



EXHIBIT

Every socioeconomic formation has a foundation consisting of three pillars: a set of property relations and institutions that organize the allocation of resources, a distributive ethic that specifies the distribution of income and resources considered fair or just, and a behavioral ethos that specifies how economic actors make decisions. These pillars are linked: if economic actors behave according to the stipulated behavioral ethos, then the property relations should implement the distributive ethic. I present several blueprints for a socialist economy, using a theory of cooperative decision-making, and contrast the results with capitalism.

Market Socialism Renewed

John Roemer

Socialism is back on the political agenda in the United States. For the first time in a century, an avowed socialist, Bernie Sanders, was a viable presidential candidate, and another, Alexandria Ocasio-Cortez, is a popular congressional freshman. These politicians and many others now advocate policies commonly viewed as socialist: single-payer universal health care, the Green New Deal, federally financed preschool and tertiary education, and large infrastructural investment, to name a few.

There is, however, little discussion of what was a central topic in earlier socialist movements: the nature of property rights in firms. The Democratic Socialists of America (DSA) devote a paragraph to property relations on their webpage, but this topic has

little popular salience.¹ Because American socialist politicians say little or nothing about property relations, the implicit assumption must be that their conception of socialism is *social democracy*: an economic system with capitalist property relations, but with significant taxation to finance the investments that comprise their policy proposals. In popular parlance, the closest reference to a change in property relations in firms is the discussion about stakeholder representation on corporate boards. Such representation, referred to in the DSA manifesto, would dilute the power of owners, the holders of firm equity, and could be a significant reform.

Every socioeconomic formation, I propose, has a foundation consisting of three pillars: a *set of property relations* and institutions that organize the allocation of resources, a *distributive ethic* that specifies the allocation of income and resources considered fair or just, and a *behavioral ethos* that specifies how economic actors are expected to make decisions. These pillars are linked: if economic actors behave according to the stipulated ethos, then the property relations should implement the distributive ethic. The behavioral ethos of capitalism is *individualism*: each actor is conceived as being in competition with all other actors, and the actions of all are constrained by nature. This ethos may be summarized as “going it alone.” The key institutions are private property ownership, contracts, and markets. The distributive ethic is “from each according to his endowments of talents and wealth, to each what he can get.” Law sets the rules — what Karl Marx called the superstructure. Katharina Pistor’s 2019 book, *The Code of Capital*:

1 The DSA website says, “Social ownership could take many forms, such as worker-owned cooperatives or publicly owned enterprises managed by workers and consumer representatives. Democratic socialists favor as much decentralization as possible. While the large concentrations of capital in industries such as energy and steel may necessitate some form of state ownership, many consumer-goods industries might be best run as cooperatives.” dsausa.org/about-us/what-is-democratic-socialism/.

How the Law Creates Wealth and Inequality, explains how law under capitalism creates the conditions for capital accumulation.²

What are socialism's three pillars? The behavioral ethos is *cooperation* — people in solidarity are engaged in a struggle constrained by nature. The distributive ethic, classically, was "from each according to her ability, to each according to her needs." A variety of sets of property relations and institutions have been proposed as socialist, from state ownership of firms to worker-owned firms. The importance of the behavioral ethos of a social formation was emphasized by G. A. Cohen.³ For Cohen, the socialist ethos was "community," an amalgam of reciprocation and altruism.

My goal in this article is to describe an attempt to conceptualize the ethos of cooperation and socialist property relations in a precise way, in order to provide a new set of blueprints of what a socialist economy could look like — an economy where economic actors cooperate in their labor supply and investment decisions, rather than going it alone, as they do under capitalism. My tools are the two major contributions of neoclassical economics: The theory of general competitive equilibrium and game theory. Of course, the standard application of these tools has been to capitalist economies, where economic actors are assumed to behave according to the individualistic ethos; they can, however, be used as well to analyze economies with socialist property relations, in which actors behave according to a cooperative ethos.

We are used to thinking of neoclassical economics as postulating capitalist property relations, but it is less obvious how they model the individualistic behavioral ethos. To see this, one needs to understand the central concept of game theory, which is Nash

2 Katharina Pistor, *The Code of Capital: How the Law Creates Wealth and Inequality*, Princeton: Princeton University Press, 2019.

3 G. A. Cohen, *Why Not Socialism?* Princeton: Princeton University Press, 2009.

equilibrium. A game, formally, consists of a set of players, each of whom plays a strategy or takes an action, and a *payoff function* for each player, which measures his welfare or income as a function of the strategies taken by all the players. Consider a special case, where the players are workers, and their *contributions* are supplies of labor. A list of contributions by the set of players is called a *contribution profile*. The payoff to a particular player from a contribution profile is the value of the project (for which the contributions are made) to her. In the applications here, payoffs will be earnings in a market economy, or the utility to the consumer/worker of the goods she can purchase with her income.

The mathematician John Nash proposed that an *equilibrium* in such a game is a contribution profile with the property that no player can increase her payoff by altering her contribution, given the contributions of the other players. The equilibrium is thus a stationary point in a clear sense. Each player wants to stand pat, given the actions of all the other players.

The Nash optimization protocol is: given the actions of the other players, I play the action, or make the contribution, that results in the highest payoff for me. This protocol models individualism, or going it alone, because each person is treating the others' actions as parameters in his own decision problem. Each views the others' contributions as fixed and, on that assumption, decides what contribution he should make. A set of contributions comprises an equilibrium, when each "goes it alone," no person wishes to change what she is doing. There is no cooperation among the players. They do not communicate with one another. Indeed, the Nash equilibrium is also called, aptly, a "non-cooperative equilibrium."

This idea — which, to the uninitiated, may seem strange — in fact revolutionized economic theory. There are now thousands of applications of Nash equilibrium to economic life. John Nash

deservedly received the Nobel Prize in economics for it: he proposed the equilibrium concept in his doctoral mathematics thesis at Princeton University in 1951, the year in which he also specified the mathematical conditions on the payoff functions of the game that would guarantee such an equilibrium exists.

Shortly thereafter, Kenneth Arrow and Gérard Debreu put the finishing touches on the model of competitive economic equilibrium that had been maturing since its first statement by Léon Walras.⁴ The model was one of a capitalist economy where firms are privately owned by households. The corporate form is assumed where, in general, a firm is partially owned by many households. Firms maximize profits at the going prices by hiring labor, renting capital, and combining these factors to produce goods that are demanded by households. Households supply labor and capital (investment) to firms. Each household decides how much of its factors of production (labor and investment) to supply to firms, knowing the wage for labor, the interest rate for investment, and how much of various consumer goods to demand in order to maximize utility. A set of prices reaches equilibrium in the economy if, for each production factor (including labor power), the total supply of the factor by consumer-worker-investors equals the total demand for that factor by firms, and for each consumer good, the total demand for the good by consumers equals the total supplied by firms. Arrow and Debreu proved that, under suitable conditions on the utility functions of consumers and the production functions of firms, such an equilibrium in prices exists, and along with it, an associated allocation of all factors and goods in the economy. In particular, this model comprises a complete theory of income distribution for the economy — a person's income is the value of

4 Kenneth J. Arrow and Gerard Debreu, "Existence of Equilibrium for a Competitive Economy," *Econometrica* 22 (1954), 265–90; Léon Walras, *Éléments D'économie Politique Pure, Ou, Théorie de la Richesse*, Lausanne: L. Corbaz, 1874.

the production factors she sells to firms plus the value of profits she receives as a (partial) owner of firms.⁵

At the beginning of the twentieth century, Vilfredo Pareto proposed a definition of economic efficiency that is still the central concept of efficiency used in economics. The concept is very general — it does not depend upon having specific property relations or other institutions, such as markets. The data needed to define Pareto efficiency are, first, the *production functions* or technologies, which describe how resources or factors can be combined to produce consumer goods; second, the *utility functions* of consumers, which give the preference orders that consumers have over all possible bundles of consumer goods; and third, the total aggregate endowment of each resource in the economy. An *allocation* consists of an assignment of all the resources to technologies, an output of consumer goods from each technology, and an assignment of the total bundle of consumer goods to all consumers. We say that the allocation is “Pareto efficient” if it is impossible to find another allocation in which every consumer has a bundle that she prefers to the bundle she received in the first allocation.⁶ Pareto efficiency formalizes the idea of the non-wasteful use of resources.

5 The generic individual in the neoclassical model is called the “household” or the “consumer.” This individual can supply labor and/or capital (investment) to firms and can also be a partial owner of firms. In contrast, the generic individual in the Marxist model of capitalism is a “capitalist” or a “worker,” or someone who holds an intermediate class position (such as a member of the petty bourgeoisie or a small businessperson). Despite its class-obscuring language, the neoclassical model can be used to demonstrate that a Marxist class structure will emerge from competition in the neoclassical model, when three conditions hold: markets for commodities and labor exist, there is sharply differential ownership of firms (or capital), and capital is scarce with respect to labor. Those with sufficiently low wealth sell their labor power to those with high wealth, and the former are exploited by the latter. See John E. Roemer, *A General Theory of Exploitation and Class*, Cambridge, MA: Harvard University Press, 1982.

6 This can be weakened to say that “some consumers have a bundle in the new allocation that they prefer to their original bundle, and no consumer has a bundle that renders him worse off than before.”

I can now state what is perhaps the most important contribution of economic theory to the justification of capitalism. It is this fact: in a general competitive equilibrium, if there is no taxation, no externalities, no public goods or public bads, and there is a complete set of markets, then the equilibrium allocation is Pareto efficient. This fact is known as the first theorem of welfare economics.

