization is most conducive to effectively satisfying the need for capital? It should be noted that, apart from saving, these methods all imply coöperation between human beings; in other words, a kind of symmetry breaking. We shall return to this point very soon, but for now let us note that coöperation seems to be universally considered as morally good.[6]

Formalization of the creation of capital

Here we sketch out a previous argument,[7] based on entropy. We note that every kind of life is fighting to maintain or decrease its entropy against the inexorable, thermodynamically ordained, increase of entropy. The universe began with very low entropy,[8] and this provided the store on which life, and civilization building on life, continue to feed.[9]

Circulating money is wholly disordered and has the maximum possible entropy, S_{max}, which depends solely on its quantity. Money incorporated into capital increases its order and concomitantly decreases its entropy. Let the entropy of the overall socio-economic system be S. The relative entropy R is defined as

$$R = 1 - S/S_{max} \tag{1}$$

and the general premiss of economic development, and more broadly civilization, is that R gradually increases. Differentiating equation (1) with respect to time, we get

$$dR/dt = [S\,(dS_{max}/dt) - S_{max}(dS/dt)]/S_{max}^2, \tag{2}$$

implying that

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[5] See C. McGovern, Commoditization of nanomaterials. *Nanotechnol. Perceptions* **6** (2010) 155–178 for a good introduction to commodity exchanges.

[6] O.C. Curry, D.A. Mullins and H. Whitehouse, Is it good to cooperate? *Current Anthropol.* **60** (2019) 47–69.

[7] J.J. Ramsden, Sovereign money. *Nanotechnol. Perceptions* **14** (2018) 3–7.

[8] C.H. Lineweaver and C.A. Egan, The initial low gravitational entropy of the universe as the origin of design in nature. In: *Origin(s) of Design in Nature* (eds L. Swan, R. Gordon and J. Seckbach), pp. 3–16. Springer.

[9] Cf. E. Schrödinger, *What is Life?* Cambridge: University Press (1944).

$$S\,(\mathrm{d}\,S_{\max}/\,\mathrm{d}t) > S_{\max}(\mathrm{d}S/\mathrm{d}t). \qquad (3)$$

The meaning of this inequality can be readily perceived by first considering two special cases:[10]

(1) $S_{\max}$ is constant, implying that $\mathrm{d}S/\mathrm{d}t < 0$. This corresponds to the activities of entrepreneurs in organizing firms.

(2) S is constant, corresponding to entrepreneurial stagnation, but the inequality (3) can still be satisfied if $\mathrm{d}S_{\max}/\mathrm{d}t > 0$; that is, the total quantity of money is increasing, which can be achieved by granting credit.

In socioeconomic reality, of course, increasing $S_{\max}$ will anyway tend to decrease S, which is the result of foregoing entrepreneurial activity; similarly, $S_{\max}$ is the result of foregoing credit expansion. Both the entrepreneurs and the banks (as the main creators of credit) will have an easier time in increasing R if they coöperate, and the more capital that is accumulated, the easier it is to maintain the increase.

While, in the absence of regulation, there is no limit to the amount of credit that can be created, for growth to occur money has of course to be converted into something physical—raw materials, machinery and workmen's wages, for example. Wages are in turn converted into victuals and other material necessities of life. The number of human beings, and the quantity of materials, on Earth are finite. As they get employed and used up, respectively, their price increases, hence more and more money is needed to procure them. Hence, a potentially unlimited supply of money does not imply the possibility of procuring unlimited labour and materials.[11]

Symmetry breaking

Symmetry is familiar enough in mathematics, especially geometry; the circle and sphere are perfectly symmetrical in their respective dimensional environments; regular polygons and polyhedra become progressively less symmetrical as the number of sides or faces diminishes, and irregular shapes are even less symmetrical. In physics and chemistry there are numerous examples of symmetry breaking, such as when vortices form in a uniform, perfectly symmetrical medium, or the distribution of molecules in an initially uniform mixture about to undergo the Belousov–Zhabotinsky reaction. Biology, too, knows the phenomenon: the zygote from which all multicellular organisms evolve begins as a perfectly symmetrical object. The operation of enzymes, whereby the active centre is strained following binding to its substrate,[12] breaks symmetry until equilibrium is restored after transforming the substrate to product and releasing the product. The concept has recently attracted more interest in biology.[13,14] When coöperativity exists, as, for example,

[10] H. von Foerster, On self-organizing systems and their environments. In: *Self-Organizing Systems* (eds M.C. Yovits and S. Cameron), pp. 31–50. Oxford: Pergamon Press (1960).
[11] Cf. H Hotelling, The economics of exhaustible resources. *J. Political Econ.* **39** (1931) 137–175.
[12] L.A. Blumenfeld, *Problems of Biological Physics*. Berlin: Springer (1981).
[13] R. Li and B. Bowerman, Symmetry breaking in biology. *Cold Spring Harbour Perspectives Biol.* 2 (2010) a003475.
[14] L.P. Saxena, Natural and controlled symmetry breaking analyses in biological systems. *Current Sci.* **108** (2015) 819–824.

when haemoglobin binds to oxygen, symmetry is broken, and the link between coöperativity and broken symmetry has been reinforced by other examples.[15,16]

Similarly, whereas a hunter–gatherer society is in essence perfectly symmetrical, all members being equal in their roles,[17] as soon as coöperation is needed, in order to permit some progress in creating infrastructure and so forth, this symmetry is broken. A great deal of insight can be obtained by considering that society breaks into just two types: those who own the means of production, and those who do not (Belloc). Marx perceived much the same distinction—"Inequality emerged when wealth created through collective efforts began to be appropriated by small groups of people … Labour of the poor majority ensured a better life for the rich minority and their servants—government officials, police, soldiers".[18,19] Lin Yutang, writing about China, describes the types simply as top-dog and under-dog.[20]

Note that, although there is of course great diversity in human abilities, this diversity is not thought to have broken the symmetry of very primitive hunter–gatherer societies, nor can membership of the two groups be correlated with ability.[21] It seems ironical that the good action of agreeing to coöperate may lead to the lender or investor enabling the receiver of funds to become one of the top-dogs (as an owner of means of production) while the giver becomes an under-dog.

Before the advent of mechanical means of production, the main instrument for production was land. On a finite planet, land is limited in supply. Whereas the hunter–gatherers, operating in sparsely populated terrain, had no need to "own" land, settlement provided some justification for ownership, in the very practical sense of having the power to decide what is done with it, and thus the top-dogs were the landowners, and the under-dogs the landless. Land may have been initially acquired by military conquest, by entrepreneurial settlement in virgin territory, or by purchase (using saved resources) from another landowner. The legal institution of inheritance provided some continuity of ownership within families.

A final point in this section is to note that the number of top-dogs is not large enough to determine the social mass of the state; conversely the under-dogs stamp the whole community with their features. This is emphasized by Belloc.[3]

Alternative social organizations

The breaking of symmetry implies the appearance of some kind of organization of human society. Seldon identifies three fundamental types:[22] benevolence; government coercion; and

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[15] J.M. Pacheco, F.L. Pinheiro and F.C. Santo, Population structure induces a symmetry breaking favoring the emergence of cooperation. *PLoS Computational Biol.* **5** (2009) e1000596.

[16] Bo Gao et al., Cooperative evolution and symmetry breaking in interdependent networks based on alliance mechanisms. *Physica A* **609** (2023) 128320.

[17] Taking appropriate account of essential biological differences, such as between male and female, and child and adult.

