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ROEMER'S "GENERAL" THEORY OF EXPLOITATION IS A SPECIAL CASE

The Limits of Walrasian Marxism

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1. INTRODUCTION

In a series of recent writings, John Roemer (1982a, 1982b, 1985, 1988) has made a provocative claim: exploitation and class are merely second-order concepts within Marxian theory, because both phenomena derive directly from differential ownership of productive assets (DOPA); indeed, exploitation remains a consistent index of economic injustice only if a "property relations" conception of exploitation replaces the common "labor-value" view.¹ In sum, property relations, not the labor exchange,

We thank John Elliott, Herb Gintis, Michael Reich, John Roemer, the members of the Greater Los Angeles Political Economy Seminar, participants in seminars at the University of California, Berkeley, and the Union for Radical Political Economics meetings at the 1989 ASSA convention, and the three anonymous referees of this journal for insightful criticisms of earlier versions of this article. Of course, remaining misdemeanors and felonies are our responsibility alone. Some of our conclusions were developed for Roemer's simplest model in Devine and Dymksi (1989).

1. Any use of Marxian exploitation or values to measure injustice must face textual evidence that, for Marx, the ethical dimension of exploitation and value was at best secondary. His main use of value was as a heuristic to discover the "laws of motion of the capitalist mode of production." But as noted below, this issue is beyond the scope of this article.

the labor process, labor values, or even capitalist accumulation should be *the* central concern of Marxian theory.

Roemer sees this result as "general," and as superseding alternative orderings of concepts in Marxian theory, because it obtains in a series of models that retain some essential Marxian features while deploying a strong form of methodological individualism and minimal institutional data. Rejecting such Marxian heuristics as materialist dialectics or the law of value, he instead uses the method of Walrasian general equilibrium theory. In Roemer's view, the latter represents the exemplar of social-scientific methodology (Roemer, 1988, p. 151); so his formal results demonstrate which Marxian propositions can be salvaged as elements of a major contemporary research agenda.²

This article rejects Roemer's claim to have established general results. He has made important contributions: he has shown that some Marxian theses can obtain even in a Walrasian framework of universal auction markets, and has encouraged a sharpening of argumentation in left political economics. But the term "general" is a misnomer. Roemer presents a narrow conception of capitalism ("capital") as merely a legal form – that is, property rights. His results for exploitation, class, and DOPA hold only under assumptions that represent a special case of Walrasian general equilibrium. Specifically, Roemer's models share assumptions about: (1) the dynamic growth path of capitalism; (2) the conditions under which labor is sold to capitalists; (3) the intertemporal reproduction of class relations; and (4) the characterization of production. These special restrictions are not justified or explained as part of his theory: they are exogenously given. This reliance on exogenous factors is at odds with a theory that claims to establish general results.

Further, these restrictive assumptions rule out phenomena of central interest in Marxian political economy, such as dynamically unstable processes, persistent involuntary unemployment, economies of scale, the struggle over wages, and power relations in production. Yet, loosening these restrictions to consider such phenomena jeopardizes Roemer's substantive conclusions. And when the latter fall, so does the strong form of methodological individualism that underlies his models. In other words, his theory does not explain exploitation *in general*: and since its philosophical basis is justified by the success of his theory, that too is undermined. While Roemer's approach produces some interesting models, it precludes a more profound notion of capital and exploitation as deeply rooted and dynamic *societal relationships*.

2. Roemer describes Walrasian theory as "one of the great contributions to social scientific method of the past century" (1988, p. 151). He does, however, criticize "the carelessness with which the theorems of that model are used to infer conclusions about actual market economies."

We argue that Roemer's Walrasian-Marxian models showing that DOPA generates all other core phenomena in Marxian theory are *special*, not *general*. These models' limited applicability suggests the value of modeling a richer set of dynamic, institutional, and behavioral interactions in frameworks not bound by Walrasian methodology. In a truly general theory, the irreducibly *social* relations of production must be specified as well as the individual and natural aspects incorporated in Walrasian models (technology, preferences, and the distribution of endowments). The analysis of exploitation then need not be limited to one set of unrealistic models of capitalism. Encompassing social aspects of social relations minimizes the role of exogenous factors, allowing for the explanation of elements of the theory of exploitation that Roemer must take for granted.

We proceed as follows. Section 2 states Roemer's central analytical framework and reviews his principal models of equilibrium exploitation under capitalism. Section 3 reviews the restrictive conditions governing labor supply in his framework: specifically, capital must remain scarce relative to labor, and the sale of labor must not be coerced. Section 4 shows how Roemer's models have a restricted treatment of the problem of reproducing class relations. Section 5 investigates Roemer's crucial assumptions about production. Each of these sections includes elements of an alternative Marxian perspective on exploitation. Section 6 brings these separate strands together by suggesting an alternative approach to exploitation and class in which, contrary to Roemer's models, DOPA is a *dependent*, not *independent*, variable.

Before proceeding, it must be stated clearly what this article is *not*. Atomistic competition is assumed throughout, so the "neoclassical" or "feudal" exploitation arising from imperfect competition is ignored. Also, we are not concerned with "what Marx (really) said" or whether Roemer's work is "truly Marxian."³ What distinguishes this article is, first, its focus on the limits of applicability of Roemer's theory – its claim to be general – and, second, its approach of showing the interdependence within Roemer's theory of his substantive and methodological assumptions.⁴

Nor are we concerned with two other claims to generality found in Roemer's work. We do not discuss noncapitalist societies, and hence do not take up Roemer's claim (1982a, Preface) that his framework encom-

3. Several authors have already developed critiques in this mode (Anderson, Locke, and Thompson, 1988; Dymski and Elliott, 1989; Lebowitz, 1988). See also Mayer's (1989–90) defense of Roemer.

4. Further, we are *not* criticizing Roemer for building "unrealistic" models. Unreality is inherent in the concept of a "model"; the point instead is that Roemer has selected models whose substantive and methodological integrity is too easily disturbed by the introduction of even slightly more "realistic" assumptions.

passes different societal modes of production as special cases. In our view, a theory of exploitation cannot be "general" if it does not apply to competitive capitalism. We also ignore Roemer's claim to have developed a normative theory of exploitation independent of, and more general than, the "labor theory of value." That is, this article ignores controversies about the ethics and semantics of value or exploitation.⁵ Any "normative" conclusions about exploitation must be based on a coherent "positive" theory, the concern of this article.

2. THE MAIN PROPOSITIONS

Roemer's theory of exploitation, which he develops in a series of increasingly general models, is summarized in two methodological and two substantive propositions.⁶ After presenting these propositions, we show how Roemer's main models embody them.

2.1. Methodological Propositions

Roemer is committed to a specific version of methodological individuals that is exemplified by Walrasian general equilibrium theory. Methodological individualism *in general* "allows *only* individuals to be the decision-makers in any explanation of social phenomena," rejecting the use of "non-individualist decision-makers such as institutions" because "institutions . . . are always to be treated as mere epiphenomena" (Boland, 1982, pp. 28, 31). The Walrasian general equilibrium system, which Roemer adopts, is even stronger than methodological individualism *per se* in that it in addition precludes *coercion*.⁷ In sum,

Proposition 1 (Walrasian Individualism): An adequate theory of economic behavior must explain endogenously occurring phenomena as the result of *voluntary* (noncoerced) choices by individuals solely on the basis of exogenously given preferences, endowments, and technology.