The two major desiderata for an economic mechanism are that it be efficient — that is, that it not waste resources — and that the distribution of income be just or fair. While capitalism arguably does well on the first desideratum, it does poorly on the second. The distribution of income, in a competitive equilibrium reflects the distribution of endowments or assets that households have, and the endowment distribution is not fair, as it reflects all the inequalities that are inherent in the “birth lottery” that assigns children to families. Under capitalism, those who are born into wealthy and highly educated families have massively better economic prospects than those who are born into poor and disadvantaged families.

The main ways that a capitalist system could rectify the unfairness of the income distribution in a competitive equilibrium are through redistributive taxation of income and wealth, massive investment in the education of the disadvantaged, and the provision of a robust selection of public goods (such as infrastructure and a health system). Aside from the fact that the wealthy will oppose the kind of investments and taxation that would be required to finance these goods, there is a limitation to the effectiveness of taxation under capitalism, due to what are called, somewhat inaccurately, “market failures.”

If there is an income tax that a society imposes to finance public goods, or simply to redistribute income and provide transfer payments to unlucky individuals, the allocation, assuming Nash optimization by workers-investors-consumers, will no longer be Pareto efficient. Public bads, such as carbon emissions or pollution,

will not be controlled by the market: there must be government intervention to regulate them, or to charge effluent fees, and capitalist firms will attempt to lobby to prevent this and to control the state agencies that are supposed to regulate them. The financing of public goods must also be arranged by the state — and that will involve taxation, which introduces inefficiency — for Nash optimizers will not voluntarily contribute to the production of a public good. This failure is called the free-rider problem, and it is a general affliction of Nash optimization. I will explain in the next section why this inefficiency arises with Nash optimization.

I will then show that if economic players optimize according to a *cooperative optimization protocol* — what I call Kantian optimization — and if property relations are arranged in a socialist manner, then the market equilibrium that is brought about will be Pareto efficient. Moreover, I extend the reach of the first theorem of welfare economics, for this result holds even in the presence of income taxation, as well as public goods and public bads. In particular, with Kantian optimization, public goods will be efficiently supplied by the citizenry in a decentralized manner, and public bads can be regulated by them in a decentralized way.

In sum, my intention is to integrate a formal theory of cooperation into models of a socialist economy, and to show that the principal normative argument for capitalism — that it brings about a Pareto-efficient allocation — is strengthened under socialism. At the same time, socialism can rectify the highly unequal income distribution of capitalism without a sacrifice in efficiency. The efficiency–equity trade-off, familiar in the theory of public economics, dissolves.

In the process of reconstructing the economic theory of socialism, however, I am led as well to amend its classical distributive ethic. My proposal may be contentious; I'll wait until later (sections 3 and 5) to discuss the amendment.

1 A SIMPLE MODEL OF CAPITALISM WITH INCOME TAXATION

We suppose that there is an economy with n individuals. Each individual is endowed with an amount of labor power and a skill level, and an amount of a capital good (that may be zero). Her labor power may be sold to a firm for a wage; what she does not sell is consumed as leisure, to be thought of as all non-income-producing use of one's potential labor. Her capital endowment (her savings) may be invested in a firm or, if not, provides the individual with security that she values. There is a single consumption good produced by all firms, using inputs of labor and capital. Individuals are also endowed with ownership shares of firms, which may be zero. These entitle the citizens to shares of the firms' profits.

There are three prices in the market: p , the price for a unit of the consumption good; w , the wage for a unit of labor time at a standard unit of skill; and r , the interest or rental rate for a unit of capital investment. Each firm, which is owned in its entirety by citizens, possesses a technology with which it can produce the consumption good. Facing the price list (p, w, r) , each firm demands an amount of labor and capital investment that maximizes its profits, which equal the value of the consumption good produced, minus the wage bill and interest paid on investments. The firm supplies to the market the amount of the consumer good that it produces with these inputs.

In general, citizens rent their endowments of labor power and capital to firms, and they receive from firms wages for labor, interest on their capital, and a share of the profits of firms in which they own shares. So, firms *demand* factors of production from households and *supply* produced goods to the market, and households *supply* production factors to firms and *demand* consumption goods through the market. Each consumer chooses the

basket of consumption goods that maximizes her utility, given her income. Her income, in turn, is determined by the supplies of factors she offers to firms.

While the firm's optimization problem is easy to state — to maximize profits — the consumer's is more complicated. It supplies labor and capital, which, at going prices, will bring an income, which is then used to purchase the consumer good. The consumer faces a problem of first determining what its income will be upon supplying production factors to firms, and then, subject to that, using its income to purchase the consumer good. It solves this problem in the best possible manner — the way that maximizes its utility, given the prices in the market.

More formally, a *general competitive equilibrium of a capitalist economy with zero taxation* is a list of prices (p, w, r), supplies of both production factors by all workers and investors, demands for the consumption good by all individuals, demands for the two production factors by every firm, and supplies of the consumption good by every firm such that:

- a.** Each firm demands labor and investment to maximize its profits, at the given prices;
- b.** The profile of citizens' labor supplies is a Nash equilibrium of the labor-supply game;
- c.** The vector of citizens' investment supplies is a Nash equilibrium of the investment game;
- d.** The individual's income equals her after-tax earnings, where earnings comprise wages for her labor, interest on her capital investment, and her share of the profits of the firms she has shares in, plus the demogrant; and

- e. All markets clear: the demand for each factor of production equals its supply, and the demand for the consumption good equals its supply.

At the equilibrium, in other words, the demand for every commodity or production factor equals its supply. There is no unemployment: total labor supply offered by workers equals total labor demand by firms. Nor is there a shortage or glut of investment funds: the capital market clears as well.

This is a highly idealized picture of a capitalist economy. Nevertheless, it is a useful construction. When Marx studied capitalism in *Capital*, he likewise postulated a competitive economy in which profits of firms came about through competition, not cheating or monopolistic practices. The challenge for Marx was to explain how the highly unequal income distribution of capitalism comes about *even if* all commodities (including labor power) are exchanging at their competitive prices. The heart of his explanation is that exploitation of labor comes about even at competitive prices, and it was exploitation that was the source of profits, which accrued to a small class. Using the model of “perfect” competition to study capitalism follows in this tradition.

The important result is:

Proposition 1: *Any capitalist competitive equilibrium where the tax rate t is zero is Pareto efficient; any equilibrium where the tax rate t is positive is Pareto inefficient.*

The first part of this proposition is called the “first theorem of welfare economics”; the second part is called the “deadweight loss of income taxation.” Here, I explain why the deadweight loss occurs. This is due, in fact, to Nash optimization by workers and investors in their factor-supply decisions.

For simplicity, let's assume that all workers have the same skill level and the same preferences for goods and labor expended. Suppose there is an income tax rate of t . If the wage per unit of skill is w , and if a worker offers an amount of labor power in amount L , her after-tax income will be $(1-t)wL$. The total tax revenue in the economy will be twL , where L is the total labor supply of all workers, since total wages will be wL , and tax revenues will be t times this. This tax revenue will be the government's budget and will be invested in infrastructure, public goods, transfer payments, and everything else the state provides. When the worker is deciding upon his labor supply L , he sees that his choice will affect significantly his take-home income $(1-t)wL$, but because he is a Nash optimizer, he also notes that his choice will have virtually no effect on the value of L , because L is the total labor supplied by millions of workers (n is in the millions), and he takes the labor supplies of others as fixed. So it's rational for the individual worker to ignore the effect of his labor supply on the value of the state's tax revenue, and hence on the value of government provision that his small action will entail. The consequence is that if t is large, it becomes unattractive to sell labor power, because the after-tax wage is small. The worker would prefer to either live on transfer payments or survive outside the market.

When I say "it's rational for the worker to ignore ...," I mean that it's rational *given the worker is a Nash optimizer*. We see evidence of this kind of rationality in the general aversion to taxation that exists in the United States in the working class: many workers resent the taxes they pay and fail to make the connection between taxes paid and the provision of public services and transfer payments that tax finance. Leftists (and Democrats) often bemoan the failure of people to understand this connection. But one must understand that this failure is a direct consequence of the ideology of "going it alone," which is formalized by Nash optimization. When

one makes an economic decision, one ignores the fact that many others are facing the same or similar decisions, and it might well be more sensible to think of acting *in concert* with those others rather than of “going it alone.” When a worker’s take-home pay falls due to an increase in the tax rate, she may ignore the fact that the tax increase finances benefits that she will enjoy: a health or education system, national parks, or federally financed scientific research. This cognitive error is unsurprising, due to the going-it-alone optimization protocol of Nash.

Readers will recognize what I have described as a free-rider problem, which is a universal consequence of Nash optimization in problems concerning public goods. The tax revenues of the state are used to finance a public good. When Nash optimizers face financing a public good, they *always* produce too little of it — to be precise, the provision of public goods is Pareto inefficient (and too small from a social viewpoint) when those who must contribute to finance it decide upon their contributions by Nash optimization. “Free-rider problem” is just the popular phrase for this Pareto inefficiency. All would be better off if they each contributed somewhat more: in the case of income taxation, this means more labor.

The deadweight loss of taxation is also commonly explained as being due to “the incentive problem.” But the incentive problem is not a fact of nature; it is a consequence of Nash optimization, which is the behavioral ethos of capitalism — that of conceiving of one’s economic problem as one of “going it alone.”