[18] V.I. Lenin, *Karl Marx and His Teaching*. Moscow: Progress Publishers (1973) (translated from articles published in 1913 and eventually gathered in the *Collected Works*).

[19] G.P. Chernikov et al., *Fundamentals of Scientific Socialism*. Moscow: Progress Publishers (1988).

[20] Lin Yutang, *My Country and My People*, pp. 180–183. London: Heinemann (1936).

[21] J. Ramsden, (In)equality. In: *Spiritual Motivation Vol. 2: New thinking for a post-Covid world* (ed. J. Ramsden), pp. 95–128. Basel: Collegium Basilea (2022).

[22] A. Seldon, *Corrigible Capitalism, Incorrigible Socialism*. London: Institute of Economic Affairs (1980).

inducement by payment in the market. Benevolence could be narrowed down to Marx's "jeder nach seinen Fähigkeiten, jedem nach seinen Bedürfnissen", which corresponds to a kind of professionalism in citizenship; government coercion, for Seldon, is synonymous with socialism; the last type corresponds to what is usually called capitalism. Socialism and capitalism are also identified by Belloc;[3] he calls the former collectivism; but he goes more deeply into the historical antecedents, noting that early societies were built on slavery. The top-dogs were the slaveowners, and the under-dogs were the slaves. Belloc discusses at some length the features of this society, and notes that far from slaves being invariably militarily conquered peoples, men of the same race as the top-dogs freely accepted slavery as an alternative to indigence. It is important to note that in exchange for the compulsion of the slaves to work for their owners, they received security of livelihood.

As we know, the antique servile state was gradually dissolved in the Christian era, and there arose a new pattern of organization, which Belloc calls the distributive or proprietary system.[3] It is characterized by a society in which the vast majority of its members are free both economically and politically. They were not, however, completely equal in terms of their land holdings; a minority held somewhat larger holdings than the average. This difference was dramatically amplified when the monastic lands, which may have amounted to almost 30% of the total land of England, were suddenly confiscated by Henry VIII in the 1530s, but were not retained by the Crown for the public good, as seems to have been originally intended, but were seized, or purchased very cheaply, by the existing larger landowners, who already processed a similar percentage of the land. The King could do little but acquiesce in this process since typically these acquisitions were the price for voting for the dissolution of the monasteries in Parliament.[23] These greatly enlarged landholdings gave their owners an immense competitive advantage over the existing small landowners, many of which were gradually bought out, further increasing the disparity between great and small. The process continued gradually for about a hundred years and was essentially completed by the middle of the 17th century. A few decades later the Industrial Revolution started to provide unparalleled entrepreneurial opportunities to the great landowners, who became an oligarchy of employers of a great mass of propertyless, but nevertheless politically free, employees (the factory system). This is the organization that Belloc calls "capitalist". It could equally well be called a plutocracy.

Since he wrote, however,[24] the organization has evolved in a way that changes its essential character, namely through the rise of finance capitalism.[25,26] Powerfully aided by the financial

[23] Fletcher and Kipling note that "the House of Commons, almost to a man, welcomed these changes; and that House then represented the sober country gentleman of the sober merchants of England" (C.R.L. Fletcher and R. Kipling, *A History of England*, p. 138. Garden City, NY: Doubleday, Page, 1911).

[24] R. Hilferding's well-known work *Das Finanzkapital* was published in 1910. In 1916, Lenin wrote "When carrying the current accounts of a few capitalists, the banks transact a purely technical operation. When, however, these operations grow to enormous dimensions we find that a handful of monopolists control all the operations, both commercial and industrial, of the whole capitalist society. They can, by means of their banking connexions, first ascertain exactly the position of the various capitalists, then control them, influence them by restricting or enlarging, facilitating or hindering their credits, and finally they can entirely determine their fate" (quoted by Lachmann[25]).

[25] L.M. Lachmann, Finance capitalism? *Economica* (new ser.) **11** (May 1944) 64–73.

[26] M. Hudson, Finance capitalism versus industrial capitalism: the rentier resurgence and takeover. *Rev. Radical Political Econ.* **53** (2021) 557–573.

instruments available in tax havens,[27] finance capitalism—an oligarchy of oligarchs—has largely subordinated ordinary capitalism. Among other implications, this constitutes a great barrier to rebuilding the distributive system. It also tends to divert money from real investment (i.e., in means of production) to financial speculation.

Norway presents an interesting case because forced industrialization, leading to concentration and oligarchization, was prevented. A decisive event was the Battle of Trollfjord in 1890:[28]

> Since the Middle Ages, the entire male adult population of Arctic Norway used to gather in the Lofoten islands in February–March to harvest spawning cod. Tens of thousands of small farm households got most of their cash income from participation in this fishery, carried out in open boats and with primitive gear. But the rich cod resources represented an opportunity not only to the fast-growing peasant population of northern Norway, but also to the embryonic entrepreneur class: A shipowner sent steamships to the spawning grounds, closing off a whole fjord full of cod, which he then claimed to be the "owner" of. The thousands of small boat fishermen did not accept this, and in a celebrated, but almost bloodless naval show of force, involving hot steam hoses on one side, and oars, fishgaffs and boathooks on the other, the intruders were chased away.

As a result, the distributive system was preserved for rather longer than elsewhere. But, far from retarding technological development, as might have been expected, entrepreneurial energies were redirected. For example, the thwarted entrepreneur established a shipbuilding business in Harstad; slightly less profitable than cod harvesting but probably more sustainable; and capital was channelled into new, import-substituting branches of industry rather than tied up in primary harvesting. Furthermore, the fishermen could not have undertaken industrial-scale shipbuilding, whereas they were more capable than the steamship-owning entrepreneurs of sustainably harvesting the cod.

Belloc points out that capitalist society is unstable, because of the strain of the divergence between its moral foundations and its actuality; and because of the insecurity imposed upon all citizens, but especially upon the dispossessed free men.[29] To relieve the strain, one can abolish restricted ownership, or political freedom, or both these two features of capitalism. The abolition of only political freedom restores slavery, but this would would be universally perceived as an abnegation of our traditions and therefore is rejected. The restriction of property ownership can be remedied either by putting it in the hands of many—reverting to the distributive system—or of none, which means government officials (Belloc calls them "public officers of the community")—this is socialism. Belloc draws attention to the impracticality of reverting to the distributive system, above all because the capitalist arrangement of society into

[27] P.R. Beckett, The awakening conscience? Tax havens from pandemic to war. In: *Spiritual Motivation Vol. 2: New thinking for a post-Covid world* (ed. J. Ramsden), pp. 77–94. Basel: Collegium Basilea (2022).

[28] An account is given in O. Brox, Let us now praise dragging feet! In: *The Necessity of Friction* (ed. N. Åkerman), pp. 123–132. Heidelberg: Physica-Verlag (1993).

[29] This instability is not really considered by Seldon; indirectly he is forced to *assume* that the dispossessed prefer more income and less equality rather than less income and more equality. What evidence there is on this point suggests, however, that the assumption is invalid.

the two groups of owners and dispossessed does not prepare the latter for the sudden assumption of the responsibilities of ownership.

Socialism is generally presented rather differently from refs 3 and 22 by its adherents,[18,19] but its essential feature is indisputably government ownership of all land and means of production. But when Lenin, and later Stalin, started to build a socialist society, they were confronted with the problem that the vast country required, in a very short space of time, thousands of new officials to administer it.[30] The officials of the former régime were practically all dismissed due to their presumed disloyalty to the new system. The problem was solved by creating the *nomenklatura*[31]—*Herrschaft durch Kader*—essentially a very strict vetting procedure ensuring that all administrative posts were filled by people who would faithfully implement the new policies.