5. See note 1. Devine (1989, 1990) provides a Marxian interpretation of value that differs from Roemer's Ricardo/Morishima tradition; with value as an alternative accounting framework to prices, values apply in the disequilibrium situations ruled out by Roemer's methodology.
6. This progression of models of increasing complexity is presented most systematically in *A General Theory of Exploitation and Class*. Hereafter, this volume is denoted *GT*, while *Free to Lose* is *FTL*. Note also that in all our quotations, any emphasis is from the original. Finally, to avoid clumsy inclusive prose, we use female pronouns to refer to workers and male pronouns to refer to capitalists.
7. Roemer discusses his methodological approach in, for example, *GT* (pp. 7, 15–16) and Roemer (1982c).

To clarify this proposition, we must first distinguish "force" from "coercion." The former, as discussed at length in Cohen (1983) and Reiman (1987), exists when an individual's circumstances in society require her to perform an action of a particular type. "Coercion," on the other hand, is of individuals by individuals. It arises when an individual is *compelled* to perform an action by another individual or other individuals: a coercer can impose a clear cost on a coerced agent for not complying with his wishes (with little or no cost to himself). Roemer's models involve force: given the existence of DOPA, "any member of a labor-selling class is in fact *forced* to sell [her] labor" to the capitalist class as a whole so as to reproduce herself (GT, p. 81). But the endowment-poor agent can choose between two or more equally attractive job offers, and so is not *coerced* by any individual employer. Coercion would exist if there were "a gun to her head" or, more likely under normal capitalist relations, if she had only one job offer (with her current employer), with no other equally attractive offers in sight (see below). To emphasize this crucial feature of Walrasian individualism, we state:

COROLLARY 1.A (NONCOERCION): *An individual's actions are "voluntary" if, for every action taken, there is at least one alternative action that can be chosen as a feasible substitute activity with little or no extra cost.*

Second, Proposition 1's commitment to grounding explanation "solely" by preferences, endowments, and technology implies that the market mechanism (the price system) will be conceptualized as an efficient purveyor of information about scarcity and demand. In particular, it means that the use of the market, including the capture of information, should be costless in an ideally parsimonious explanation. Transactions costs thus are minimal. Crucially, such costs cannot prevent market equilibration.⁸

Such market equilibration must be of a very specific sort, because of Proposition 1's requirement that behavior be attributed to voluntary individual choice alone. Since markets are *social* institutions wherein the aggregate behavior of all agents summed together constrain every individual's behavior, universal voluntary choice raises a difficulty for a theory that explains individual behavior in terms of market coordination. But the difficulty is avoided if it is shown that "the nature of any institution is what it is only because people have directly or indirectly chosen

8. As noted by some of its most sophisticated theorists (cf. Arrow, 1959), Walrasian economics typically has had problems incorporating disequilibrium situations into competitive analysis. Usually, they posit either the existence of an omniscient "Auctioneer" who steers markets to general equilibrium at zero cost or general "recontracting," i.e., costless changing of the terms of contracts agreed to while in disequilibrium. However, Roemer never addresses the issue of disequilibrium dynamics explicitly; equilibrium is simply assumed.

that it should be what it is" (Boland, 1982, p. 51).⁹ As institutions, markets meet this requirement only when they clear in equilibrium; thus:

Proposition 2 (Market-Clearing Equilibria as Focal Points): Substantive propositions about endogenous phenomena should be investigated for the market-clearing equilibria of a model.

Equilibrium prices in clearing markets are *social* constraints on individual action, but they encompass or reflect *every* relevant individual's actions – their demand and supply behavior – in markets.¹⁰ Nonclearing markets, by contrast, are inconsistent with Walrasian individualism because by definition they involve a market outcome in which at least one person's action is involuntary (coerced). Consider, for example, a non-clearing (rationed) labor market in which not all of the eligible agents receive jobs.¹¹ An employed worker would have to perform all those actions required by her employer that imply a cost to her less than the cost of losing her job. In this case, the worker would be coerced by her employer, as defined above.¹² On the other hand, in a clearing labor market, each worker has a larger number of alternative jobs to choose among at the equilibrium wage; there is no coercion of workers, since they may easily move to another employer.

Proposition 2 implies different criteria for static and dynamic substantive propositions. For statics, a substantive proposition must consistently attribute any outcome of interest to exogenous states and endogenous behaviors consistent with Proposition 1 and its Corollary. Because of Proposition 2, however, substantive propositions about dynamics must pass an additional hurdle. A methodologically satisfactory theory must model dynamics as a sequence of equilibria, explaining not simply the occurrence of a phenomenon, but also its persistence. Thus:

COROLLARY 2.A (DYNAMIC CONSISTENCY): Any endogenous phenomenon that is a persistent feature of a model will occur in reproducible equilibria – that is, once it exists in one equilibrium, it recurs in subsequent equilibria.

9. The term "people" here means "every agent" whose preferences and resources make him or her involved with the institution; so institutions pass this test only if every such agent has an opportunity to affect institutional outcomes.
10. Its acceptance of Proposition 2 distinguishes Walrasian individualism from what Levine, Sober, and Wright (1987) term "atomism." A purely "atomistic" explanation would preclude any appeal to social devices, even devices such as market-clearing equilibria that take into account every agents' expressed preferences.
11. Rationing might arise, for example, due to either quantity constraints arising from limited effective demand for products, as in neo-Keynesian economics (cf. Malinvaud, 1980), or the employers' payment of "efficiency wages" (see below) or both.
12. Coercion here is analogous to the exercise of "power" in Bowles and Gintis (1990): for them, since a capitalist is on the short side of the labor market, he can impose a cost of job loss on workers, who are in abundant supply and cannot individually impose a similar cost on the employer.

According to this Corollary, any change follows the method of comparative statics, wherein interest centers on equilibria per se, and not on the process of moving between equilibria. It arises due to changes in the variables assumed to be given exogenously in Proposition 1 (preferences, endowments, and technology).

2.2. Substantive Propositions

Several substantive assertions are based on these methodological premises. Logically, these assertions are developed in two steps: first, the basic elements of a *capitalist* economy are defined; second, Marxian propositions are established for that type of economy.

For Roemer, four conditions must exist in any "capitalist" economy: (A) private property rights in goods and productive assets that can be exchanged in self-enforcing markets;¹³ (B) the deployment of particular productive assets in initiating one or more productive processes; (C) the accumulation of these assets over time; and (D) the entitlement of these assets' owners to a positive return.¹⁴ Assets satisfying (B) and (C) may be termed "capital." That is, capital consists of specialized commodities used in production and exchanged in self-enforcing markets. Feature (C), accumulation, occurs when all or part of output is used to increase the stock of capital assets. Feature (D) entails the dual assumptions that capital-using processes are more productive than processes requiring no capital, and that capital assets are scarce – that is, there are not sufficient capital assets to produce all of net output with capital-using processes. In sum:

CAPITALIST ECONOMY (DEFINITION): *A capitalist economy is one in which capital is privately owned and accumulated, and the return on capital – the profit rate – is positive.*

Roemer's approach to the capitalist economy diverges from the neo-classical approach in his explanations both of why accumulation occurs and of why capital is scarce. Neoclassical theory turns to individual preferences to explain accumulation and, ultimately, differences in wealth and income. When individuals have different time preferences for consumption, "patient" individuals are more likely to save, use the more efficient technologies requiring capital assets, and receive property income. Differences in labor/leisure preferences explain differences in

13. In a self-enforcing market, no extra transactions costs are needed to enforce contracts.

14. "The essential aspect of capital is that it is an input to production that cannot be instantaneously produced. It must already exist in order for it to be used in the present. . . . When capital becomes private property and is distributed in an inegalitarian manner, differentiation and exploitation arise, through the market process" (*FTL*, p. 24). Further, he sees a "model with accumulation" as a more precise term for a model of a capitalist economy (*GL*, p. 110).

labor incomes. Limited preference for saving and labor keeps capital scarce even though neoclassicals typically envision a “synchronization economy,” in which capital assets required to produce output in any period can be generated within that time (cf. Blaug, 1985, pp. 187–88).