Proposition 1 appears every day, on almost every page of the *Wall Street Journal*. The first part of the proposition is an advertisement for capitalism of a laissez-faire variety. The second part warns us against trying to redistribute income. The conservative mantra claims not only that redistribution of market incomes via taxation is unjust, because people deserve what they get by

going it alone, but moreover that any attempt to redress income inequality will be wasteful, because of the deadweight loss of taxation. Conservatives and liberals are reduced to arguing over the magnitude of the incentive problem, and how inefficient taxation will be. The argument I offer here, however, does not engage in that controversy. Rather, I propose that under socialism, economic decisions will be made cooperatively, and the incentive problem will vanish, as we now show.

2 SOCIAL DEMOCRACY WITH KANTIAN OPTIMIZATION: SOCIALISM 1

In what I'll call "Socialism 1," the property relations of capitalism are maintained, but there is income taxation with a demogrant distributed to all citizens. Workers and investors, however, do not determine their factor supplies by Nash optimization as they do under capitalism, but rather by Kantian optimization.

Firms will maximize profits, as under capitalism. They will demand production factors of labor and capital, and produce output that maximizes the surplus over factor payments (profits) at the given prices. Households will continue to offer labor power and capital to firms. But their decisions will not be made via Nash optimization, but rather in a cooperative way.

Let's describe how workers will decide upon their labor supplies. To simplify the problem, let's assume (as above) that all workers have the same skill level and preferences. They face an income tax rate of t . When a worker decides upon her labor supply L , she asks herself, "What is the labor supply that I would like all workers to offer?" She does not take the labor supplies of others as fixed, or as independent of hers. She thinks as follows: "If all workers offer a labor supply of L , then my after-tax labor income will be $(1-t)wL$, and the total tax revenue will be $twnL$. My share of that, if I consume it as the provision of the public good it finances, will be

$twnL/n = twL$. So my real income will be $(1-t)wL + twL = wL$. This is independent of the tax rate. So I should just offer the labor supply that will maximize my utility, assuming I receive a real income of wL .

Why is this way of optimizing different from Nash optimization? Each worker is asking, "What is the labor supply I would like all workers to offer?" and it is therefore necessary for the worker to consider not only her after tax income, $(1-t)wL$, but the value of the public good generated by the total labor supply, which on a per-capita basis is twL . In contrast, with the Nash counterfactual, "What labor supply should I offer given the labor supplies offered by others?" the worker realizes that her labor-supply decision will have essentially no effect on the value of the public good, so she ignores this effect.

I call the cooperative way of reasoning "Kantian" optimization, because each worker is offering the labor supply that she "will be universally offered," which is Immanuel Kant's categorical imperative.

The effect of Kantian optimization is to internalize the positive externality of the public-good provision that is financed by taxation. The failure to connect the taxes I pay with the public provision that they finance is corrected, because each individual is not "going it alone," but rather is contemplating the effect of her actions as part of the concerted actions of all workers. The free-rider problem disappears, and it is not hard to show that the resulting allocation of resources is Pareto efficient.

This Pareto efficiency holds, regardless of how high the tax rate is. The tax rate must still be set democratically. But now, citizens can decide on how much redistribution they desire without fear of the deadweight loss of taxation. Any tax rate will engender a Pareto-efficient allocation of resources. Taxation will, indeed, alter the value of public provision, and hence the distribution of real income, but it will not waste resources. In economic jargon, the

trade-off between equity and efficiency no longer exists. The *Wall Street Journal* could no longer argue that taxation is wasteful. The propaganda value of Proposition 1 is vitiated.

The same argument is true for the optimizing investor. If investors optimize in the Kantian manner, then changing the tax rate will not change the supply of investment. This is not because workers and investors have altered their preferences for income and leisure or income and security under social democracy; it is because the investor is optimizing in a cooperative manner. (One might raise the question of whether it is less reasonable to suppose that investors could optimize according to the Kantian protocol.)

There is an important illustration of Kantian optimization in American history. At a convention to discuss the signing of the Declaration of Independence, there was, unsurprisingly, reluctance from delegates to put their heads on the chopping block by confronting King George III so aggressively. Benjamin Franklin spoke: "If we do not hang together, we will, most assuredly, each hang separately." Signing the Declaration was a situation inviting the free-rider problem. Franklin was urging the delegates to optimize in the Kantian manner, not in the Nash manner: take the action you would will that we all take. Do not think, "I would prefer that all others sign, and I do not," for that is the recipe for disaster. Franklin's speech is the earliest expression of the logic of Kantian optimization that I have found.⁷

There are two objections that one can raise against the proposal that citizens should optimize according to the Kantian protocol under socialism. The first is that, in reality, not all workers have the same wage or skill or preferences. The fact of this kind of heterogeneity turns out to be easy to accommodate, although doing so involves a certain amount of mathematical apparatus that I cannot

7 I invite readers to supply me with other historical examples.

present here. Suffice to say, there is a satisfactory generalization of the Kantian protocol I have presented here that will work — the consequence of optimizing in that manner will be Pareto efficiency, regardless of the tax rate. The second objection is that it is utopian to suppose that people would adopt this kind of cooperative optimization protocol. I will address this challenge in section 6 below.

To summarize:

A social-democratic equilibrium at a tax rate of t is a list of prices (p, w, r) and an allocation such that:

- a. Each firm demands labor and investment to maximize its profits, at the given prices;
- b. The profile of citizens' labor supplies is a Kantian equilibrium of the labor-supply game;
- c. The list of citizens' investment supplies is a Kantian equilibrium of the investment game;
- d. The income of each individual equals her after-tax income, where income comprises wage income for her labor, investment income for her investments, and her share of the profits of the firms she owns, plus the public good provision; and
- e. All markets clear: the demand for each factor of production equals its supply, and the demand for the consumption good equals its supply.

We have:

Proposition 2: *The social-democratic equilibrium at any tax rate t between zero and one is Pareto efficient.*

We might ask whether existing social democracies — chiefly, the Nordic countries — are social democracies in the sense of the above

definition of the concept. Are workers and investors choosing their factor supplies according to the Kantian protocol? This is an open question for research. I can think of three pieces of evidence that this might be the case — or, more circumspectly, that the profile of labor supplies is closer to being a Kantian equilibrium than a Nash equilibrium in the Nordic countries.

The first piece of evidence is the coexistence of very high tax rates and high productivity and efficiency in the Nordic economies. The second is that the labor-force participation rates in the Nordics are exceptionally high. The average 2019 labor force participation rate in the OECD countries was 72.4 percent, approximately the US rate. All five Nordic countries (Iceland, Sweden, Denmark, Norway, and Finland) have rates between 78 percent and 87 percent. (The highest such rate among all OECD countries is Iceland's 87 percent.) This is indicative of there being a very weak incentive effect in response to high taxation in these countries, which is, as we have noted, a consequence of Kantian optimization in the labor-supply decision.⁸ The third piece of evidence is that the negotiations between labor and capital are more centralized in the Nordics than elsewhere. Union density is very high, and negotiations over wages and hours take place between national unions, representatives of capital, and sometimes the state. It seems to me that Kantian optimization would be an attractive protocol for a national union, negotiating hours and conditions of work for the various occupations of its members. Kantian optimization represents a kind of solidarity that might well be attractive to a union that is negotiating for the entire working class. Such optimization does not preclude there being different annual labor supplies for different occupations, whose members have different degrees of stress or danger on their jobs. I am less inclined to think

8 See: data.oecd.org/emp/labour-force-participation-rate.htm.

that investors behave according to the Kantian protocol, in part because I do not know of evidence that investment decisions are coordinated the way labor decisions are in the Nordic economies.

More generally, a century of social democracy in the Nordics has succeeded in creating a degree of trust among citizens that is unparalleled. As I will argue in section 6, trust is the key ingredient necessary for a group to engage in Kantian optimization. Each must trust that the others in the group will also play the Kantian strategy, and not exploit her by playing the Nash strategy against her — for a non-cooperator will calculate that he can free ride by playing Nash against the cooperative crowd.

3 A SHARING ECONOMY: SOCIALISM 2

Only the behavioral ethos, but not the property relations, are different from those institutions under capitalism in Socialism 1. I now propose to change both the behavioral ethos and the property relations. In the model of this section, firms are no longer owned by shareholders, as in social democracy, but rather by those who invest in and supply labor to them. It's worth reviewing the distinction between investors and owners in actual capitalism. Owners own equity in the firm, which gives them a property right equal to a share of the firm's assets and income. Investors purchase corporate bonds: they are paid interest on their investments, and when the bond matures, the principal is refunded to the investor. Shareholders (owners) of the firm are the residual claimants: they are last in the queue to receive income from the firm. Workers' wages and bondholders' interest are paid first, and then if any revenue remains (profits), that is distributed to owners, or retained in the firm's bank account, which is the property of the owners. There are no shareholders in Socialism 2.

When firms initially create shares that sell to the public, it is to raise funds — it's an alternative to floating bonds. But once shares

are purchased in the initial public offering, the firm receives no further revenue when shares are traded. The stock market allows households to trade shares with one another, but these share purchases produce no capital for the firm. In contrast, issuing bonds always raises capital for the firm. (There is also a secondary market in which corporate bonds can be bought and sold, with no income repercussions for the firm.)

In the model I now present, there are no shareholders of firms. Firms will continue to maximize profits in a market economy, but the profits will be returned to the firm's workers and investors (that is, their factor suppliers) in proportion to the value of their labor or investment supplied to the firm. In Socialism 1, there was an exogenous tax rate, and in the present model of Socialism 2, there will be an exogenous parameter σ , which is the share of profits distributed to its workers, while the share $1-\sigma$ is distributed to its investors. The two polar cases are "labor-owned firms," when $\sigma = 1$, and investor-owned firms, when $\sigma = 0$. In both cases, workers and investors are paid wages and interest for their investments, at rates w and r determined by the market. After those payments, profits remain; in the case $\sigma = 1$, those profits are distributed to workers in proportion to the value of their labor supplies, and in the case $\sigma = 0$, they are distributed to investors in proportion to their investments. In general, we allow σ to be any fraction between one and zero: for example, if $\sigma = 75\%$, then 75 percent of the profits are distributed to workers in proportion to their labor supplies, and the remaining profits are distributed to investors in proportion to their investments.