Although the country could now be administered, a new problem of incompetence now arose; selection for the nomenklatura favoured people who desired to make a career as a nomenklaturist, rather than as an expert in a specific professional area. In a fashion very similar to the military,[33] this leads to incompetence, so widespread that any success must be regarded as an epiphenomenon. In the USSR, time and time again, one saw the spectacle of brilliant contributors being exiled or worse; being competent, they tended to freely criticize deficiencies and suggest improvements.

External defenders of socialism often responded to the obvious defects of the system, such as the poor economic efficiency, the prevalence of coercion and so forth by arguing that the USSR had not faithfully applied the principles of collectivist economy.[22] This defence is echoed in our own time by defenders of a contemporary centralized system, namely the EU, by arguing that the member states are not yet well enough integrated to reap the supposed benefits accruing from this supranational authority, and that even tighter control is needed. But Seldon has clearly shown that the core features of collectivist systems are irredeemable.[22] Above all, a state economy is based on the notion of a holistic entity, whereas a market economy is based on the notion of a "network of independent entities that by experience learn to discover ways of serving one another". As Seldon remarks, "by working through individual decision—based on aspiration, emulation, concern for family, friends, 'good causes' of all kinds—the market economy has preserved individual liberty and reached unprecedented living standards";[22] in contrast, the collectivist system tends to suppress individual decision, and the rule of law tends to be replaced by the arbitrary rule of men.

If ignorance of the market is a primary reason for socialist economic inefficiency, it might be solved by putting mechanisms in place to acquire—and exploit—the necessary knowledge—a cybernetic solution.[34] Visionary proposals along these lines were made in the USSR,[35] but tended to be suppressed, possibly because implementation would ultimately

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[30] The European conquerors of South America were faced with a similar problem.
[31] T.H. Rigby, Staffing USSR Incorporated: The origins of the nomenklatura system. *Soviet Studies* **40** (1988) 523–537. Communist China had a similar difficulty, and solved it in a similar fashion.[32]
[32] J.P. Burns, China's nomenklatura system. *Probl. Communism* **36** (September-October 1987) 36–51.
[33] N. Dixon, *On the Psychology of Military Incompetence*. London: Jonathan Cape(1976).
[34] Cf. O. Lange, *Introduction to Economic Cybernetics*. Oxford: Pergamon Press (1970).
[35] J.J. Ramsden, Epiphenomena of Soviet life: 30 years on. *J. Biol. Phys. Chem.* **21** (2021) 137–154.

have disempowered the nomenklatura. The vast size of the Soviet Union also made implementation a daunting task. But something along these lines was in fact implemented, in Chile after Salvador Allende was elected as president in 1970—Project Cybersyn.[36] This remarkable experiment was tragically terminated after the Pinochet coup in 1973, before its effects on the economy could be assessed.

Several important Western European countries—notably the United Kingdom and France—are sometimes described as "mixed economies", in which some industries are run in collectivist mode by the government, and others are private. At one time in the UK, the reach of the state extended even into domains traditionally almost exclusively private, such as hotels and restaurants.[37] Apart from such anomalies, however, the state-run industries are utilities that arguably belong to the national infrastructure—electricity generation and distribution (the National Grid); water collection, treatment and distribution; roads and motorways (the latter are, however, privately owned and run in France); railways; hospitals (a national health service can be thought of as a kind of insurance policy); courts of law and so forth. It may make economic sense to provide them using tax revenues because it is efficient to provide them collectively and having their services provided at cost helps industry by keeping the cost of living, and hence the wages that have to be paid to its employees, lower than otherwise—this is Patten's concept of "burdenless taxation".[38] The debate here is about the extent of the infrastructure that should be provided. Air services? Bus services? Taxis? It is an obvious deficiency that no set of rational, quantitative criteria ever seems to have been developed to help decide what is best run by the state and what is not. The greater the capital expenditure on the infrastructure, the less responsive the service can be to market fluctuations. Hence state taxis would be absurd, but state water seems less so. Nevertheless, the greatest (in England) public health catastrophe in water supply since the cholera epidemic in London in 1853 was the Camelford aluminium poisoning in 1988, by the state South West Water Authority.[39] As an undergraduate I well remember the excellent quality of the water supplied by the small Cambridge Water Company.[40] Later it was taken over by a larger company and the water became unpalatable. An excellent solution for this kind of infrastructure, which is largely local in nature, is for it to be owned by the municipality. This ensures that the business remains fairly directly accountable to its customers, and is indeed the arrangement widely found in Switzerland. It should also be noted that Switzerland, widely perceived as a bastion of free,

[36] S. Beer, *Brain of the Firm* (2nd edn), part 4 (chs 16–20). Chichester: Wiley (1981).

[37] This situation arose because the (formerly private) railway companies had acquired many assets accessory to their main business, such as hotels, docks and so forth. When the railways were nationalized in 1948, these assets automatically became state property. By the time the railways were partially renationalized, starting in 1994, they had been sold off.

[38] S.N. Patten, *Theory of Dynamic Economics*, ch. 16. Philadelphia (1892).

[39] Due to the impending privatization of the water authorities, news about the catastrophe was quite effectively suppressed, because it was felt that the negative reactions would make the industry unattractive to investors; evidently a lesson had been learned from the effective suppression, two years earlier, of news about the Chernobyl nuclear power station disaster by the Soviet authorities.

[40] This was largely an initiative of the then Vice-Chancellor, Dr Richard Okes, who set out to organize a "good honest company" to supply the University and town. The company was established by the Cambridge University and Town Waterworks Act of 1853. It remained privately owned until 1996, when it became a public limited company, and was taken over in 1999.

market-oriented enterprise, has an excellent state railway system, which was doubtless appreciated by Lenin during the time he lived in Zürich. It is well known that he found that Switzerland was, in effect, already "socialist", in the sense of having a high degree of social responsibility coupled with individual professionalism. Seldon in fact remarks that a notable feature of capitalist economies is that they can tolerate "invasion" by socialist, (collectivist) entities,[22] whereas socialist economies cannot normally tolerate invasion by capitalist entities, except on a microscale, due to the real threat of being completely surpassed and taken over.[41]

Another kind of compromise between collectivism and capitalism is the so-called "regulated market", in which competition between firms is allowed and even encouraged, price transparency is required, and consumers are protected. It is doubtful whether these features warrant a special name, since they typically form part of the normal legal framework of a developed country.

The reader may well object that much of the above argument in favour of the system generally called "capitalism" in comparison with socialism or collectivism is actually based on the information gathering that is intrinsic to any free market economy. Insofar as free markets are superfluous in a state-run, socialist economy (the government dictates economic production and prices; and wages, hours of work and working conditions),[42] it might be thought that "capitalism" is synonymous with the free market economy. In practice it is, but the essence of capitalism is that private individuals are allowed to own and operate businesses for profit. It also encompasses corporations—juridical persons with similar rights to those of natural persons, epitomizing coöperation. The free market—i.e., the interactions of buyers and sellers—determines prices, production and distribution of goods and services, as well as wages, hours of work for employees and so forth.[43]

Belloc demonstrates that efforts to remedy the strains of capitalism are initially directed towards collectivism but inexorably end up ushering in the servile state, in which laws essentially guarantee a secure livelihood for the employed, but also leave the means of

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[41] Invasive success is not particularly straightforward to predict. Modeling is very useful thing because of the complexity of evolution in different scenarios. See S. Galam, B. Chopard, A. Masselot and M. Droz, Competing species dynamics: qualitative advantage versus geography. *Eur. Phys. J. B* **4** (1998) 529–531.