By contrast, Roemer rejects reliance on subjective preferences, emphasizing instead objective social conditions. Following Marxian tradition, he assumes accumulation as a fact of capitalist life; on the other hand, capital is scarce because he posits – following what Blaug terms the “advance economy” model – that only *previously produced* capital assets can be deployed in any round of production. Roemer purposely abstracts from differential time preferences. He acknowledges that such psychological differences can generate exploitation, but argues that time preference is “socially determined” (*FTL*, p. 62; *GT*, p. 133).¹⁵ His perspective is captured well when he writes that

in [my] model exploitation and the unequal distribution of income are not the consequence of people having different preferences: everyone has the same preferences. This may not be an accurate depiction of the world; the point is, exploitation and inequality result even under that stringent assumption [so that] exploitation in this model cannot be explained by the existence of different kinds of people. (*FTL*, pp. 26–27)

Roemer then makes two substantive propositions about the capitalist economy:

Proposition 3 (Sufficiency of DOPA): The existence of DOPA is sufficient to generate Marxian phenomena – specifically exploitation and classes – in a market economy. In a simple model, exploitation exists when some agents consume goods whose labor-value is less than the value produced by those agents’ labor (and vice versa). Classes exist when there are distinct groups of agents defined in terms of the ownership of capital assets in a society.

Proposition 3 has an important implication for the capital-labor relationship:

COROLLARY 3.A (THE UNIMPORTANCE OF THE LABOR RELATION): *The existence of exploitation requires that a market open in either labor or credit, but not both. That is, relationships in neither labor markets nor the production process are essential to establishing the existence of exploitation.*

15. He argues that “[a]ttitudes toward saving are shaped by culture, and cultures are formed by the objective conditions that their populations face” (*FTL*, p. 62). He also denies that entrepreneurial skill explains the rate of profit, since this skill is “the consequence of environmental or genetic factors from which [the entrepreneur] does not deserve to benefit [, namely] luck” (*FTL*, p. 64).

Substantive Proposition 3 and methodological Proposition 1 interlock, reinforcing each other. Proposition 1 acts as a filter for selecting and defining analytical subjects. For Proposition 3, this means that any "Marxian" features of an economy must be developed based on the principles of free atomic movement. That is, exploitation and class are the result of voluntary individual choice; methodological consistency requires, in effect, that workers be *free* to lose. In turn, Roemer shows that these phenomena, when so defined, lead to substantive Proposition 3; this justifies his restricted definitions of exploitation and class and completes a logical circle.

Further, from Corollary 2.A, we directly get Proposition 4:

Proposition 4 (Persistence of DOPA): There is no tendency in an economy initially characterized by DOPA for the inequality of wealth-holdings to dissipate. Since Marxian features in an economy – exploitation and classes – derive from DOPA (by Proposition 3), then these features will persist once they arise.

As noted, analysis that conforms with Walrasian individualism must examine equilibrium states, and in dynamic settings, reproducible equilibria. In statics, establishing the theoretically privileged status of DOPA simply requires showing that introducing DOPA to models causes exploitation and class to arise. In dynamics, DOPA must also be shown to cause exploitation and class in equilibria that reproduce DOPA itself. The persistence of DOPA in a dynamic setting insures that Proposition 3 is time-invariant: endogenous dynamics will not undermine it.

2.3. The Models

We next show how Roemer's models, while progressively more "general" and abstract, uniformly embody these propositions. Roemer's five main models are discussed in turn.

Model 1: The factory/farm parable. He begins many of his works on exploitation with a parable of factories¹⁶ and farms (an imaginary pre-capitalist economy) to reveal his most important conclusions. There are 1000 agents and one produced good, "corn."¹⁶ Corn is both consumed and used as a means of production. It can be produced with two technologies of different productivity: the "factory" technology produces 2 units (tons) of corn from 1 day of labor and 1 ton of seed-corn capital, while the "farm" technology, requiring no corn capital, yields only 1 ton of corn from 3 days of labor. Agents have identical preferences: each needs to consume 1 ton of corn per week (the exogenously given subsistence level) and to reproduce any corn-capital owned. There is no accumulation, only what Marx termed "simple reproduction."

16. See Roemer, *GT*, pp. 8–12; 1982b; 1985, pp. 34–36; *FTL*, chap. 2. Leisure also results, but gives agents no utility.

Initially, in what we call an "Egalitarian Economy," each agent has $\frac{1}{2}$ ton of seed corn. Each then behaves identically: the capital is deployed in a factory with $\frac{1}{2}$ day's labor, for a *net* yield of $\frac{1}{2}$ ton of corn; the remaining subsistence requirement is generated through $\frac{3}{2}$ days' labor on the farm. So every agent works a total of 2 days per week.

Roemer then introduces DOPA by assuming that a minority of 10 agents own the entire capital stock, in equal allotments of 50 tons of seed corn. He also assumes that a labor market opens, and that agents are indifferent between farm and factory work, there being nothing inherently "alienating" about factory work. Since 1 day of farm labor produces $\frac{1}{3}$ corn, the factory wage is $\frac{1}{3}$ corn per day in equilibrium. If 990 nonowners are specialized in either factory or farm labor, 167 agents work for 3 days in the factory, while the remaining 823 work for 3 days on the farm. Each of these agents receives the subsistence bundle of 1 corn per week. On the other hand, the 10 rich agents do not work; in a week, each hires 16.7 workers for 3 days of factory labor, pays total wages of 16.7 tons of corn, replaces the seed-corn stock of 50 tons, and earns a "profit" of 33.3 tons of corn.

Adding DOPA to the Egalitarian Economy generates the Marxian features of Proposition 3. First, *classes* arise: some poor agents (the "workers") work for rich agents (the "capitalists"). Second, *exploitation* emerges: to produce their subsistence level, workers labor for 3 days, even though it only takes 1 day of factory labor to produce the wage they receive; on the other hand, though the rich do not work, each gets a "surplus" of 32.3 beyond his weekly subsistence. Crucially, these phenomena arise *endogenously* due to *voluntary* choices.

Model 2: Subsistence production with fixed coefficients. In chapter 2 of *GT* and chapters 4–7 of *FIL*, Roemer presents a more general model that retains the basic features of the Parable with many sectors and many goods: agents with differential endowments of productive assets, who seek only subsistence, produce n goods with a fixed-coefficient technology. Agents obtain the means to pay for their subsistence by either producing autonomously, hiring the labor of others, or selling their own labor. The market price of net output produced by laboring for oneself, plus the net return from hiring labor, plus wages earned from any other labor sold, must equal the market price of the subsistence bundle. All agents choose that combination of activities that allows them to attain subsistence with minimum labor time.

There are four basic results. The first is the class-exploitation correspondence principle (CEC): every agent who hires others' labor is an exploiter, and every agent who sells labor is exploited (*GT*, pp. 78–79; *FIL*, p. 82). The second is the "fundamental Marxian theorem" (FMT): a positive profit rate on productive assets implies exploitation, and vice versa (*GT*, pp. 68–69; *FIL*, p. 41). The third is the class-wealth corre-

spondence principle (CWCP): the greater the market price of any agent's productive assets, the higher he will be in the class hierarchy – and more likely to hire others' labor (*FTL*, p. 77). These three results together constitute Proposition 3: the FMT links profits to exploitation, the CECP links exploitation to class, the CWCP links class to wealth.