Many socialists will bridle at the proposal that investors would be symmetrically treated to workers in this version of "socialism." Isn't it the case that all profits should be distributed to workers — and investors should be paid only the interest on their investments? I will address this important question below in section 5. This raises the most important issue for socialist finance.

To see this, let's note that, today in the United States, the average capital-to-labor ratio in the corporate sector is on the order of \$400,000: the average worker works with capital worth two-fifths of \$1 million. It would be crazy for each worker to carry a \$400,000 mortgage to finance her owning the capital that she works with — it would be foolish to tie up all one's wealth in a single firm. The risk must be shared: either the state could own the capital, or millions of investors could — households that purchase corporate bonds.

Table 1 shows the distribution of financial wealth in the United States.⁹

Table 1 Distribution of Financial Wealth in the United States, 2017¹⁰

Fractile of the wealth distribution	Fraction of total financial wealth owned by fractile
Bottom half	2.5%
.50-.90	26.1%
.90-.99	30.3%
.99-.999	17.7%
.999-.9999	10.5%
.9999-1.0	12.9%

From Table 1, we see that the richest centile (the sum of the last three rows) owns 41 percent of the financial wealth. I will argue below that much of this wealth must be redistributed under socialism. However, the middle and upper-middle wealth classes,

9 Financial wealth consists of the value of corporate equity, corporate bonds, pension funds, and the like. It does not include residential wealth, the value of one's real property net of mortgage debt.

10 Computed by the author from Gabriel Zucman, "Distributional National Accounts," 2017, gabriel-zucman.eu/usdina/.

defined as those in the fiftieth to ninety-ninth centile of the wealth distribution, own 56 percent of the wealth. That wealth must be profitably invested, assuming it continues to exist in a socialist economy, and this is the main reason that — as I will argue below — investors should receive a share of profits in any feasible socialism.

I now define an *equilibrium for a sharing economy with sharing parameter* σ . First, I define the “Firm’s Workers’ Fund” as a share σ of the profits of the firm, and the “Firm’s Investors’ Fund” as the remaining share $1 - \sigma$ of the firm’s profits. In this economy, there are, as before, three prices: p , the price for a unit of the consumption good; w , the wage for a unit of labor of normalized skill; and r , the interest rate for a unit of capital (or a \$1 bond). Firms will, as before, choose their factor demands and the supply of the good (or goods) to maximize profits. Households will supply labor to firms: their labor supplies will comprise a Kantian equilibrium of the labor-supply game. Similarly, the supply of investment to firms by households will comprise a Kantian equilibrium of the investment game.

The income of households will consist of four components: wages for labor supplied, interest for capital supplied, a share of the Firm’s Workers’ Fund proportional to the worker’s supply of labor to the firm, and a share of the Firm’s Investors’ Fund proportional to the investor’s supply of capital (via purchase of corporate bonds) to the firm.

In competitive equilibrium, the total supply of labor is equal to the firms’ total demand for labor, the supply of investment is equal to the firms’ demand for capital, and the supply of consumer goods is equal to the consumers’ total demand for consumer goods.

As I said, if the parameter $1 = \sigma$, then the firm is worker owned. Investors receive interest income on their investments, but they do not share in the profits. If $\sigma = 0$, the firm would be investor owned: profits would be distributed entirely to investors, and workers

would be paid only a wage. Society must choose this parameter through a democratic procedure.

We have:

Proposition 3: *For any value of σ between 0 and 1, the sharing equilibrium is Pareto efficient.*

I will not attempt to give an intuition for this proposition. The mathematical argument is not easily translated into non-mathematical language. It depends upon the workers and investors using the Kantian protocol. The equilibrium would not be efficient if factor suppliers were using the Nash protocol.

We now have two socialist variants, illustrating how we can combine a formal model of cooperative optimization with various regimes of property relations to achieve Pareto efficiency.

I do not, however, know how to impose redistributive taxation in the model of Socialism 2 and preserve efficiency. What must take the place of income taxation, as a way of achieving a reasonably equal distribution of income, is redistribution of financial wealth. Simulations show (see section 9) that if we keep the wealth distribution of financial capital displayed in Table 1, then even for the “labor-owned sharing economy,” when $\sigma = 1$, the Gini coefficient of income without taxation is too high (over 0.50). This is unacceptable for socialism. If, however, we tax away about half of the financial wealth of the top 5 percent of the wealth distribution and distribute it equally to all households, then the sharing equilibria have income Gini coefficients of between 0.36 and 0.41. Not only would the income distribution be more equal than it is in the United States today, but there would be no deadweight loss that occurs with Nash optimization.

Clearly, if there is no income taxation in the sharing economy, then the degree of income equality in the sharing equilibrium — even if σ is close to 1 — depends upon the degree of redistribution

of wealth, which can be accomplished, as Piketty argues, through wealth taxation.¹¹ And we can impose income taxation in the sharing economy, which will reduce income inequality, but with an efficiency cost (as we have under capitalism). There is, of course, a sharp disagreement among economists as to the true efficiency cost of income taxation. Piketty, Saez, and Stantcheva argue that the richest households in the United States do not reduce their factor supplies enough to reduce their tax payments until the marginal tax rate on high incomes reaches above 82 percent.¹² If that is true, there's not much reason to abstain from substantially higher income taxation of the very rich, as was imposed until 1980.¹³

The question that many will raise is why I propose that investors share in the profits of firms in the sharing economy, to be discussed below in section 5.

4 PROFIT MAXIMIZATION AND PUBLIC BADS

There is an important fact about these models of market socialism. Pareto efficiency of the allocation of resources and income is a consequence of the combination of profit maximization by firms and Kantian optimization by households that supply factors of production. (I have not given an intuition for why this is the case — again, that would necessitate a further attempt to translate economic reasoning into words.) Moreover, the reliance

11 Thomas Piketty, *Capitalism in the Twenty-First Century*, Cambridge, MA: Harvard University Press, 2015.

12 Thomas Piketty, Emmanuel Saez, and Stefanie Stantcheva, "Optimal Taxation of Top Labor Incomes: A Tale of Three Elasticities," *American Economic Journal: Economic Policy* 6, no. 1 (2014), 230–71.

13 In 1950, the average income tax paid by those in the top 0.1 percent of the US income distribution was 60 percent. The top marginal rate was much higher. By 2010, the average rate for this fractile had fallen to about 35 percent. Emmanuel Saez and Gabriel Zucman, *The Triumph of Injustice: How the Rich Dodge Taxes and How to Make Them Pay*, New York: W. W. Norton & Co., 2019, Figure 2.2.

on profit maximization by firms is essential: I do not know of any model that gives Pareto efficiency of economic equilibrium in the absence of profit maximization. I think that the tendency of many socialist economists to ignore the issue of Pareto efficiency in their models of market socialism is a serious error. It may be the result of viewing efficiency as a right-wing idea, which is nonsense. We have only to look around the world, and over time, to understand the importance of designing the economic mechanism to be non-wasteful. Efficiency and equity are the twin requirements of a good economic mechanism: the most powerful defense of capitalism with low taxation is that these desiderata are in conflict. Capitalism elects to favor efficiency over equity, and that may be due to the interests the capitalist class. But socialists must not commit the knee-jerk response of favoring equity over efficiency. Both are important, and the central message of this article is that they are not in conflict if the behavioral ethos is cooperative.

It is worth mentioning that a reliance on profit maximization by firms has been standard since the earliest model of market socialism, from Oskar Lange and Fred M. Taylor.¹⁴ Although their model postulated that firms were owned by the state, firm managers were assumed to report their demand for production factors and supplies of output by maximizing profits, given the prices for output, labor, and capital announced by the central planners.¹⁵

The reliance on profit maximization may disturb some socialists, because we rightly associate profit maximization with many evils — evils that are called, in economic lingo, public bads.

14 Oskar Lange and Fred M. Taylor, "On the Economic Theory of Socialism," in Benjamin Lippincott (ed.), *On the Economic Theory of Socialism*, Minneapolis: University of Minnesota Press, 1936 [1956].

15 See John E. Roemer, *A Future for Socialism* (Cambridge, MA: Harvard University Press, 1994) for a discussion of the Lange-Taylor model and the debate that took place around it.

Examples are child labor, fast assembly-line speeds, and environmental degradation — conditions that reduce the welfare of workers and citizens more generally, and that profit-maximizing firms “produce” unless otherwise controlled. In the presence of unregulated public bads, profit maximization is *not* Pareto efficient. (This is why the first theorem of welfare economics postulates an absence of public bads.) I have avoided this question until now: public bads have not been associated with production in the models proposed thus far. We have ignored, among other things, the fact that the profits of capitalist firms are used to lobby politicians to advocate rules and regulations that create a favorable environment for profitability, regardless of the side effects (negative externalities) on the population at large. Under capitalism, the effectiveness of state regulation and law in controlling public bads depends on who controls the state, as the current American administration makes abundantly clear.