[42] I recall that, in Moscow in 1990, there were markets selling a huge variety of produce from every part of the Soviet Union, far exceeding in colour and diversity, and indeed quality, the products available at that time in Western Europe (one recalls that, a few years earlier, Frédy Girardet, the owner of "Chez Girardet" in Crissier, Vaud—at the time reputed to be the best restaurant in the world—lamented the impossibility of obtaining high quality vegetables). To be sure the produce available in the Moscow markets was rather expensive compared with the extremely limited range of fresh produce in the "Gastronom" supermarkets.

[43] What seems like one of the most perfect forms of price discovery imaginable is described by Elspeth Huxley in *Four Guineas*, p. 114 (London: The Reprint Society, 1955): "Here [Wangara, Ghana] came Barbary merchants with camel-trains of beads, salt and a resinous wood used for sweetening water stored in skins. Halting by the river, they beat their drums to summon the Negroes, who refused to emerge until the merchants had arranged their goods in piles along the river-bank and withdrew from sight. Then out came the Negroes to place a heap of gold beside each pile of goods, and again retreat. If the merchants were satisfied, they took the goods, beat their drums and departed; if not, they withdrew again and waited for the Negroes to add more gold. This "silent trade"—said to have been practised by Phoenician merchants trading down the Guinea coast—endured for many centuries ...".

production in the hands of the owners. The greatest barriers to taking any different course are the pervasion of the mentality of the wage-earner, and status taking the place of contract. Now, Belloc was writing in 1913 and it is up to the reader of his book to decide to what extent his reasoning has been borne out by subsequent events more than a hundred years later.[44] Such an analysis is beyond the scope of the present article. Belloc himself notes that "there is a complex knot of forces underlying any nation once Christian" and refrains from making any prediction. At any rate his fundamental points endure, which we summarize in Table 1.

Table 1. Summary, in matrix form, of the possible conditions of man.

	Economically free	Economically unfree
Politically free	Distributive state	Capitalism
Politically unfree	Modern China	Servile state

The case of Russia is interesting because at the start of its industrial development in the latter part of the 19th century it was practically still in a servile state; that is, it had never known the distributive state ushered in by Christianity in Western Europe. Capitalism—with much Western capital—was, however, beginning to make inroads. Stalin especially seems to have realized that only by revolution and violent elimination of the capitalists and great landowners could real change be enacted—a solution ruled out by Belloc. But the problem of how then to administer the vast country severely limited his options. Nevertheless, a great deal was undoubtedly achieved.[35] Much of this was merely catching up with the West—at the time of the Great October Revolution Russia was many decades behind, but the new system placed great emphasis on study, mathematics and science, which were fostered with great enthusiasm.[45] Unsurprisingly, given the way it was formed, the ruling nomenklatura did not much share in this enthusiasm. In the aftermath of the dissolution of the USSR its members were well placed to take advantage of the ensuing disorder. In a move recalling the fate of monastic lands in 16th century England, the proto-oligarchs were essentially bribed with state assets into supporting Boris Yeltsin's re-election in 1996. One might say of this manoeuvre that democracy was to blame. The rest, as they say, is history. There was no attempt to retain—let alone continue to develop—the impressive scientific–technical edifice. Lack of confidence in the future direction of the state, as well as a precipitous decline in the formerly lavish resources (the USSR was in the top echelon, according to fraction of GDP spent on science), drove many mathematicians and scientists to emigrate. In tsarist times, the old oligarchy's wealth was founded on vast landholdings (much as their equivalent in England) and, even though these estates were frequently neglected,[46] nevertheless ownership must have inculcated strong patriotic ties, whereas the new oligarchy's wealth is mainly

[44] Belloc was writing specifically about England, but its economic development was generally in the vanguard of European trends and his arguments apply to most of the Occident.
[45] The spirit is well conveyed by Lazar Lagin's children's novel *The Old Genie Hottabych*.
[46] With exceptions. Nikolai Gogol's novel *Dead Souls* provides an excellent conspectus of the spectrum of estate management in Tsarist times.

founded on resource extraction—mines and factories were acquired and continued to operate with minimal investment—profits were mostly taken out of the country and spent on purely personal luxuries, such as multiple gigantic yachts. In an interval of the order of one year Russia descended from a rather advanced economy to one resembling that of a primitive developing country, with its legacy of infrastructure giving a semblance of some continuing sophistication. Russia has long admired and sought to emulate the USA, where the ruling class has been accused of doing something very similar—"hollowing out" the economy for purely personal gain. Belated realization of its catastrophic effects resulted in the election of Donald Trump as president in 2016. In Russia it was not even necessary to offshore manufacturing as was done in the USA, since wages at home could be forced down to keep exports globally competitive. But it does not look as though it was an option to construct a distributive state; much of the population had been serfs for many generations, and such pockets of independent peasants as there were were ruthlessly eliminated under Stalin. Decades of collectivist indoctrination rendered the vast majority of the population incapable of any entrepreneurial activity. Russia now has an extreme ratio of the number of oligarchs—probably only a couple of hundred—to the total population, about 140 million.[47] For comparison, the nobles constituted about 1% of the population (a similar ratio to that in France under the *ancien régime*; in Hungary the ratio was about 4%, and in Poland about

[47] The case of Boris Abramovich Berezovsky is interesting, since he was an archetype of the Russian oligarchs. At first his career was somewhat academically oriented; after gaining his doctorate he worked in the Institute of Control Sciences (*Institut Problem Upravleniya*, founded in 1939 and now named after V.A. Trapeznikov) in Moscow and published a number of papers and a book. His work as a consultant on information management at the automobile manufacturer Aftovaz gave him the idea to found Logovaz, a company that bought cars destined for export in order to sell in Russia, where there was great unsatisfied demand. Evidently intelligent enough to see the opportunities presented by the enormous disparities in values of goods appearing in the latter years of the Soviet Union, he amassed some wealth from Logovaz and by importing personal computers from the West and selling them with a vast markup. This provided him with the resources with which he could acquire state assets after the dissolution of the Soviet Union. He might well have had misgivings about the morality of his actions—indeed by all accounts he died a depressed and disillusioned man, apparently committing suicide in 2013—but presumably through the bystander effect (diffusion of responsibility) overcame any compunction at the time. Historians of the era will doubtless be grateful that Berezovsky brought a lawsuit against his former protégé, Roman Arkadyevich Abramovich in 2007 in London, the proceedings of which are, in accordance with English legal practice, thoroughly documented.[48] At the end of the trial, Mrs Justice Gloster commented:

> On my analysis of the entirety of the evidence, I found Mr Berezovsky an unimpressive, and inherently unreliable, witness, who regarded truth as a transitory, flexible concept, which could be moulded to suit his current purposes. At times the evidence which he gave was deliberately dishonest; sometimes he was clearly making his evidence up as he went along in response to the perceived difficulty in answering the questions in a manner consistent with his case; at other times, I gained the impression that he was not necessarily being deliberately dishonest, but had deluded himself into believing his own version of events. On occasions he tried to avoid answering questions by making long and irrelevant speeches, or by professing to have forgotten facts which he had been happy to record in his pleadings or witness statements. He embroidered and supplemented statements in his witness statements, or directly contradicted them. He departed from his own previous oral evidence, sometimes within minutes of having given

8%); the nomenklatura comprised about 1.5%.[31] Note that oligarchy is not a distinctive form of social organization; capitalism could equally well be called oligarchy. As Belloc pointed out, the essential point is that the top-dogs are sufficiently in the minority to not influence the general tenor of society.