The fourth result is credit/labor market isomorphism: exploitation can arise if, instead of hiring poor agents' labor, the wealthy merely *loan* their capital assets to the poor (*GT*, p. 90; *FTL*, p. 95). This equivalence of *rentier* capitalism and industrial (or entrepreneurial) capitalism result implies Corollary 3.A. Proposition 4 is satisfied because Roemer restricts his attention to static equilibria.

Model 3: Accumulation with fixed-coefficient technology. The subsistence assumption of Model 2 is replaced in chapter 4 of the *GT* with the assumption that all agents accumulate – they consume nothing and instead use net income to maximize their end-of-period capital assets. This Model, unlike the previous two, is capitalist, as defined above.

Introducing accumulation introduces more analytical complexity. In the Parable and Model 2, the wage was determined exogenously.¹⁷ In Model 3, on the other hand, the wage is endogenous: the system is solved assuming that the labor market clears (full employment). It is then demonstrated (*GT*, pp. 116–17) that this Model has a uniform profit rate that is a function of the equilibrium vector of prices (including the wage) and the technology matrix.¹⁸

Roemer demonstrates that the CECP still obtains for this Model, and shows (*GT*, p. 130) that exploitation status depends on relative wealth. While the FMT cannot be well defined, a positive profit rate is guaranteed: so Proposition 3 holds in its entirety. However, Model 3 does not necessarily have a stable steady-state equilibrium, and hence is not strictly reproducible, a point to which we return below.

Model 4: Accumulation with GCRS technology. In chapter 5 of the *GT*, Roemer introduces generalized constant returns to scale (GCRS) technology to Model 3 in lieu of fixed-coefficient technology. GCRS technology can encompass fixed capital, joint production, and, most importantly, factor substitution. One novel result obtains with GCRS technology: because of substitutability between capital and labor inputs, labor values are not independent of prices (market relations). So the CECP obtains only if labor value is redefined to equal the smallest amount of direct labor that could be hired to produce any commodity,

17. The n commodity equations in Model 2 could be solved for the $n - 1$ independent commodity prices and the profit rate; the subsistence bundle \mathbf{b} is fixed exogenously, so wages w simply equal the inner product \mathbf{pb} .

18. Further, because agents do not consume, the definition of exploitation must be generalized: agents are exploited when there is no bundle they *could* buy, supposing they bought any, whose labor value is as great as the labor they contribute.

given those technologies that earn the maximal profit rate (*GT*, pp. 157–58, 162). With this redefinition, Proposition 3 obtains.

Model 5: A complete property-relations conception of exploitation. Up to this point, Roemer's Models have been characterized by correspondences between exploitation, wealth, and class status. By further relaxing the assumptions used thus far, however, Roemer drives a wedge between exploitation and wealth ownership. In chapter 6 of the *GT*, Roemer replaces the homogeneous labor of previous Models with heterogeneous labor – differentiated by skill level. This introduces the possibility that "a rich producer with a very large 'skill' will be exploited, and a poor producer with virtually no skill will be exploiting" (*GT*, p. 175). Also, if agents have heterogeneous labor/leisure preferences, then even with homogeneous labor assumed, the industrious rich may be "exploited" by the lazy poor (*FTL*, pp. 129–31; 1985).

The CECP continues to hold in all of these cases; but because of these cases' perverse ethical implications, Roemer questions whether the "labor-value" conception of exploitation allows the best interpretation of whether social outcomes are just.¹⁹ He proposes instead a "property-relations" conception of exploitation, according to which any proper subset of agents is "exploited" if seceding from the larger social entity, with endowments proportionate to its size, would raise its utility. What blocks such secession is that the only subsets of agents with sufficient assets to withdraw are those who lose utility from doing so. With this redefinition of exploitation, Proposition 3 again applies, and the "perverse" results are overturned.²⁰

2.4. Roemer's Claim to Generality

In what sense is Roemer's theory of exploitation (incorporating all five Models) "general"? We have seen that his claim is based on a set of interlocking methodological and substantive propositions about what an economic theory should be and what it says. Roemer is committed to a method conforming with the "reductionism of the Cartesian tradition, with its belief that complexity must be broken down (by 'analysis') into constituent 'atoms' that produce the phenomena of our scale along linear chains of causation regulated by laws of nature" (Gould, 1987, p. 14).²¹ Using models embodying this method of Walrasian individualism, Roemer shows that labor exchange is not required for exploitation (Model

19. See note 1.

20. The FMT, which is integral to Proposition 3, must be reinterpreted for the property-relations definition of exploitation: there is a positive profit rate if and only if there is DOPA, which gives rise to this type of exploitation (*FTL*, chap. 4).

21. Gould uses the term "atom" in a less precise way than Levine et al. (1987) do in their discussion of "atomism."

2); further, the "labor-value" definition of exploitation is not independent of market relations with GCRS technology (Model 4). Thus, "[a]lthough for simple models the surplus labor definition of exploitation and the property relations concept are equivalent, for more complicated specifications of production the labor theory of value approach cannot be defined, while the property relations approach remains tractable" (GT, p. 192).

Roemer recognizes that his Walrasian approach bears a cost: it forces the theorist to distinguish between phenomena in the world "out there" and phenomena that are scientifically appropriable. Roemer concedes, for example, that coercive domination in production exists *in reality* under capitalism (FTL, chap. 7). But such domination is inconsistent with free atomic behavior and thus with Walrasian individualism. So any coercive domination in the world "out there" must be left out of a rigorous theory of capitalism. More broadly, *any* sociological and political phenomenon can be theorized only if it can be reduced along "linear lines of causation" to technology, preferences, and the distribution of endowments.

Roemer sees this cost as justified by the substantive conclusions of his Models. We must now turn to analyzing the robustness of those Models: if their substantive conclusions fall, then the cost imposed by the methodological propositions seems less justified. Our strategy is to start with the Parable and work to more general Models. But we do not dwell on Model 5. This Model is a game-theoretic version of Model 4, and is logically equivalent to the latter under the assumption of universal income maximization (cf. GT, pp. 84–86). The unique contributions of Model 5 are to the ethical interpretation of labor value and the role of heterogeneous labor, both topics beyond the scope of this article.

3. CAPITAL SCARCITY AND LABORERS' FREE CHOICE

All of Roemer's Models entail two restrictions on labor-supply conditions: (A) capital must remain scarce relative to labor; and (B) agents who sell labor must retain free choice over how they secure their income. The first is required for the profit rate to be positive.²² If this were not so, productive assets would be effectively free and DOPA would lose its significance. This restriction on static equilibrium has, as we see below, a dynamic implication: the growth rate of labor supply (adjusted for the effects of labor productivity increases) constitutes an upward bound on that of capital. Indeed, for dynamic consistency (Corollary 2.A), these growth rates must be identical.

22. "What are the features [of the model] . . . that have caused exploitation to emerge? . . . the scarcity of capital relative to the labor available for it to employ; and differential ownership of the capital stock" (FTL, p. 23).

The second restriction guarantees that countervailing power exists on the supply side of the labor market, so that the sale of labor does not occur on terms dictated solely by its buyers. Individual laborers' supply decisions affect wages, in accordance with Proposition 2: workers can be understood as freely choosing to sell their labor in unconstrained exchanges with capitalists. This restriction then implies noncoercion (Corollary 1.A) and insures that under Walrasian assumptions about market-clearing dynamics, labor markets equilibrate at full employment.²³

These restrictions obtain in all of Roemer's models. For example, in the Parable, the scarcity of capital and the existence of exploitation and class are maintained by the absence of accumulation and the existence of the farm sector. The latter provides capitalists with an infinitely elastic supply of labor. This keeps wages down, allowing capitalists to appropriate a share of production without working.²⁴ The role of restriction (B) is also clear in the Parable, because workers retain the option of finding employment in the farm sector: they can generate their subsistence autonomously, without capital (seed corn). Thus, neither coercive domination nor involuntary unemployment exist (as in Corollary 1.A): the all-volunteer reserve army of the unemployed can retreat to the farm, which acts as an "employer of last resort."