In this section, I will argue that Kantian optimization by workers and investors suffices to regulate the production of public bads in a decentralized manner. Consider an economy that is like the one employed in the previous sections — there are firms producing a consumer good, using labor and capital. In addition, however, there is a public bad that is produced as a “joint product” with the firms’ output. Think of production of the good as being enhanced if the firm pollutes, or increases the speed of the assembly line, or employs child labor. Therefore, if a firm maximizes profits, it will choose to produce the public bad along with its other (desirable) output. One standard way of controlling such behavior is to render it unprofitable, by charging the firm steep effluent fees for polluting, or fines for employing child labor. Or the workers’ union can refuse to supply labor if the assembly-line speed is too high.

I will argue that another strategy can be effective using Kantian optimization. We must now realize that the public bad appears

as an argument over which workers and investors have preferences. That is, citizens' welfare is increasing in consumption, decreasing in labor, and *decreasing* in the level of the public bad. We assume that the level of the public bad is a known function of the firm's output.¹⁶

I must discuss briefly the tragedy of the commons, which is the other face of the "free-rider" coin. The free-rider problem is the fact that, in problems involving the financing of public goods, Nash optimizers contribute too little — the provision of the public good is inefficiently low. Now suppose we have a public bad, such as carbon pollution of the biosphere. It turns out that if those who contribute production factors to the firm produce the public bad, and do so using Kantian optimization, the outcome will be Pareto efficient.

Suppose we introduce the public bad into the social-democratic economy of section 2. We continue to have income taxation at some rate t . The definition of the equilibrium is otherwise unchanged — that is, factor suppliers optimize in the Kantian manner, so at equilibrium, both factor-supply profiles are Kantian equilibria of the relevant games, as defined in definition SD. Now, when workers supply labor, they take account not only of the effect on their after-tax income and the public good provided by taxation but, in addition, of the effect on the level of the public bad. Other things equal, they will *reduce* their factor supplies in order to moderate the level of the public bad. In this way, they take account of the effect of their labor supplies and investments on the emissions of carbon dioxide and planetary warming. Since they are choosing their labor supplies in the Kantian manner, there is

16 For instance, in the United States at the time of writing, every dollar of output on average produces CO₂ emissions of 300 grams. Citizens' welfares decreases with the level of carbon emissions, which increases global temperature, and hence the risk of various climate catastrophes.

no commons' tragedy with regard to the level of the public bad, as there is with Nash optimization.

One might make two objections to this argument. The first is that even a national economy may be too small a unit for the level of production to have a significant effect on a global public bad, like carbon emissions. We would have to require Kantian optimization by all the workers in the world in concert. The point is well taken, and it shows that addressing the problem of global warming requires international cooperation, something much more difficult to organize than cooperation among the workers in a single economy. The second point is a skeptical one. Consider the issue of closing down coal mines in the United States to reduce fossil-fuel emissions. We know many workers in the coal industry oppose doing so: they would rather have the carbon pollution and keep their jobs, even if they understand the dangers of increasing concentrations of atmospheric carbon. This means that the Pareto-efficient allocation of output, labor, and carbon dioxide may still cause temperature increases that will adversely affect future generations, who have no say. Convincing the present generation to reduce fossil fuels sufficiently may well require substantial economic reform so that, for example, former coal miners are not thrown onto the street, and more generally, the standard of living of the less well-off is protected. On a global level, this would require substantial transfers from the rich North to the poor South. In the United States, preferences of many do not properly reflect the true reduction in welfare that will accompany continued carbon emissions at the present rate, and so Pareto efficiency (with today's preference orderings) is an inaccurate measure of welfare.

Although I agree that American preferences about global warming may be in large part due to the go-it-alone ethos that comprises American individualism, I would contend that the principal

problem exhibited by the coal-miner example may not be that miners have bad preferences, but rather that they see the contribution to climate change they would make if the coal mines were to close as having very little effect on climate change. They naturally view their potential contribution to reversing climate change as trivial — because they are Nash optimizing, by assuming nobody else changes their behavior. It would be a very different question if closing the coal mines were one decision among many, part of a grand plan to eliminate all fossil fuels and retool the global economy in a green way. That would be the Kantian approach with regard to the carbon emissions problem. If coal miners were part of a cooperative action to solve the problem of excessive carbon emissions, in which their action was one small part of a global plan, their opposition to closing the mines might well disappear. We should not underestimate the logic of “going it alone,” and the difficulty people have of conceiving a cooperative effort to control global emissions, given the prevalence in the United States of the going-it-alone ethos. How can the American coal miners see closing the coal mines as part of a global cooperative action, when their own president attempts to scuttle the international effort to craft a cooperative response to addressing this huge public bad?

We have the following result:

Proposition 4: *If a public bad is a joint product with output, and preferences belong to a certain class, the social democratic equilibrium with taxation is Pareto efficient at any tax rate t in the interval $[0,1]$.*

That is, Kantian optimization can handle efficiently both redistribution of income and regulation of the public bad.¹⁷ Nash optimization

17 Some might ask, why speak of the efficient level of a public bad, like carbon pollution? Because there is a positive efficient level. If we had no carbon emissions, with the present technology, there would be very little production and consumption.

is incapable of doing this, because when considering reducing her labor supply, the worker assumes that she is doing this alone, which has a miniscule effect on total carbon emissions. A commons' tragedy is the consequence.

It is also possible to show that public *goods* can be efficiently produced when factor suppliers use Kantian optimization. I will not present that result here, but the logic is similar to that justifying Proposition 4.

5 WHY SHOULD INVESTORS SHARE IN THE PROFITS OF FIRMS?

Marx wrote, in part VIII of *Capital*, volume 1, that capital is born “dripping from head to foot, from every pore, with blood and dirt.”¹⁸ In nineteenth-century Britain, considerably after “the so-called primitive accumulation” of capital had occurred, it was probably the case that most investment came from the aristocracy, those with landed wealth. But today, as Table 1 shows, 56 percent of financial capital belongs to the middle and upper-middle class. It cannot be said that the wealth of these classes came into being “dripping from head to foot,” etc.

This does not mean that the current distribution of financial wealth is just — not to speak of its concentration in the top 1 percent, but even its relative concentration in the middle-income class. The argument for the injustice of the wealth distribution, however, is more nuanced than Marx's blood-and-dirt argument: it's a Rawlsian argument, based on the morally arbitrary distribution of advantage that is produced by the birth lottery, capitalist property relations, and the distributional ethic of capitalism, which

Eventually, with well-developed alternative energy sources, the optimal level of carbon emissions may be zero, but it is not at present.

18 Karl Marx, *Capital*, vol. 1, Moscow: Progress Publishers, 1965, 760.

we might rephrase as “to each what she can get with the endowments with which she is born.” Rawls, to the contrary, argued that the distribution of advantage in the birth lottery had no ethical justification: a person has no moral right to full possession of assets so distributed.¹⁹

Piketty argues that a progressive aspect of economic development in the twentieth century was the emergence of a wealth-owning (patrimonial) middle class (see Table 1).²⁰ Capitalism has done almost nothing to enable wealth accumulation by the bottom half of the income distribution: — that will have to await a socialist transformation.

Socialism must be a regime with pervasive compensation for those who have bad luck in the birth lottery, which surely characterizes most of those who occupy the bottom half of the income distribution. G. A. Cohen defines three levels of equality of opportunity. *Bourgeois* equality of opportunity “removes socially constructed status restrictions, both formal and informal, on life chances.” *Left-liberal* equality of opportunity “also sets itself against the constraining effect of social circumstances [e.g., the wealth of the family into which one is born, JR] by which bourgeois equality of opportunity is undisturbed.” *Socialist* equality of opportunity seeks to correct for *all* unchosen disadvantages — disadvantages, that is, for which the agent cannot herself be reasonably held responsible, whether they be disadvantages that reflect social misfortune or those that reflect natural misfortune.²¹ Now, even if socialist equality of opportunity has been approximately achieved in a socialist society, different occupations will

19 John Rawls, *A Theory of Justice*, Cambridge, MA: Harvard University Press, 1971.

20 Piketty, *Capitalism in the Twenty-First Century*.

21 Cohen, *Why Not Socialism?*, 15–18.

pay different salaries, and there will be differential accumulation of wealth. This wealth must be efficiently invested, and therefore households will have investment income. Marx's argument of the bloody creation of capital will not apply if socialist equality of opportunity exists, so long as citizens have freedom of occupational choice. In the models of Socialism 1 and Socialism 2, there are degrees of freedom in how profits are distributed, but the wage rate and the rental rate of capital are determined by profit maximization and the supply of the production factors to the market.

The alternative to households' owning wealth is for the state to confiscate savings and become the only investor. I believe there will be an important role for state investment under socialism, but my task here has been to focus on the degree to which a socialist economy can operate in a decentralized manner. I have argued that many of capitalism's so-called market failures are due to Nash optimization, and they can be corrected if citizens employ a cooperative optimization protocol. The deadweight loss associated with income taxation and the inefficient production of public goods and bads can be reversed with Kantian optimization. But there are other market failures that will not be amenable to Kantian optimization: first, there is an argument that industries that have large-scale economies in production should be state-owned; second, market failures associated with asymmetries of information will still require intervention in the form of social insurance that is state-financed;²² third, some important goods, such as education and perhaps medical care, should be state-financed and controlled.

22 One might be able to argue that moral hazard would vanish or be reduced if all citizens choose their lifestyle behaviors in the Kantian manner, and adverse selection might likewise be reduced if all citizens choose whether or not to purchase (voluntarily) insurance in a Kantian manner. But I do not consider these issues here.