As mentioned above, Belloc stresses the strain of the divergence between the moral foundations of capitalism and its actuality, without explicitly stating what those foundations are. They can be summarized as the Christian ideals of individual responsibility and freedom and justice for the individual.[50] Hundreds of years ago Machiavelli, in his remarkable book *Il Principe* (published in 1532), pointed out that these ultimate values, sought for their own sakes, are incompatible with law and order for the body politic, which would appear to be essential for a civilized communal life.[51] This dooms the socialist–utopian ideal, as expounded for example by William Morris in *News from Nowhere*. Nevertheless, Stent pointed out that the primacy of wisdom and social harmony in a civilized community could be, and was in China, achieved by Confucianism. It is superfluous to detail the remarkable technological achievements of China, which was in many ways centuries ahead of the West.[52] One might have imagined that something of Chinese civilization was known to Machiavelli, but he is silent on the topic. Modern China is a worthy legatee of this tradition;[53] most Western commentators decry the modern Chinese state as being unpleasantly and unacceptably authoritarian, but appear to be ignorant of its antecedents.

> it. When the evidence presented problems, Mr. Berezovsky simply changed his case so as to dovetail it in with the new facts, as best he could. He repeatedly sought to distance himself from statements in pleadings and in witness statements which he had signed or approved, blaming the "interpretation" of his lawyers, as if this somehow diminished his personal responsibility for accounts of the facts, which must have been derived from him and which he had verified as his own.

and this opinion may well apply to the majority of the oligarchs. Despite the prevailing culture at the time, they became rapidly obsessed with money grabbing, well embodying the character of Mr Moneybags (who was actually a foreigner) lampooned in Lagin's novel.[45] There was apparently never any thought of building on the solid legacy of knowledge from Soviet times, in order to create real value. Had they desired to do so, they would have had to act with the utmost celerity; scientists and engineers faced a sudden existential threat and within months of the dissolution of the Soviet Union their only hope was to emigrate in order to continue their work. Given that it is much harder to breed physicists than oligarchs,[49] the effects of this emigration are likely to be practically irreversible, except in the very long term. The oligarchs, whose defining characteristic is that they are few in number, were manifestly unfit to rule the country; they now form a kind of aristocracy, but this word means government by the best citizens, which the oligarchs certainly are not.

[48] [2012] EWHC 2463 (Comm). The quotation is from ¶34 of the executive summary.

[49] L. Bragg, Physicists after the war. *Nature* (Lond.) **150** (1942) 75–80.

[50] Cf. Max Weber's thesis of the influence of Protestantism, especially Calvinism, on the development of capitalism.

[51] An excellent exposition is given by G. Stent, The dilemma of science and morals. *Zygon* **10** (1975) 95–112.

[52] J. Needham, Science and China's influence on the world. In: *The Legacy of China* (ed. R. Dawson), pp. 234–308. Oxford: Clarendon Press (1964); much more detail is given in the author's monumental *Science and Civilization in China*.

[53] J.J. Ramsden, China: a modern Machiavellian state. *J. Biol. Phys. Chem.\}* **20** (2020) 47–49.

In the interval 1933–6, Nazism in Germany created a novel economic system that does not fit into the categories discussed so far.[54] In order to prepare for war, strict overall direction of the economy replaced the market mechanism; the government decided what, and how much, should be invested, produced, distributed, consumed and stored; commodity prices, interest rates and wages were fixed by the government.[55] Nevertheless, private property and profit still existed; it was not socialism or state capitalism. Moreover, unlike the planned economies associated with socialism, it was evidently highly effective, insofar as in 1939 Germany was better prepared for war than any other country.

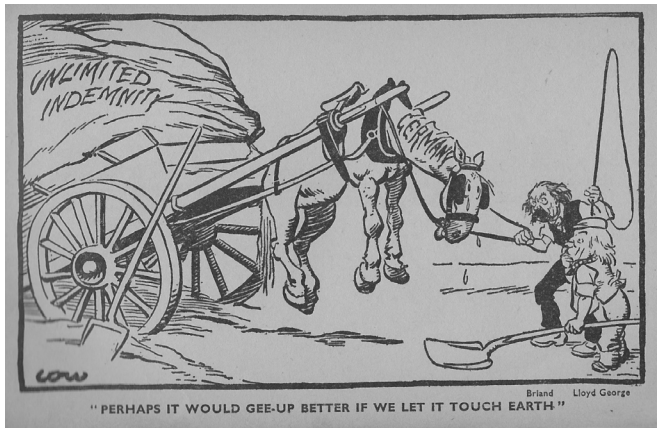
Before concluding this section, the extensive writings of Peter Kropotkin should be mentioned. They have been comparatively neglected and will probably repay detailed study. In his *Fields, Factories and Workshops*[56] he addresses the question of *what* should be produced, and in *Anarchist Communism*[57] Kropotkin shows how individual freedom (and the satisfaction of individual needs) can be combined with coöperation for species welfare by placing all the means of production (including land) into public hands. All in all, he makes a case for something very like Belloc's distributive state, alongside public ownership of large infrastructure (e.g., a nuclear fission electricity generating plant).

These two systems complete the table of possibilities (Table 2).

Table 2. Summary, in matrix form, of the possible economic systems.

	Planned	Free
Private property	Nazi system	Capitalism
Collectivist	Socialism	Anarchist communism

[54] It is not hard to understand how the Nazi movement arose, given the feeling of utter hopelessness and demoralization that prevailed in Germany after the First World War, well captured by David Low's cartoon, published in the London *Evening Standard* on 24 January 1921:



[55] O. Nathan, *Nazi War Finance and Banking*. Washington DC: NBER (1944).
[56] P. Kropotkin, *Landwirtschaft, Industrie und Handwerk*. Berlin: S. Calvary (1904).
[57] P. Kropotkin, *Anarchist Communism: Its Basis and Principles*. London: Freedom Press (1913) (first published in 1891).

Social organizations as regulatory systems

It is obvious that a collectivist economy with central planning is regulated, but what about the other systems? To help to understand this, let us examine the canonical diagram of immediate effects of a regulatory system, shown in Figure 1.[58] The idea is that disturbances of any kind D wreak some transformations of the states of the system (T), which result in a change in the output variables E. Examples of these variables are population, gross domestic product (GDP) and its equivalents, mean global temperature, atmospheric CO_2 concentration, diversity of individual incomes, informational temperature of the economy,[59] and countless others. Most of these variables have valid ranges beyond which the system cannot survive. It is a job of the regulator R to adjust the system in order to keep the variables E within the desirable ranges. For example, burning virgin rainforests in order to clear the land for commercial agriculture or arboriculture releases a great deal of CO_2; it can be stopped by imposing and enforcing laws that prohibit the burning. The burning is D; awareness of the burning may pass directly to the regulator R, who then imposes on T the necessary laws to forbid it, and recruits policeman to enforce the laws. C may also have knowledge about the deleterious effects of excessive CO_2 release on the atmosphere and may have already imposed such laws.

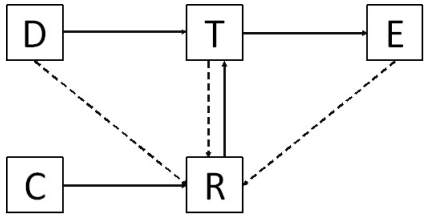


Figure 1. Schematic diagram of immediate effects for a regulatory mechanism. D represents disturbances; T represents the mechanism of the system (which can be represented as a table of transformations); R represents the regulator mechanism; and E represents the essential variables of the system. C is an independent controller. Arrows represent communication channels along which information passes; those with solid shafts must exist, and those with dashed shafts may exist.