Taken together, restrictions (A) and (B) establish a knife-edge condition: labor must be abundant and freely available, and yet fully employed, that is, not *overabundant*. Falling off this knife edge either undermines Roemer's substantive propositions, eliminates the Model's capitalist character, or violates Walrasian individualism. We examine restriction (A) first.

3.1. Capital Overaccumulation and the Profit Rate

Though capital's scarcity is crucial to Roemer's theory, its persistence is problematic. In precapitalist Models 1 and 2, capital remains scarce because of the assumption that no one accumulates. But this is hardly efficient: in the Parable, for example, each capitalist must waste 32.3

23. Full employment and the noncoercion of labor permeate Roemer's conception. For example, the term "unemployment" appears just *once* in *GT* (p. 260) and there it refers to unemployment in socialism. Elsewhere in the *GT*, Roemer writes: "The riddle for Marx was: How can one explain the systematic expropriation of the surplus product (beyond subsistence requirements of workers) by one class, by one side of the market, when the institution for labor exchange is not coercive? To answer this query, Marx constructed his theory of value and exploitation" (6). Roemer sees his theory as answering this question more accurately than did Marx's. Also see *FTL*, pp. 26–27.

24. This is the "classical" labor-surplus economy analyzed by Lewis (1958).

Table 1
Accumulation in the factory sector

Week	Factory Capital Stock, Days Worked, and Net Output	Labor Demand (workers) and Wages	Total Profits (tons)	Surplus and Accumulation (tons)
1	500.00	166.67	333.33	323.33
2	823.33	274.44	548.89	538.89
3	1362.22	454.07	908.15	898.15
4	2260.37	753.46	1506.91	1496.91
5	3757.28	1252.43		

tons of corn (the surplus) in each period to keep capital scarce. Further, why shouldn't accumulation be encouraged if seed corn yields profits for its owners, who need not work? These problems disappear in Model 3, wherein agents accumulate. But then accumulation creates the possibility of dynamic inconsistency and again threatens the scarcity of capital. To see this, we first introduce accumulation into the Parable. Until section 4.2, we assume that only capitalists accumulate.²⁵

Accumulation with fixed coefficients. Recall from above that after 1 week of production, the 10 capitalists get an aggregate surplus of 323 tons of corn. If capitalists accumulate all of this, then in week 2 their capital stock is larger by 323 tons; as before, they hire more workers than in week 1, at the daily wage of $\frac{1}{3}$. Each of the 274 workers hired works for 3 days each using 3 tons of seed corn. The remaining workers labor for 3 days on the farm. In the factory, each worker's labor replaces the invested capital, yields that laborer her 1 ton of subsistence corn, and nets each capitalist 2 tons of profit.

Table 1 shows a simulation of this process for 5 weeks. The accumulation process is transformed dramatically in week 5: if capitalists employed all available seed-corn capital, they would require more than the 990 workers available. Here "overaccumulation" has occurred: given the labor constraint, capitalists can employ only $990 \times 3 = 2970$ tons of seed-corn capital; so with 3757 tons available, the Model has tipped from "labor surplus" to "labor shortage." The reserve army of farm workers no longer caps the factory wage at $\frac{1}{3}$ corn per day. If capitalists accumulated only a fraction of their surplus or accumulated something other than seed corn, the end of the labor surplus would simply be

25. In terms of this discussion, the Parable is a one-good version of Model 2 or 3. No significant results change when *n*-sector production is introduced.

delayed. Roemer is clear that his Parable is dependent on the existence of the reserve army of workers on the farm (GT, p. 10). What he misses is that introducing accumulation into this Model *necessarily* leads to the abolition of that reserve.

Dynamic inconsistency induced by the erosion of surplus labor in Models 1 and 2 causes Roemer's substantive Propositions 3 and 4 to fail. In week 5, the excess supply of capital equals 787 tons. In the Walrasian auction, the owners of unused capital bid up the offer price for labor, until the wage equals 1 corn per day, the entire net factory product. Profits fall to zero while exploitation and accumulation end. Proposition 3, the sufficiency of DOPA, is overturned. Class differences persist, but capitalists derive no advantages from their seed corn beyond their availability for consumption. Because accumulation is replaced by simple reproduction, the Model is no longer *capitalist* as defined above.

Propositions 3 and 4 can be rescued from dynamic inconsistency if capitalists collude. To maintain positive profits, capitalists must re-create scarcity artificially each week. This requires collusion among capitalists or coercion of free-riders: a positive profit rate requires some capital be unused or consumed, but each capitalist wants his own capital used productively when the profit rate is positive. But any definite social outcome achieved by a *conspiracy* of capitalists violates Walrasian individualism.²⁶ That is, preferences, technology, and endowments alone are insufficient to close the Model in a way that rescues Propositions 3 and 4: outcomes depend, as well, on the purely *social* relations of production. For example, capitalists could preserve a positive profit rate *either* by having each discard an equal fraction of his seed corn or by forcing some capitalists, chosen at random, to discard all of their seed corn. Nothing in agents' preferences or endowments and nothing in the nature of technology predetermines *which* course of action they will adopt: the specific outcome is inherently *social*. So Proposition 1 fails. Further, any collusive solution necessarily requires that accumulation end: only simple reproduction is allowed. This "solution" again overturns the capitalist nature of the Model.

In the Parable, then, capital accumulation contradicts the conditions allowing persistence of exploitation over time. This problem can be solved by introducing growth of the labor force, say, at a steady rate n , and/or growth in labor productivity at rate m . The Appendix shows that the continued existence of a labor surplus requires that

$$n + m \geq ar - ab. \quad (1)$$

26. Roemer often states that capitalist collusion is unnecessary to his results. See *FTL*, p. 26.

Here a is the fraction of surplus that capitalists accumulate, r the profit rate, and b the ratio of capitalists' subsistence to their capital stock. Condition (1) shows that labor-force growth and/or labor-saving change is required to offset the negative impact of capital accumulation on profits and to avoid dynamic inconsistency. Thus, the existence of exploitation and positive profits rely on the ad hoc (i.e., unexplained within Roemer's framework) assumption that condition (1) obtains. This doubly damages Roemer's results. First, since Roemer's models cannot consistently explain exploitation when condition (1) is violated, they do not explain exploitation in general. Second, the very existence of condition (1) indicates that introducing DOPA is insufficient to explain exploitation, profits, and classes, negating Proposition 3.²⁷

Accumulation with GCRS technology. In his discussion of Model 3 with accumulation and a fixed-coefficient technology, Roemer (*GT*, pp. 118, 120) is quite conscious of the problem above, which is akin to that of Harrod's growth model (Harrod, 1939): the growth rate "warranted" by accumulation (g) need not equal Harrod's "natural rate of growth" ($n + m$). This problem was "solved" by Solow (1956) when he dropped fixed-coefficient technology.

Similarly, in Model 4 Roemer introduces technology (GCRS) allowing factor substitution.²⁸ However, the impact of an overexpansion of capital relative to labor (a violation of condition (1)) on Roemer's Propositions is not substantially different. To see this, drop the ad hoc assumption that the natural rate is positive, and suppose instead that $n + m = 0$. As the capital stock expands relative to the labor force, production processes become more capital intensive: no quantitative imbalances between capital and labor appear. Instead, this shift is accommodated through changing marginal products and income shares. With concave technology, the profit rate decreases steadily as the relative volume of capital increases. If accumulation is based entirely on profits, as assumed above, growth also slows.