One might argue that, in the model of Socialism 2, investors should be paid interest (rent) on their investments, but all profits should go to labor — that is, one should set the parameter σ equal to 1. However, if it is the case that (approximately) all disadvantages that are unchosen have been corrected for, and socialist equality of opportunity holds, I do not see why savings from one's labor that are invested in production should not share in the economic surplus. Surely, there must be very high estate taxation, and gift taxation *inter vivos*, in order to preserve the conditions of equal opportunity for the next generation. As well, I believe that income taxation should be high, in order to sustain the cooperative ethos, for it would be difficult to maintain that ethos in a society with large differences in living standards. I do believe that human nature is sufficiently plastic to accommodate popular adoption of Kantian optimization, but perhaps it is insufficiently plastic to sustain that behavior in the presence of large income differences. These are empirical questions.

There is, finally, a political argument for respecting the principle that both investors and workers share in the economic surplus. Is it conceivable that socialist property relations would be democratically adopted by a polity used to capitalism if this were not the case?

I am not the first socialist to propose that households should be free to accumulate savings, and to invest, under socialism. James Meade proposed a model of a property-owning democracy, which was a variant of social democracy.²³ Meade proposed a clever scheme for reducing wealth differentiation through inheritance taxation. Jacques Drèze presented a general-equilibrium model of an economy of worker-owned firms, in the spirit of the models

23 James Meade, *Efficiency, Equality and the Ownership of Property*, Cambridge, MA: Harvard University Press, 1965.

that I have discussed here, but without the Kantian component.²⁴ Anthony Atkinson, Giacomo Corneo, and Joseph Stiglitz have also proposed social-democratic models in which households continue to be a major source of investment, even if, perhaps to minimize opposition, they do not always use the socialist nomenclature.²⁵

6 IS KANTIAN OPTIMIZATION PSYCHOLOGICALLY FEASIBLE?

Most (perhaps virtually all) economists have come to think that Nash optimization is *the* unique rational protocol in games. I propose, on the contrary, that the optimization protocol varies with the economic structure, as do property relations. My critique of earlier models of market socialism (my own included) is that they varied only the property regime from capitalism's, but not the behavioral ethos.²⁶ That this was the case shows the tremendous grip that beautiful models have on the mind, and hence on the way we interpret reality. John Nash's model of equilibrium in games is beautiful, and it has seduced most economists into thinking it is the ur-conception of rational behavior that should apply in all social systems.²⁷

This does not settle the question posed in this section's title. Some, perhaps many, will argue that Kantian optimization is not psychologically feasible for human beings. Evolution, they will say, has programmed us to "going it alone." The "selfish gene" has only an individualistic protocol. This view, however, is sharply contested

24 Jacques Drèze, *Labour Management, Contracts and Capital Markets*, Oxford: Basil Blackwell, 1962.

25 Anthony Atkinson, *Inequality: What Can Be Done?* Cambridge, MA: Harvard University Press, 2015; Giacomo Corneo, *Is Capitalism Obsolete?* Cambridge, MA: Harvard University Press, 2017; Joseph Stiglitz, *People, Power and Profits: Progressive Capitalism for an Age of Discontent*, New York: W. W. Norton & Co., 2019.

26 Roemer, *A Future for Socialism*.

27 Sylvia Nasar's 1998 biography of Nash is entitled *A Beautiful Mind* (New York: Simon & Schuster).

today. Samuel Bowles and Herbert Gintis give anthropological, biological, and economic arguments and evidence that human cooperation is prevalent, if not ubiquitous.²⁸ The evolutionary psychologist Michael Tomasello argues, on the basis of experiments with human infants and the other great apes, that humans have evolved — probably uniquely among the five species of great ape — an ability to cooperate, based on their capacity to construct joint intentionality with others. Nicholas Christakis has a similar message.²⁹ For me, the main piece of evidence for our ability to cooperate in economic matters is the existence, in the advanced democracies, of collective decisions to gather approximately half the society's gross domestic product through taxes that are used to finance projects from public goods to social insurance. Another striking fact is that the size of the human group within which peaceful behavior is the norm has increased, over the last ten millennia, from only several hundred souls to more than a billion. As Pinker points out, in 1400 in Europe, 25 percent of male aristocrats died violently, by homicide or in battle. In 2000, the global homicide rate was 8.8 per 100,000.³⁰

Many people today behave cooperatively in many of the roles they have and competitively in others. Has the orbit of roles in which we cooperate increased over time and with economic development? There is evidence that, in dictator and ultimatum laboratory games, the degree of trust in others, and hence cooperation, increases with economic development.³¹

28 Samuel Bowles and Herbert Gintis, *A Cooperative Species: Human Reciprocity and its Evolution*, Princeton: Princeton University Press, 2011.

29 Nicholas Christakis, *Blueprint: The Evolutionary Origins of a Good Society*, New York: Little Brown Spark, 2019.

30 Steven Pinker, *The Better Angels of Our Nature: Why Violence Has Declined*, New York: Penguin Group, 2011, 81–7.

31 Joseph Henrich, et al. (eds.), *Foundations of Human Sociality: Economic*

The prerequisites necessary for establishing cooperation and Kantian optimization are understanding, desire, and trust. A fourth condition that is ameliorative, if not strictly necessary, is that those involved believe they are all in the same boat. People must *understand* that cooperation will produce better outcomes than going it alone, in the sense of Benjamin Franklin's warning to the signatories of the Declaration of Independence, and this will engender a desire to cooperate. However, understanding and desire together are insufficient: each person must trust that if she cooperates, the other players will as well — others will not optimize, à la Nash, against her. A Nash player can almost always exploit a Kantian, by taking the Nash action against her Kantian one (if I cooperatively recycle my trash, the Nasher next door may not, free riding on my contribution to the public good). Finally, being "in the same boat" is a synonym for the symmetry of the individuals with respect to the threat or the challenge: symmetry in that regard may induce those involved to act in concert with others.

Trust is most easily established in communities or societies that are homogeneous ethnically, religiously, and/or linguistically; with homogeneity, it is more likely that each will believe that others think the way she does. Heterogeneity frustrates the understanding that we are all "in the same boat," and hence reduces the propensity to act in concert with others. Recall Martin Niemöller's famous words: "First they came for the socialists, and I did not speak out — because I was not a socialist ... Then they came for the Jews, and I did not speak out — because I was not a Jew. Then they came for me — and there was no one left to speak out for me." Nevertheless, even in heterogeneous populations, cooperation is achievable. Often, it has emerged out of war or crisis: think of the

Experiments and Ethnographic Evidence from Fifteen Small-Scale Societies, Oxford: Oxford University Press, 2004.

Great Depression, World War II, and even COVID-19, although the jury is still out on the last example, at the time of writing.

We must understand the tremendous effort that the capitalist class and its ideologues have expended to proselytize the citizenry concerning their behavioral ethos and distributive ethic, and to venerate in the extreme those who have succeeded in playing the capitalist game.³² Capitalist ideologues (at least in the United States) have succeeded in convincing a large part of the citizenry that the state destroys rather than creates value, and so taxation is an unalloyed bad. Along with this ideological campaign, American capitalism has destroyed trade unions, one of the few institutions that taught a solidaristic ethos, however inadequately. The concerted effort the Republican Party has expended in order to destroy or repeal the Affordable Care Act is surely not explained merely by the material interests of private insurance firms, but rather by the fear that successful universal health insurance, only achievable with significant state participation, would chip away at the anti-collectivist prejudice of Americans.

Mao Zedong wrote that “power comes out of the barrel of a gun.” Perhaps that was the case in 1927 China, but it is surely an incorrect diagnosis for the advanced capitalist democracies today. The most powerful weapon the capitalist class has today is the ideology it purveys — its distributive ethic, which can be paraphrased as the view that the market with private ownership is not only efficient but delivers a fair distribution of income, and its behavioral ethos of individualism, which is said to be not only ethical but prudent, because “you can’t trust human nature.”

32 In the economics curriculum, we so proselytize by teaching students that Nash optimization is the unique conception of rationality in games. We do not point out that Nash optimization models the protocol of “going it alone,” a behavioral ethos associated, perhaps almost uniquely, with capitalism. It has been noted that economics majors are the most selfish players in laboratory games, such as the prisoner’s dilemma and the dictator game.

7 SIMULATIONS OF SOCIALIST INCOME DISTRIBUTIONS

In this section, I report simulations of socialist income distributions for a model of the American economy. The details of the economy's specification can be found in section 7 of "What Is Socialism Today?".³³ I assume the distribution of financial wealth is as specified in Table 1 above: about 41 percent of total financial wealth is owned by the wealthiest 1 percent of the population. I assume that the distribution of real wages — reflecting marketable skills — is lognormal, with the median skill equal to 69 percent of the mean skill. I further assume that financial wealth is monotone, increasing in the real wage.³⁴ There is a single consumption good produced by a firm using capital (wealth) and labor as inputs. The firm's technology exhibits decreasing returns to scale, and so, at all the equilibria I study, there are positive profits. Every consumer-worker-investor maximizes a utility function that is linear, increasing in consumption, and decreasing and concave in labor time. The utility function is a standard quasilinear function.

I simulate two kinds of equilibrium:

- A.** Socialist-1 equilibrium, with the same distribution of skills and financial wealth as under capitalism, with various tax rates (see section 2); and
- B.** Socialist-2 equilibrium, with various distributions of financial

33 John E. Roemer, "What Is Socialism Today? Conceptions of a Cooperative Economy," Cowles Foundation Discussion Paper No. 2220, New Haven: Cowles Foundation, Yale University, 2020.