In the absence of any regulation or control, variety in D passes directly to E:

$$\begin{array}{cc} & 1\ \ 2\ \ 3 \\ \downarrow & a\ \ b\ \ c \end{array}$$

Here, 1 may represent no burning, 2 moderate burning and 3 extreme burning, and outcome a may represent no change in atmospheric CO_2 concentration, b moderate change and c great change. If regulator R is operating with or without controller C the behaviour of T might be represented as follows:

[58] This system is extensively discussed in W.R. Ashby, *An Introduction to Cybernetics*, part 3. London: Methuen (1964).

[59] J.J. Ramsden and Gy. Kiss-Haypál, Company size distributions in different countries. *Physica A* **277** (2000) 220–227.

	T	R: α	β	γ
D	1	b	a	c
	2	a	c	b
	3	c	b	a

in this example, the regulator R has three actions available to it, by judicious choice of which a desired outcome can always be selected.

The centrally planned socialist system only requires the solid arrows in Figure 1. Outcomes are decided by C on ideological grounds. In principle the human controller should reflect the popular will, but often this seemed not to be the case in Comecon.[60]

The free market system relies on the dashed arrows in Figure 1, especially the one from E to R. This is "regulation by error". The manufacturer (seller) of goods notices that a certain product remains unsold, and adjusts production accordingly. The manufacturer may also become aware of impending events—this is D influencing R directly—such as when Thales of Miletus concluded from certain cosmological observations he had made that the next olive harvest would be excellent, and bought up all the oil presses in advance.

The absence of free markets in a collectivist system immediately suggests that central planning is necessary to determine how resources should be allocated. But is it possible for the optimum allocation to be found automatically, thereby eliminating all the bad features associated with planning, nomenklatura and so forth?[61] Let the economic system be represented by

	A	B	C
↓	B	C	A

Now suppose that we can provide an input *f*, the value of which determines the output:

↓	A	B	C
f_A	B	C	A
f_B	A	A	A
f_C	A	B	C

Automatic operation implies that the system can automatically select its input; if we represent possible input values by a subscript indicating the state on which the input now depends, we find that only $f_A(A)$, $f_B(B)$ and $f_C(C)$ are possible (and not $f_A(B)$ etc.), hence the above table reduces to the simple transform

	A	B	C
↓	B	A	C

lacking any autonomy. Hence, external planning is indeed necessary.

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[60] Central planning has one advantage over the free market, namely that it can readily plan ahead.

[61] W.R. Ashby, Principles of the self-organizing system. In: Principles of Self-Organization (eds H. von Foerster and G.W. Zopf), pp. 255–278. Oxford: Pergamon Press (1962).

Interim summary

We have established the need for capital in any progressive society. Satisfying this need ineluctably breaks society's symmetry, and two groups emerge—a small minority owning the means of production of human necessities, and the large majority who mostly work for the minority. The owners *de facto* form an oligarchy. This situation leads to social tension because individual responsibility and freedom are incompatible with the practically and essentially servile status of the majority. Several ways of relieving this tension have already been tried. One is the distributive or proprietary state, particularly associated with Christianity, in which ownership is distributed widely throughout the entire population. Another is deliberate deferral to the good of society as a whole, particularly associated with Confucianism and now characteristic of contemporary China. Finally there is socialism, in which the means of production are owned by everybody; this is Marxism and in practice the means of production are controlled by a small number of representative, or self-appointed, officials, who typically plan the economy.

Which system is most efficient?

It seems obvious that the system that is the most resource-efficient, in the sense of having the greatest output of desired goods from a given input of raw materials (this includes labour productivity) will be the most sustainable and will, therefore, ultimately dominate. Are there conspicuous differences in efficiency between the systems (Table 2)? Clearly some waste is inevitable in the free market (regulation by error) system.[62] On the other hand, thanks to the free market, it always remains fairly closely tuned to reality and significant waste is unlikely. In contrast, failures of government "enterprise" are legion, mainly because of ignoring market information, and because of overemployment of bureaucrats and other personnel. Parkinson remarks that no one can reduce the civil service in a democracy;[63] one might have thought that a centralized, collectivist economy could reduce it by decree, but Parkinson's law of the increase of administrative staff applies inexorably to capitalism and socialism alike and to have fewer staff would diminish the power of a nomenklaturist, hence it is never reduced. The late Sir John Bourn, sometime Comptroller and Auditor-General, uncovered staggering waste in the UK's public sector, such as costly and ineffective computer management in the NHS, "redundant" public employees being paid off and then rehired, 56 MGBP wasted on the Pergau dam in Malaysia (an aid project of dubious value undertaken in return for buying British military equipment), BAE's 190 MGBP windfall profit from the sale of surplus land after purchasing the Royal Ordnance factories, and many many more during 20 years in the post. The fundamental defect of central planning (Figure 1, with the solid channels only) is that it inevitably lacks sufficient variety to cope with the variety of disturbances. Centralization also implies the need for greater channel capacities than in a delocalized system, and they may be unattainable on technical grounds.

The private sector is often criticized for failing to pay for the diseconomies, most prominently pollution, created by its activities.[64] Nevertheless, remedial mechanisms exist,

[62] J.J. Ramsden and M. Tyrer, The necessity of waste? *Materials World* (July/August 2022) 22–25.
[63] C.N. Parkinson, *The Evolution of Political Thought*, pp. 243–244. Boston, Mass.: Houghton Mifflin (1958).
[64] E.J. Mishan, *The Costs of Economic Growth*. London: Staples Press (1967).

albeit not always effectively applied.[22,65] And, while rational economic planning should eliminate diseconomies, in reality pollution was often very bad in the socialist countries; for example the Erzgebirge in southern Germany were almost completely denuded of trees due to acid rain generated by pollution from coal-burning industries in Moravia.

A more difficult problem in the private sector is the pervasive presence of conflicts of interest. The manufacturer of a drug that alleviates the symptoms of disease has no interest in finding a permanent cure (although, of course, competitors have). It has been suggested that dentists encourage mass medication that promotes the need for remedial work on teeth.[66] The publisher of an open access journal that receives its income from "author processing fees" (fees paid by authors to have their papers published) has every interest in publishing the largest possible number of papers, regardless of quality.[67] While competition does indeed provide a potential remedy, the tendency is for mergers and acquisitions to constantly diminish competition; in the first half of the 20th century in the UK there were dozens of aircraft manufacturers but now only one or two. This continual consolidation is accompanied by a generally deleterious loss of variety and destructive internal conflicts. For example, Boeing has introduced a brilliant large jet aircraft in the B787, not least because of its superior fuel efficiency but also because of the peerless quality of its cabin air, which is not bled off the engines, as in every other modern jet airliner, but taken directly from the atmosphere. Nevertheless, Boeing is essentially forced to be reticent about the "bleed-free" feature because the company makes far more aircraft that still use the conventional bleed-air system.

Ethical (and aesthetic) strains are apparent in many projects undertaken by the private sector. The Spanish seafood company Nueva Pescanova is building a farm for a million octopuses, to be kept in cages, off the Canary Islands, driven by insatiable demand for them as human food. Cost-effectiveness has driven cargo container ships to reach 24,000 20-foot equivalent units (TEU)—the volume of a 20-foot long standard shipping container (the Daewoo Algeciras class), limited only by the dimensions of key waterways and dock facilities. The Post Office scandal associated with the Horizon computer system has set many precedents for the degree of injustice perpetrated on innocent people, but has become enmeshed in seemingly interminable legal wrangles.