In the limit, in steady-state equilibrium, the capital-labor ratio is constant, so the accumulation rate will equal the natural rate, that is, zero. In equilibrium, this type of Model acts *as if* it had fixed proportions. Unless capitalists consume or waste the surplus, that surplus also equals

27. As a substitute for the voluntary reserve army of the farm sector, Roemer suggests that the state can preserve a reserve through payments to the jobless (*GT*, p. 11; *FTL*, p. 24). Even if this point is accepted, DOPA would again be insufficient to imply the persistence of exploitation in Roemer's Model, contrary to Proposition 3. A theory of state behavior also seems needed.

28. Though we discuss a one-sector model, the same results apply in a multi-sector model. The one-sector model shows the effects of factor substitution under ideal conditions (e.g., no reswitching is allowed).

zero.²⁹ In sum, DOPA is insufficient to explain exploitation; unless restrictions on the economy's natural rate are imposed, the model's equilibrium involves simple reproduction and is not "capitalist" as Roemer defines the term.

3.2. Choice, not Coercion, in the Labor Market

The second condition in Roemer's knife-edge treatment of labor supply is noncoercion (Corollary 1.A). Noncoercion exists if agents who sell their labor have an alternative means of securing income: this exit option prevents capitalists from imposing conditions more onerous than those at other employers. Noncoercion is guaranteed by full employment: if any unemployed worker is willing to accept the equilibrium wage, there is an employer ready and willing to hire her; all unemployment is thus voluntary. Contrariwise, any capitalist who offers wages lower than, or conditions more onerous than, in equilibrium will lose his entire workforce.³⁰

In the Parable, a marginal sector requiring no advance capital provides this alternative: those not hired in the "factory" can go to the "farm" – that is, they can deploy an infinitely expansible reservation technology. The "farm" is an "employer of last resort," whose net return sets a floor on the factory wage. Here, the absence of coercive domination applies not only to workers' choice of employers (the absence of monopsony) but also to the overall choice of whether to work for the capitalist class or not.

In Models 2–4, the farm disappears, but it is assumed instead that production can be undertaken only with pre-existing capital (*GT*, p. 31). In these advance-economy models, full employment is simply assumed to exist (*GT*, pp. 64, 114, 154) as part of a reproducible equilibrium. But this lack of attention to the mechanisms that allow full employment to be attained and maintained with positive profits is problematic, given the assumptions about technology and the natural rate of growth built into Models 2–4.

In the fixed-coefficient economy of Models 2 and 3, the amount of labor demanded in each capital-using production process is technolog-

29. If the accumulation rate follows Appendix equation (A4), which is not dependent on the fixed-coefficient assumption, then all profits go to capitalist consumption. Note that if the model has an aggregate Cobb-Douglas technology then the zero profit rate is attained only in the limit as the capital-output ratio approaches infinity. If the elasticity of substitution exceeds unity, the zero profit rate cannot be attained; however, we doubt that Roemer wants to base his general theory of exploitation on such special assumptions concerning technology.

30. "Onerous working conditions" do not include coercion: no worker's choice-set has been limited artificially. In equilibrium, below-average conditions will correspond to compensating above-average wages. Below, "unemployment" refers to involuntary unemployment alone.

ically fixed, and so a fixed amount of labor is demanded in each industry given the vector of final demand. To obviate any gap between labor demanded and labor supplied, it is assumed that workers can function as semiproletarians, producing output autonomously by working their own assets. This assumes that there are no workers who are both not employed by capitalists and without productive assets. This is a much stronger assumption than merely the existence of DOPA. Further, this condition allowing full employment, even if initially satisfied, can plausibly be sustained over time with fixed-coefficient production only if the warranted growth rate exactly equals the natural rate.

Suppose the warranted growth rate is less than the natural rate. It would become increasingly implausible that the growing proportion of workers not employed by capitalists could support themselves; rising unemployment seems likely instead. This is where Model 4's factor substitution fills the gap left by the farm's abolition. Instead of relying on the possibility of autonomous production, Model 4 envisions a Walrasian auction market for labor, in which an equilibrium wage is determined endogenously by markets, instead of being set in advance by a subsistence level. The Model moves instantly to full employment and stays there.

However, the full-employment assumption comes at a high theoretical cost. It rules out a simple and more realistic solution from the broad Marxian tradition to the labor-scarcity problem of section 3.1. The capital stock might grow at the natural rate, maintaining a constant unemployment rate: the demand for labor would increase at the same rate as its supply, never catching up. Thus, the wage squeeze on profits would be avoided. To assure the persistence of this unemployment, we *must* drop the assumption that workers can produce subsistence goods autonomously (the farm). In addition, some non-Walrasian "imperfection" would have to be added to keep real wages from falling to clear the market.³¹ Workers could still move between industries, but with no guarantee that employers would hire them at the current wage. Each worker's countervailing power would dissipate. Her subsistence needs would then compel her to work on terms set by her current employer or by one from whom she is seeking a job. Clearly, this causes both of Roemer's methodological Propositions (1 and 2) to fail: the freely available substitutes of Corollary 1.A would no longer exist.

3.3. Roemer's Propositions outside the Knife's Edge

This discussion has shown that Roemer's conception in Models 1–4 runs into profound difficulties when capital's growth rate does not equal the

31. One reason for unemployment is discussed in section 5.

natural rate or when unemployment exists. When the capital accumulation rate is too high: (1) DOPA is an insufficient device for generating persistent exploitation; (2) both of Roemer's "capitalist" economies (Models 3 and 4) cease to be capitalist, as he defines this term; and (3) rescuing Proposition 4 requires violations of Walrasian individualism. Removing full employment, while useful for explaining the persistence of exploitation, jeopardizes noncoercion and hence Walrasian individualism.

The fragility of Roemer's model forces him to consider only "golden age" growth ($g = m + n$) in his "general" model of capitalism. This is akin to a study of customer satisfaction with automobiles that uses car companies' commercials as its data. The problems that capitalist societies might experience due to capital overaccumulation or underaccumulation are ruled out. These problems might be summed up as a latent contradiction within this theory between capitalist accumulation and exploitation.

4. REPRODUCTION OF CLASS RELATIONS

Roemer's Models of capitalism assume that capitalists and workers are reproduced over time, as classes. But if capitalists possess a superior technology and workers do not, why cannot workers simply appropriate it instead of working for capitalists? Second, if they cannot use that technology without having accumulated capital, why cannot they save from above-subsistence wages or work longer hours than needed to attain subsistence, to become capitalists themselves? Roemer's Models of capitalist economies uniformly assume there exist *barriers to entry into the capitalist class*, that is, factors that prevent workers from acting on their knowledge that profits can be made through the ownership of capitalist assets and the utilization of technology.³²

Either means of entry would cause the floodgates to open. Capitalist profits, now merely transitory quasi-rents, would disappear in equilibrium; indeed, class itself would not exist, bringing down Roemer's entire system. To see this, we consider these two questions in turn.

4.1. Worker Appropriation of Technology

The first question is obviated in Roemer's Models by his definition of a capital asset as a specialized commodity, whose possessors alone have

32. Heterogeneous agent preferences or abilities could act as "barriers" to the entry of some agents into the capitalist class; but this neoclassical explanation, as noted, is one from which Roemer wants to distance himself. Accordingly, our discussion below refers not to such individual barriers as much as to barriers that affect the working class as a whole.

the right to sell it. This idea is uncontroversial as long as capital assets are simply physical commodities (as long as the state enforces property rights). But suppose that some capital assets consist of technological knowledge. In all of Roemer's Models, the capitalists simply "own" the more advanced technology. The barriers to workers easily imitating that technology are not explained. This is especially a problem in the Parable in which there exist two technologies with distinctly different productivity producing exactly the same product.