34 This is a simplifying assumption. The financial wealth of the population at a given real wage must be understood to be the average financial wealth of all individuals at that real wage, so the assumption is probably approximately correct in the present-day United States, where those with large wealth also receive large salaries. This would have been a poorer assumption in Victorian England or the French *ancien régime*, where the wealthy did not work.

wealth and with various values of the sharing parameter (see section 3).

The benchmark to which I compare the various socialist income distributions is the capitalist income distribution with a tax rate of 30 percent (see section 1). Recall that the capitalist allocation is Pareto inefficient, while all the socialist allocations are Pareto efficient.

A. Income distribution in social democracy (various tax rates)

In Figure 1, incomes in the US capitalist economy at an income tax rate of $t = 30\%$ are normalized to be 1 for everyone in the economy, as represented by the dotted line in the figure.

Figure 1 shows that the post-fisc³⁵ incomes of almost everyone are greater under social democracy, at either a 30-percent or 50-percent income-tax rate, than under capitalism at a 30-percent tax rate. This is due to the Pareto efficiency of social democracy, in contrast to capitalism's inefficiency with taxation. Note that at a 30-percent tax rate, social democracy does very little to increase the income of the lowest skilled, but their incomes increase by at least 70 percent when the tax rate increases to 50 percent (Nordic style). At a 90 percent tax rate, the incomes of the lowest skilled triple; the incomes of those in the top 7 percent of the distribution are lower than under capitalism at a 30-percent tax rate. I remind the reader that with a flat tax, at any rate, post-fisc incomes are increasing as one's quantile increases: that is to say, the decreasing curve at 90-percent taxation is the *ratio* of two incomes, not the absolute value of income.

35 "Post-fisc" means after income taxes are collected and the demogrant is distributed to citizens.

Figure 1: Income distribution in social democracy

The ratio of post-fisc income in Social Democracy (section 2) at tax rates of 30 percent, 50 percent, and 90 percent to post-fisc income under Capitalism at a tax rate of 30 percent (section 1). The abscissa is the quantile of the real wage (and wealth) distribution.

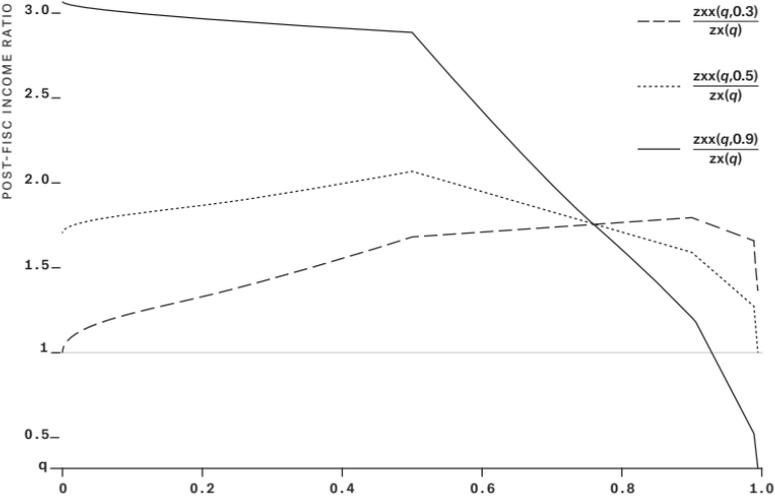


Figure 2: Income distribution in the sharing economy

Ratio of income in the sharing economy to the income under capitalism at a tax rate of 30 percent, by quantile of the real wage (and wealth) distribution, for sharing parameters $\sigma = 0, 0.5$, and 1.

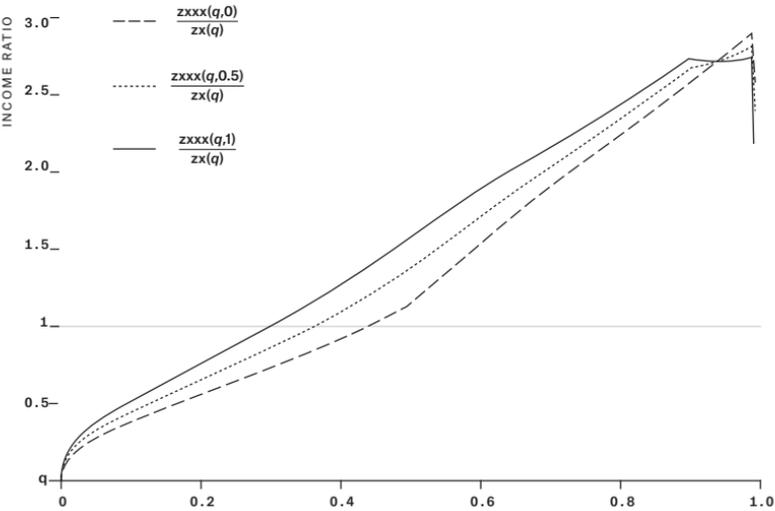


Figure 3: Socialism 2 with leveling down of top 5%

Leveling down the top 5 percent of wealth. Ratio of income in the sharing economy to income under capitalism (with $t = 30\%$), by real-wage quantile, for three values of the sharing parameter σ .

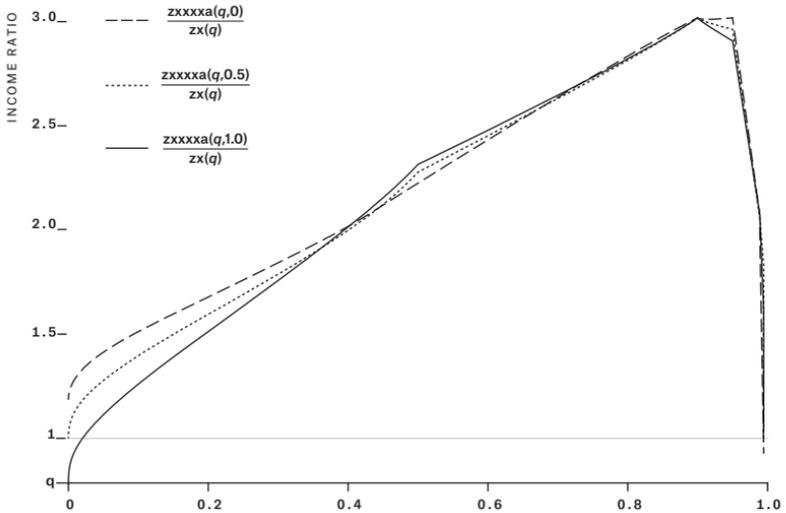
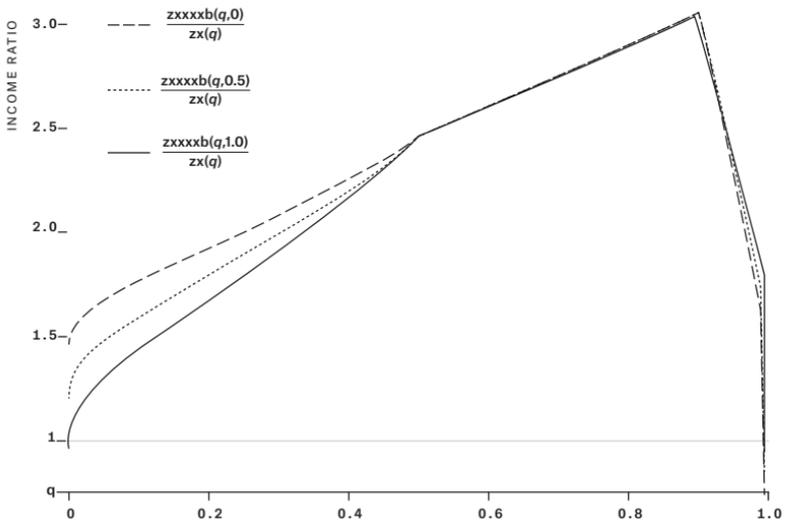


Figure 4: Socialism 2 with leveling down of top 10%

Leveling down the top 10 percent of wealth. Ratio of income in the sharing economy to income under capitalism (with $t = 30\%$), by real-wage quantile, for three values of the sharing parameter.



The income Gini coefficients of the social democratic equilibria at the tax rates of 30, 50 and 90 percent are 0.48, 0.34, and 0.07, respectively.

B. Income distribution in the sharing economy (Socialism 2)

The distribution of financial wealth for the simulations in Figure 2 is the same as in the capitalist economy. There is no income taxation in the sharing economy. The consequence is that the gains from efficiency go entirely to the top 60 percent of the income distribution: the bottom 40 percent of the skill distribution does better under capitalism with redistributive taxation. Workers do slightly better when firms are labor-owned (when $\sigma = 1$) than when investors share in the profits ($\sigma = 0.5$) or when all profits go to investors ($\sigma = 0$). But the sharing parameter makes little difference because investors are, in all cases, paid rent (interest) for their investments. The economy with sharing parameter $\sigma = 1$ is one where all profits go to labor, but the ownership of capital is still as in Table 1, and hence the wealthy have large incomes from investing capital in firms. This shows that the sharing economy is regressive without a substantial redistribution of wealth.

How much redistribution is needed? In Figure 3, we have the income ratio of the sharing economy when all the “excess wealth” of the top 5 percent of the wealth distribution is redistributed equally to the entire population, where excess wealth is defined as the amount of wealth owned by the top 5 percent that exceeds the wealth at the 0.95 quantile.

In other words, the simulation confiscates wealth from the top 5 percent in order to bring their wealth levels down to the level of the individuals at the ninety-fifth centile. This constitutes 44 percent of the nation’s financial wealth, so the redistribution is substantial. We see in Figure 3 that all individuals in the

investor-owned economy (when $\sigma = 0$) except those at the very top of the wealth distribution now fare better than they do under capitalism with $t = 30\%$ — the gains from Pareto efficiency are now shared widely. It is interesting to note, in contrast with Figure 2, that with this wealth leveling, the least skilled workers do better when firms are investor-owned than when they are worker-owned. This is unsurprising when one understands that, with the redistribution of wealth, the capital owned by the least skilled citizens is significantly more valuable than their labor power.