A solution to the defects of both socialism and capitalism is professionalism. For the most primitive occupations this might simply mean working as hard as possible.[68] For the medical doctor it is formalized in the Hippocratic oath. For the scientist, integrity is paramount.[69] Professionalism also encompasses spiritual interest in the work, the importance of which is

[65] England's water companies provide particularly egregious examples. For example, in 2021 Southern Water was fined 90 MGBP for 51 offences of polluting beaches and watercourses by deliberately releasing sewage. Profits are large enough to cope with difficulties: 400 MGBP in 2022 for Thames Water, an enterprise of similar size and record of offences; in any case the companies' monopoly position enables them to simply raise prices to cover fines.

[66] D. Cross, An unhealthy obsession with fluoride. *Nanotechnol. Perceptions* **11** (2015) 169—185.

[67] J. Beall, Scholarly open-access publishing and the problem of predatory publishers. *J. Biol. Phys. Chem.* **14** (2014) 22—24.

[68] J.J. Ramsden, *The New World Order*. Moscow: Progress Publishers (1991).

[69] Scientific integrity special issue of *J. Biol. Phys. Chem.* (December 2017).

emphasized by Kropotkin.[56,70] It tends to be vitiated by the division of labour that, since the time of Adam Smith, has been assumed to be the key to raising human productivity. So it may have been for a time, but the enormous development of machinery has almost decoupled output from the labour of individual human beings.

Professionalism is, however, difficult to apply to the owners of the means of production, the directors of limited companies whose duty is to maximize return to shareholders. Their goal is primarily chrematistic, pursuit of which may bring them into conflict with others in the organization, whenever professionalism would diminish profits—in the short term, that is.

Little has been said so far about innovation, which is absolutely central to progress. Here one should note the observation of Sir George Thomson,[71] that "the one really dangerous menace is the loss of freedom. Science depends above all things on freedom to think". Which system is most conducive to that? At first sight one might suppose it corresponds to the upper row of Table 1, political freedom.[72] If economic freedom is also needed, which may well be the case, then the distributive state is clearly the best, especially if combined with public ownership of industries based on technologies that can only be exploited by large-scale economic organization. It seems paradoxical that in some ways the generally much less free USSR was more conducive to freedom of scientific thought than the capitalist West.[73] A corollary is that China, which lacks political freedom in pursuit of Confucian social harmony, would be expected to be even less innovative, yet this is manifestly not the case.[52]

An especial difficulty in deciding which system is most resource-efficient is that achieving high efficiency now may vitiate achieving it later.

What values should we strive for?

As John Dupré has remarked, "teleology is much better at getting things done then deterministic causation".[74] As we approach the conclusion, let see whether goals can help us determine whether there is an optimal system. Discounting mere survival, and the closely related environmental ethic,[70,75] we can consider the following candidate goals for the progress of society:

- Prosperity
- Welfare
- Equality
- Freedom
- Population
- Knowledge.

[70] S. Boyden, Phylogenetic maladjustment and the biology of modern society. In: *Spiritual Motivation Vol. 2: New thinking for a post-Covid world* (ed. J. Ramsden), pp. 3–34. Basel: Collegium Basilea (2022).
[71] Thomson, G.P. The Strategy of Research. The 4th Fawley Foundation Lecture. Southampton (1957).
[72] It is striking that life in socialist–utopian worlds, as imagined for example by William Morris in *News from Nowhere*, is suffused with a peculiar dulness and static quality, devoid of innovation—very different from the world of the Red Queen in Lewis Carroll's *Through the Looking Glass*.
[73] J.J. Ramsden, Epiphenomena of Soviet life. *J. Biol. Phys. Chem.* **21** (2021) 132–136.
[74] J. Dupré, Are there genes? In: *Royal Institute of Philosophy Supplement* (ed. A. O'Hear) **56** (2005) 193–210.
[75] E. Ashby, The search for an environmental ethic (Tanner Lecture on Human Values, delivered at the University of Utah on 4 April 1979).

Let us consider each in turn. Prosperity is usually taken to be a self-evident goal; it corresponds to Adam Smith's self-interest.[76] It is undoubtedly *the* goal for capitalism; the Nazi system was also very effective at achieving it; and socialism has generally not succeeded in achieving it. Apologists for capitalism assume that everyone prefers more prosperity to less and will gladly sacrifice freedom (encompassing equality of status) for prosperity. There are two main difficulties: firstly, when people are asked, they seem to generally prefer freedom to prosperity; and secondly wealth is not a value,[77,78] hence cannot be a goal; and thirdly, it is inimical to higher goals—as Jesus of Nazareth remarked, "Ye cannot serve God and mammon".[79]

Welfare economics focuses on how to best allocate resources in a society in order to maximize the welfare of all its members, achieving the greatest possible benefit for society. It is derived from Bentham's utilitarianism—the principle of maximizing overall happiness or utility, which is then used as the basis for measuring welfare of a society. "Welfare" is usually defined as material prosperity. Considering that about half of government revenues in most Western European countries are spent on welfare payments, the goal of welfare may be considered to be already well established. It is an effective way to resolve the inequalities of capitalism, but creates a servile state, and by depressing individual freedom and responsibility, depresses the capacity to innovate, making the servile state ultimately unsustainable. The welfare state is generally associated with socialism, which tends to make it unaffordable.

One difficulty with the concept of welfare has been the question of how to quantify it, which can now be done rather objectively using the quality of life index Q, defined as the product of life expectancy X and annual income G raised to the power of one minus risk aversion ε:[80]

$$Q = G^{1-\varepsilon} X; \tag{4}$$

this is what needs to be maximized.

Equality (of status) appears to be fully defensible as a goal,[21] but the sheer diversity of humanity makes it impossible to achieve except by coercion, which not only implies the loss of freedom, but also raises the question *quis custodiet ipsos custodes?* A better, more universal goal is freedom.[81]

Freedom would appear to maximize human potential and therefore appears as a worthy goal. It is depressed under capitalism, both for the owners, who become ensnared in chrematistics, and for the non-owners—partly because the owners are able to modify the legal framework of society to their relative advantage. Freedom is also depressed under

[76] This is usually taken to correspond to man's material interests, but man has of course also spiritual interests.

[77] R.M. Dworkin, Is wealth a value? (review of R.A. Posner's Economic Analysis of Law (2nd edn, 1977). *J. Legal Studies* **9** (1980) 191–226;

[78] R. Schmalbeck, The justice of economics: An analysis of wealth maximization as a normative goal. *Columbia Law Rev.* **83** (1983) 488–525.

[79] Matthew 6, 24.

[80] See, e.g., P. Thomas, Does health spending need to outpace GDP per head? *Nanotechnol. Perceptions* **13** (2017) 17–30.

[81] Bertrand Russell, in his 2nd 1948 (inaugural) Reith Lectures, noted that equality had come to be prized more than liberty.

socialism, because the workers do not spontaneously organize themselves into productive groups, hence the means of production have to be organized by a special class of people who, in effect, acquire the status of owners under capitalism.[82] It is even more severely depressed under the Nazi system.[83] Only the distributive system is definitely freedom-oriented.