But rights to the use of technical knowledge typically cannot be protected perfectly by patent rights: markets in such knowledge are not self-enforcing because of ease of imitation and theft of basic ideas. In that case, some extra-market means is required to protect the owners of these technologies. Those capitalists whose class position depends on their property rights in these technologies clearly have an interest in undertaking this extra-market action. A notorious contemporary example is offered by the controversy over property rights in computer software; a historical example is England's eighteenth-century ban on the export of mule-jenny textile technology. In both cases, capitalists whose technologies were "abused" took extra-economic measures in response. In these cases, Corollary 1.A is violated.

4.2. Worker Accumulation

To consider the second question, we return to the numerical example in section 3.1, that is, the Parable with the warranted growth rate exceeding the natural rate. Now suppose, as Roemer does, that workers are allowed to accumulate and capitalists are not permitted to collude. As in the no-collusion case above, the daily wage rises to 1 in week 5. Since this is above subsistence, workers can save 2 of the 3 tons of corn they earn each week. Assuming they do so, in week 6 excess supply of seed corn grows by 1980 tons ($= 2 \times 990$ workers) of worker-owned seed corn. Week-6 wages are again bid up to 1, and workers save another 1980 tons of seed corn. With sufficient repetitions, DOPA and class differences disappear, violating Proposition 4. Proposition 3 also fails, while the capitalist nature of the Model is negated.

Suppose instead that the growth rate warranted by capitalist accumulation never exceeds the natural rate, so that wages stay at subsistence. In this event, too, worker accumulation can occur if workers can labor for more than 3 days per week while, at the same time, capitalists do not work. Since workers in the Parable sell their labor for only 3 days per week, they could spend the rest of the week working on the farm to produce seed corn, which can then be used to enter the factory sector as capitalists. Worker accumulation would again drive profit rates to zero and cause DOPA to disappear.

Roemer's Parable precludes the possibility of workers accumulating to become capitalists simply by assuming that the workweek is limited to 3 days; thus, given the low productivity on the farm, workers can get no more than subsistence from autonomous labor. Roemer lists, among the "requirements" for his Parable, that "the propertyless ones . . . have no time to accumulate capital on their own, after seeing to their subsistence needs" (GT, p. 11). Not only is this assumption *ad hoc*, but it is not attributable to the existence of DOPA. Thus, the introduction of DOPA to the model is again insufficient to explain exploitation and class.³³

In Model 3, worker accumulation is allowed, but causes problems. If the growth rate warranted by capitalist accumulation rate initially equals the natural rate, any worker accumulation will push the system off the Harrod knife edge, causing overaccumulation and a labor-shortage economy.³⁴ This ends with a situation where the profit rate equals zero, agents' assets are identical, capital ceases to matter, and there is no exploitation. Roemer observes this case, but finds it of "no interest" (GT, p. 129). However, he does not explain why; this lack of interest arises, it seems, because it is ruled out a priori by methodological Proposition 2. More importantly, he does not explain the economic mechanisms that prevent this case from being the *normal* situation.

As above, Model 4 abolishes Harrod's knife edge by introducing factor substitution. Nonetheless, a problem remains. If workers accumulate from their wages, they might gradually enter the capitalist class. As Samuelson and Modigliani (1966) show, under empirically possible assumptions about worker saving, the workers' share of the ownership of total capital tends toward unity in the long run; Marglin shows that this case, in which a relatively egalitarian "people's capitalism" arises, can apply if the capitalist saving rate is less than 16 times greater than that for workers (1984, p. 132).³⁵ In this case, in long-run equilibrium, profits may be earned, but the profit earners would lose any exalted status as the "capitalist class" extends to include the entire population. This analysis contradicts Proposition 4, the persistence of DOPA.

33. A different way of preventing worker accumulation would be to assume that workers seek only subsistence, while capitalists alone accumulate. But, as noted, the purpose of Roemer's project would be defeated if exploitation's existence depended on a distinction between a "frugal elite" and a mass of "lazy rascals"; these are Marx's terms (1977, p. 873) for this distinction, which he saw as central to the bourgeois political economy of his day. Another alternative would be to assume that capitalists use coercion to prevent worker accumulation, but this would clearly contradict Proposition 1 and Corollary 1.A.

34. Roemer's assumption that all income is accumulated has been relaxed.

35. See Marglin (1984, chap. 6) for complete discussion and references. Pasinetti's 1962 contribution (1974, chap. 5) originated this literature. This theory does not depend on the nature of the technology assumed. For a very simple case, see the Appendix.

The empirical likelihood of the people's capitalism case arising need not concern us here. Rather, the point is that a general theory of exploitation and class should have some suggestion about the forces that prevent such a case from arising. But here, as in section 3.2, Roemer's full-employment assumption has a high theoretical cost. One simple solution to the "people's capitalism" problem is to use the common but rarely examined assumption that workers' saving is very low, near zero. However, Walrasian analysis provides no justification for this assumption. But if we go beyond such economics, and allow for the normality of involuntary unemployment, we can approach an answer. As Sweezy notes, the uncertainty and insecurity of working-class life under real-world capitalism makes worker accumulation necessary but its effects on their wealth only transitory: "what appears to be 'accumulation' on the part of workers . . . has little in common with the accumulation of the capitalist. It springs, rather, from the necessity under which the worker is placed to attempt to insure a flow of use values to himself and his family at a time when his labor power will no longer be saleable" due to either unemployment or retirement (Sweezy, 1970, pp. 139-40). With at most "life-cycle" saving, and most saving going for consumer durables such as houses and cars, few workers can permanently join the capitalist class.³⁶ Given, in addition, the existence of a minimum degree of accumulation necessary to enter the profit-earning class – for example, based on Roemer's assumption that "capital in advance" is needed to start autonomous or capitalist production – there would be severe limits on even temporary entry into the capitalist class.

4.3. Barriers to Entry

The existence and persistence of exploitation and class thus depends on barriers to entry into the capitalist class. We have seen from examining these barriers that Roemer's methodological constraints must be transcended to provide a coherent explanation of the reproduction of DOPA and exploitation over time.

There is one especially important element of unreality in our discussion in section 4.1: for most technology, imitation involves more than copying a floppy diskette. This brings us to the next special dimension of Roemer's general theory.

5. PRODUCTIVITY AND PRODUCTION

At the root of any model of an expanding production economy are three questions. First, why is the production of a surplus feasible? Second,

36. The saving of the employed and young would be largely canceled in aggregate by the dissaving of the unemployed and old. See Marglin (1984, chap. 7) for an alternative but related answer.

on what scale are inputs converted into outputs in production, and how does this scale of production affect the organization of work and the distribution of rewards?

Roemer's models embody the "black-box" approach to these questions that characterizes Walrasian general equilibrium. The economy's "absolute productivity" – the feasibility of surplus output beyond subsistence – is simply asserted on the basis that the capitalist economy *has* a "productive" technology.³⁷ In effect, productivity is guaranteed *ex ante* for the owner of capital: achieving a surplus is a merely technical matter once capital assets have been secured. Roemer handles the second question about the scale of production by assuming that production technology has constant returns to scale, that is, that output increases linearly with the amount of resources used. Complementing both assumptions, he assumes that transactions costs in the labor market are zero. Costless contracting ensures that *ex ante* wage bargains specify *ex post* performance criteria with exactness, and costless enforcement ensures that contractual terms are precisely met.