A critic might note that, if 44 percent of the nation's financial wealth were redistributed as an equal demogrant, then poor households would likely consume much of the demogrant rather than invest it. An alternative would be for the wealth confiscated to be held by the state, which would invest it in firms. The state would then receive both interest on its capital investment and its share of profits (when the firms are not worker-owned), which it would distribute as a demogrant to households (or invest in public goods and services). The resulting income distributions would be the ones of Figure 3. Of course, this ignores the question of the state's behavior as an owner of capital.

Finally, Figure 4 presents the relative income distributions when the top 10 percent of wealth distribution is leveled down: this would involve capturing 54 percent of the entire financial wealth of the economy and redistributing it as an equal demogrant (or, as above, there is the state-ownership option).

The picture when the top 10 percent of the wealth distribution is leveled down is similar to Figure 3. This is not surprising, because leveling down the wealth of the ninetieth to ninety-fifth centiles, as occurs in Figure 4, only produces an increase in the fraction of total wealth redistributed from 44 to 54 percent. To be precise, compared to Figure 3, Figure 4 implements a further redistribution of income from the top 10 percent to the bottom 90 percent.

Let me attempt some summary of these simulations:

- Social democracy with taxation (Figure 1) appears to be an effective way to achieve significant improvements in the income distribution, compared to capitalism. At a tax rate of 50 percent (as currently exists in the Nordic economies), the incomes of those in the bottom half of the skill (and wealth) distribution would increase by between 70 percent and 90 percent, compared to capitalism with a 30 percent tax rate. A critical question is whether a tax rate of 50 percent is politically accessible, given the wealth distribution of the United States. The societies that today have tax rates of this magnitude have a considerably more equal distribution of wealth than the United States, and also considerably more trust in others and in government.
- A sharing economy — even a fully worker-owned economy — is regressive compared to capitalism with a 30 percent tax rate. The regressivity would be reduced with income taxation, which does not exist in the simulations of Figure 2. If there is not either a significant redistribution of wealth or substantial income taxation, a worker-owned economy is not good for workers. The driving force here is that the US economy is very capital-intensive, and as long as capital remains owned by households in a highly regressive manner, investors will extract a large share of the social product in a market economy. This is even the case if all profits go to workers.
- If the capital of the top 5 percent of the wealth distribution is leveled down via wealth taxation and redistributed equally to all, and households invest that capital rather than consuming it (Figure 3), then the investor-owned sharing economy is good for workers. Ironically, the lowest skilled fare better in the

investor-owned economy than in the worker-owned economy, because their capital would be worth more than their labor power.

- If the capital of the top 10 percent of the wealth distribution is leveled down via wealth taxation (Figure 4), the income distributions are qualitatively similar to those of Figure 3; income is, however, higher for the bottom 90 percent than in Figure 3. The advantages of this further leveling down would not be solely with respect to the static income distribution, but they could make the cooperative ethos more robust.
- None of these simulations changes the distribution of skills from what it currently is in the United States. Because socialism will reform the class nature of education, the skills of the least-skilled workers should increase substantially, and this will reduce income inequality to a degree that I do not try to predict.
- Recall that the Arrow-Debreu model of capitalism is a much cleaner system than actual American capitalism, replete as the latter is with monopoly elements and non-competitive rents in general. The gains of a socialist economy with respect to this beast are not modeled here. All the models are ones of perfect competition, with no monopoly elements.

8 THE ROLE OF THE STATE

I have said very little about the role of the state in the economy, because I have wanted to emphasize that Kantian optimization can decentralize in an efficient way important aspects of resource allocation that, when Nash optimization is the behavioral ethos, *must* be handled by the state. I do, however, think that the state's economic role will be important in market socialism, although I have nothing original to add to what others have written about this.

In particular, the state will be largely responsible for education, health, research, and social insurance. Moreover, the degree to which citizens engage in Kantian optimization will surely, in reality, be incomplete. It will take time for people to learn to cooperate thoroughly in their economic decisions, and to design the institutions (such as labor unions and investors' unions) that will facilitate such behavior. I have said that many inefficiencies that we call market failures are more accurately called failures of Nash optimization, but not all inefficiencies are of this kind. The absence of certain markets (for insurance and credit) will probably continue to require state intervention. Regarding pervasive economic planning in normal times, I am more agnostic.

My aim has been to construct alternative blueprints of what a socialist economy could be. The blueprint that most socialists thought they knew evaporated with the failure of the twentieth-century planned economies. Socialist blueprints are necessary to inspire people to organize for an alternative to capitalism: you can't fight something with nothing. Having the blueprint, and the inspiration it hopefully creates, is only the first step. But the second step, how to realize the blueprint from the status quo, is another issue. That path will surely require major state participation in the economy. Whether human society will ever reach a point at which the state can wither away is a question I do not find particularly interesting. This eventuality is too distant from our historical experience to discuss scientifically.

Indeed, my adherence to market socialism is motivated by a belief that change must be incremental. Markets have evolved over centuries, even millennia, and they do certain things very well. We have no precise ideas about how Pareto efficiency can be achieved without markets. As I wrote, Pareto efficiency is a concept that is independent of markets and property relations: it is a general conception of non-wasteful allocation of resources.

Unless we have an alternative to the first theorem of welfare economics in its various forms, which are truths about market economies, capitalist or socialist, we would be insane to discard markets. If some leftists believe that markets are not essential, this is because they have not properly understood the importance of efficiency as a desideratum, which is, as I've said, an unfortunate error in the history of socialist thought.

9 FINAL REMARKS

Socialism has always been conceived of as a cooperative society. The first contribution of this article is to construct a precise model of how economic agents can cooperate in their economic decisions. This model can be embedded into general-equilibrium models of economies with socialist property relations, thus showing precisely how various negative features of capitalism as a resource-allocation mechanism can be rectified under socialism: the deadweight loss associated with income taxation, and the failure of the market to properly decentralize the production of public goods and the regulation of public bads.

A corollary is that economists should cease to conceive of Nash optimization in games as the universal characterization of rationality, independent of social system. Many would agree that Nash optimization is not appropriate within the family: I propose to extend this claim to the socialist economy as a whole. The skeptic may respond that my models are pie in the sky. I reply that the view economists have of reality has been shaped by the mathematically beautiful concept of Nash equilibrium. With a fine hammer, as they say, every problem looks like a nail. Now that we have a precise formulation of cooperative optimization, we must reexamine history to see where we can observe cooperation in economic activity. Armed with this new hammer, we will, I predict, find many examples of cooperative behavior.

The second contribution of this analysis — and this may be sharply contested — is a view of socialist finance. Socialist ethics, I claim, require a radical interpretation of equality of opportunity, as proposed by G. A. Cohen. But it would be unrealistic to believe that, once such equality has been achieved, people will all save to the same degree out of their labor earnings. People will still choose different occupations, achieve different levels of education, earn different wages, and save at different rates. Unless savings are confiscated by the state, households will invest differentially, and investments must afford a market return. Capital will no longer be born encrusted with blood and dirt. While wealth taxation must be substantial, in order to sustain the cooperative ethos, it should not be confiscatory. I do not know enough to recommend precise rules: I have proposed general principles.

Let me also offer a final thought regarding the comparison of social democracy (Socialism 1) and the sharing economy (Socialism 2). These are quite different economic mechanisms. In the former, capitalist property relations prevail; in the latter, firms are not for sale to shareholders but are effectively owned by those who contribute factors of production to them: their workers and investors. There will be a stock market in social democracy, but not in the sharing economy, as there exists no property right in the firm that outsiders can purchase. In both blueprints, workers and investors will decide upon their factor supplies cooperatively, according to the Kantian protocol.

I have not raised until now the issue of sustainability of the cooperative behavioral ethos. It might be the case that the cooperative behavioral ethos is more sustainable in the sharing economy than in social democracy, precisely because the entire economic surplus is distributed to those who contribute to production in the former, but not in the latter. The principle of cooperation is clear in the property relations of the sharing economy, in contrast

to the existence of a right to receive a share of profits, which can be bought and sold, without contributing to production, in social democracy. Will it therefore be easier to sustain the cooperative ethos in factor provision in the sharing economy than in social democracy? I cannot say, but it seems to me that this might well be so. The right to private firm ownership in social democracy may infect its behavioral ethos.

Models must make radical simplifications of real life. The cooperation I have modeled with Kantian optimization is, I think, only the tip of the cooperative iceberg that would evolve in a socialist society. Presumably, cooperation would spread in ways we cannot imagine at present, just as, under capitalism, the individualistic ethos has created horrors that were impossible for any reasonable mind to imagine.³⁶ Non-economists may perceive the way I have modeled cooperation as mechanistic and overly formal — bloodless, one might say. I am sufficiently Marxist to believe that cooperation is the key ingredient in constructing socialism, and sufficiently an economist to believe in the power of formal models to clarify our thinking. ☞

36 Who imagined that Nash optimization could have resulted in the 2009 sub-prime-induced financial crisis? Very few economists. The Nash protocol was aptly described by Charles Prince, former Citigroup chief executive, who said about his bank's participation in dangerously risky lending in 2007, "When the music stops, in terms of liquidity, things will be complicated. But as long as the music's playing, you've got to get up and dance. We're still dancing." *Financial Times*, July 9, 2007.