Population is a tricky goal because in some respects conditions for the survival of one individual are conditions for the survival of all; the underlying existential goal therefore implies a continuously increasing population, which is actually happening. On the other hand this also places increasingly onerous pressures on Earth's environment. Species extinction rate has enormously accelerated, to the extent that a 6th mass extinction is now foreseen,[84] and global warming along with other aspects of climate change may have an anthropogenic cause.[85] Objective calculation of the sustainable world population indicates a figure of about 2000 million,[86] which we are now way above. Optimists suggest that the global brainpower of these many souls will boost the innovation needed to enable such a large population to sustainably exist. There is some merit in this viewpoint, but it requires that the majority of these brains live in an economic system with sufficient freedom to allow unfettered innovation, which is definitely not the case at present. Ultimately, ensuring sufficient freedom becomes an existential matter for humanity.

Knowledge was considered by Plato as the supreme good;[87] and, conversely, ignorance is a great evil. But since the Information Revolution, following which the entire world's knowledge can be accessed within seconds from one's desk, the value of knowledge seems to have diminished. During the First Annual Symposium of the Tureck Bach Research Foundation in 1995 at Oxford University, Mitchell Feigenbaum noticed a motto on one of the buildings: "get knowledge, get riches but with all thy gettings get

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[82] As mentioned previously,the nomenklatura in the Soviet Union comprised about 1.5% of the population.[31] There is of course no exact equivalent in Great Britain, but there are about 2 million active limited companies in England and Wales, and each one must have at least one director, hence the number of directors also amounts to at least 1.5% of the population—probably 3 or 4% would be a better estimate. In France, *cadres* are perhaps a closer equivalent to the nomenklatura; the *Bureau international du travail* (BIT) reckons that in 2019 5.2 million people were *cadres*. This amounts to almost 8% of the population of 67 million. There is no precise definition of "oligo" but these numbers seem far too great to warrant being described as oligarchies. Numerically, the present Russian oligarchy is more akin to the British House of Lords before its various reforms.

[83] The loss of freedom under the Nazi system implies the loss of innovation; it is a puzzle that during the decade in which the Nazi system was established, although Hilbert lamented the decline of mathematics at Göttingen University, German industry manifested peerless innovative power, as displayed at the 1937 International Exhibition in Paris, for example.

[84] R.A. Mason, The sixth mass extinction and chemicals in the environment: our environmental deficit is now beyond nature's ability to regenerate. *J. Biol. Phys. Chem.* **17** (2017) 160–176 .

[85] G.C. Holt and J.J. Ramsden, *Climate Change from First Principles*. Basel: Collegium Basilea (2019).

[86] J.J. Ramsden, A.A. Mamali and N.T. Athanassoulis, A sustainable world population. *J. Biol. Phys. Chem.* **19** (2019) 11–21 and references therein.

[87] Plato considered knowledge to be the highest form of goodness and the only path to true happiness. He saw knowledge as essential for achieving a just and harmonious society. He believed that without knowledge, it was impossible to achieve true justice or create a social order in which citizens could reach their potential and lead meaningful lives. Plato argued that knowledge is the most important possession of all, and it is what distinguishes humans from other animals.

understanding";[88] understanding surpasses knowledge. Whereas knowledge can be readily transmitted, achieving understanding is a personal quest. This explains why every year large numbers of new books on what would seem to be well-worn topics, such as quantum mechanics and general relativity, are published. The subjects are hard to understand even when the knowledge associated with them is indisputable, and these books are monuments to numerous personal attempts to achieve understanding, some of which are of course better than others. J.R. Oppenheimer notes "Spinoza's view that it is man's highest function to know and to understand the objective world and its laws",[89] and it seems hard to better that statement. Again, it seems that freedom is favourable to the pursuit of this goal.

The conclusion seems clear enough—the distributive or proprietary system is the most conducive to the pursuit of man's highest function. It follows that it is worth making strenuous efforts to reëstablish that system.

This pursuit is also favourable to innovation and is, therefore, to be preferred on purely pragmatic grounds. But invention and innovation, perhaps more than anything else because it is not immediately productive, requires capital. The problem with the capitalist system is that the top-dogs, focusing on chrematistic pursuits, become plutocrats and addicted to money, and hence they end up almost exclusively investing in whatever gives the largest monetary return in the shortest time.

Alongside that, the tendency to concentration further reduces the potential variety of ideas about what to invest in. Hence, although the capitalist system starts by being good at raising capital, it becomes less so over time. Furthermore, by having created a global market of potentially the entire world population for any software product, the Internet hinders raising capital for everything else that is not software. Nevertheless, there is a healthy startup culture in liberal economies like those of the USA, UK and Switzerland in the West, and in Japan and Taiwan in the East—where there is also a strong tradition of intense innovation in large corporations.[90] By counteracting the trend to concentration, this tends to restore balance. There is really a continuum of organization between the distributive system and what we generally call "capitalism" and resolute pressure in the direction of the former may achieve it incrementally without catastrophic disruption.

In moving to establish the distributive system, it will certainly help if real power over one's environment is gradually shifted downwards from remote, high-level central authorities to local organizations akin to the building management committees established for multiowner apartment blocks. These committees have the great advantage of having the material means to enact their decisions. This would have to be the case for local organizing committees. A further not insignificant factor for success will be the use of approval voting to ensure that decisions best reflect the considered collective will of members.

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[88] M. Feigenbaum, Unfolding processes, emergent phenomena and numbers' structural legacy. *Interaction* **1** (1997) 1–10.

[89] J.R. Oppenheimer, Newton: The path of light. In: *Science and the Common Understanding* (BBC Reith Lectures 1953), p. 3. London: Oxford University Press (1954).

[90] See S. Watanabe, A paradigm shift to sustainable evolution through creation of universal ties. Nanotechnol. Perceptions 12 (2016) 100–129.

Conclusions

Any progressive human society needs capital; the system usually called "capitalism" means that the means of production, acquired with capital, can be privately owned. It is usually combined with the institution of free markets to optimize the allocation of resources (that is, best match supply with demand). It creates severe social tension because of the disparity in status (encompassing wealth) between the owners and non-owners. Hence it is unstable, due to its ethical contradictions,[3] or simply because the non-owners, being in an overwhelming majority, may act violently to dispossess the owners.[63]

Capitalism is indissociable from allowing private individuals to own and operate businesses for profit; the profit is essential for providing a surplus income for investing in innovation to continually develop the business, as well as providing a means of livelihood for the owner. The latter can easily expand to encompass, almost without limit, the potlatches characteristic of early Canadian society.[91] The desire to hold them may be an almost primaeval instinct. They are a means of dissipating private wealth back into society, which may dissipate the social tension to some extent.

To resolve the instability, one may guarantee security of livelihood for the non-owners. This is Belloc's servile state, in which much of humanity has acquiesced throughout much of history. Nevertheless, it never seems to achieve the same level of prosperity as capitalism, which limits the value of the guarantee. Since wealth is not a value in itself, lesser prosperity is not an incontrovertible weakness. Far worse is the weakness of innovation that the system tends to engender, which makes it prone to invasion.

The alternative is to revert to the distributive state. Belloc dismisses this as being impracticable, but since he wrote we have had at least two revolutions, the scientific and the informational, with more undoubtedly on the way,[92] and given the immense accumulation of knowledge and understanding, which continue to grow, it seems inconceivable that a practical way cannot be found. Indeed it may already be happening, assisted by so-called AI (large language models). The Internet is said to have "democratized" global society; it is probably more accurate to say that it is rendering democracy irrelevant, as evinced by the very low turnouts in many municipal elections nowadays. This irrelevance may free up man's energies for the pursuit of the highest function.

J.J. Ramsden

[91] M. Denhez, *The Canadian Home*, p. 25. Toronto: Dundurn Press (1994).
[92] J.J. Ramsden, Revolutions: agricultural, industrial and scientific. *J. Biol. Phys. Chem.* **21** (2021) 31–34.