Constant-returns, black-box technology, and zero transactions costs have important consequences for the treatment of production. First, *ex ante* market arrangements are able to preordain all salient aspects of production: the value added by each worker can be accurately assessed and rewarded. Second, because production processes can be fully monitored and obey constant-returns laws, they can be satisfactorily characterized as carried out by "isolated" individuals operating freely in markets. The existence of firms is an unnecessary complication. Non-market social relations of direct cooperation or authority may arise, but any such *social* relations of production are exterior to the treatment of production in the Walrasian economy. Thus, production is presocial, involving an exchange of contracts among agents followed by these agents' "exchange with nature"; and what makes an economy "capitalist" has nothing at all to do with social relations within production.

This section shows that the assumptions of zero transactions costs, combined with a constant-returns approach to production, are required to sustain Roemer's methodology. At the same time, these assumptions are an inadequate basis for a truly general theory of exploitation and class. If transactions costs are not zero and returns to scale are not constant or if generating a surplus from capital assets is not a merely technical matter, his substantive and methodological Propositions fail.

We start with the second of the questions posed above. Throughout the remainder of this section, we drop the assumption of zero transactions costs. This immediately implies the existence of firms (Coase,

37. Defining A as the matrix of input coefficients augmented by the cost of reproducing workers, a technology is productive if the matrix $[I-A]$ is strictly non-negative.

1937). It also means that *ex ante* market relations (contracts) cannot precisely guarantee *ex post* performance: it is simply too costly to prespecify each agent's performance in contracts ahead of time, either because more information is missing than *ex ante* contractual guarantees can overcome or because more contingencies may arise than can be efficiently built into contracts. With this assumption broken and firms in existence, we now consider the effects of relaxing Roemer's other assumptions about production.

5.1. Economies of Scale

Roemer treats economies of large-scale production as merely an "imperfection" inessential to his theory (*GT*, p. 94), while showing that his Model 5's results are unaffected by the introduction of scale economies (*GT*, pp. 219ff.). But a number of arguments can be made that his model has greater internal consistency if the assumption of constant returns is replaced by that of increasing returns to scale up to some "minimum efficient scale," after which constant returns may obtain. A region of increasing returns could explain the productivity advantage of the factory over the farm in the Parable. Second, this region could explain workers' failure to enter the capitalist class even when, as in section 4.1, some capital takes the form of poorly defended rights in technological knowledge: this makes entering the capitalist class more difficult than merely pirating computer software. Third, this region could justify Roemer's crucial "capital in advance" assumption. If the basis of this advance economy assumption is the existence of set-up time, then set-up time could be explained by the fact that workers and machinery need to be organized into productive units. This is clearly linked to the notion of scale economies: with completely isolated production (involving a single worker), little set-up would be needed. In sum, economies of scale could form a barrier to entry into the capitalist class, making it more difficult for those workers who have accumulated to become capitalists.³⁸

If the assumption of constant returns is relaxed, however, the idea of production as a presocial "black box" must be abandoned if we are to understand the origins of scale economies. Even without the introduction of complex machinery, there are two basic explanations of scale economies, of why labor productivity rises when workers cooperate directly. The first is Smith's famous argument for the advantages of the detailed division of labor within a factory (1982, chaps. 2–3). Second, even simple cooperation among workers performing the same task, as in bucket brigades, can boost labor productivity (cf. Marx, 1977, pp. 443–47). But introducing scale economies attributable to either cause (or both)

38. Economies of scale, however, are not *sufficient* to prevent entry; as in section 4.2, there must also be barriers that prevent workers from accumulating too much.

overturns Roemer's methodological Proposition 1, since they bring in social relations – and conflict – not strictly reducible to the behavior of an individual.

To see this point, first consider a factory with scale economies due to either or both of these causes. Here, any worker's productivity depends on whether her work is performed in isolation or with others, while her *reward* depends on an extra social relation not required in the original Parable – the bargain struck between cooperating agents. None of the conclusions below are changed by the introduction of machinery: simple cooperation and the detailed division of labor appear as relations between workers using machines, as in networks of interdependent work stations or in assembly lines.

Cooperative work. First, examine an egalitarian case roughly analogous to that of the Parable: a factory is organized as a worker's cooperative. Despite the simplicity of this story, either source of scale economies makes the nature of production and the bargain among workers different from a simple market transaction: the return each receives for her effort cannot be determined simply by supply and demand in an auction market. First, when the co-op is operating at or below the minimum efficient scale, an individual's contribution is not well defined, since removing one worker to calculate her contribution hurts others' productivity. More fundamentally, an individual's work has *external effects* on the labor of the rest of the team. Using a negative example, a bucket-brigade worker who slops water on the ground makes it more difficult for others to put out the fire. Similarly, low-quality work by one individual producing pins (drawing out the wire, in Smith's example) hurts the effectiveness of others' labor (straightening it, cutting it, etc.). The complexities of estimating each worker's contribution to the final product make it difficult if not impossible for a worker to be rewarded in proportion to her effort. Effort is hard to measure because, among other things, the *quality* of the product is variable.

Given the social nature of production, not only does output depend on effort, but effort depends in part on co-op social organization, including the system for distributing rewards.³⁹ A team's compensation rule obviously affects its workers' productivity: a utility-maximizing worker will expend more effort, *caeteris paribus*, if that effort is rewarded. Examine an extreme case where, because of the difficulty of measuring individual contributions to output, the co-op distributes net output equally among its members. Individualistic agents will act as free riders, so there is a "collective good" problem: the average productivity of the

39. "Effort" or "labor intensity" is the ratio of actual labor done per hour of time spent in the production site (under capitalism, the labor-power sold). We assume that effort gives each worker disutility; in a well-organized co-op, on the other hand, work might be pleasurable.

group depends on the agreement struck collectively by workers. As with most collective-good problems, coercion of the "free riders" may result, negating Corollary 1.A.

This "horizontal" conflict among workers cannot be solved by voluntary market relations. But it might be solved if we drop the standard Walrasian assumption of individualistic utility-maximization and introduce the notion of "team spirit." If such spirit is cultivated and flourishes, then coercion against free riders may not be needed. But this in turn implies that group morale – an externality due to all team members' words and deeds – affects productivity. Issues of fairness necessarily arise: if a worker sees the distribution of income among workers as "unfair," her effort will fall. This in turn hurts the productivity of all.

In sum, net output is not fixed *ex ante* by the laws of physics or market agreements, but depends on social relations between, and the subjective judgments of, workers in the team. These results apply to the extent that an individual worker's contribution to production cannot be measured because of the costliness of transactions alluded to above. If workers' efforts did not have interdependent effects, there would be none of these problems. However, there would then be no economies of scale.

Further, when transactions costs have precluded the writing of complete *ex ante* contracts, monitoring is required to avoid "shirking" even where effort *can* be measured. If the number of workers is small, workers might minimize shirking by simply monitoring each others' effort, using team spirit and economic incentives. But as the number of workers grows, monitoring requires a "vertical" social relation: supervision. This supervisor must be paid a fraction of the net product. Since a pure supervisor does not contribute directly to production, new possibilities of social conflict arise – even if the supervisor is elected democratically. The quality of supervision also affects individual effort, morale, and thus group productivity.

Capitalism. None of the conclusions about the social nature of production change if we now introduce DOPA into our tale, and replace the co-op with a capitalist-owned firm. However, the *type* of social relation changes: the vertical conflict is transformed and intensified. The capitalists cannot be the passive *rentiers* of Walras and Roemer, because productivity – and thus profit – depends on worker effort and morale and is thus determined only *ex post*. Production must be organized, a pay scheme set up, and effort monitored. Hired supervisors must also be supervised.

Suppose a capitalist receives all output beyond production workers' wages; he then may distribute some to supervisors. If so, the goals of the owner and the workers conflict: a capitalist maximizes profits by cutting wages and boosting worker effort, whereas workers maximize

utility, which depends positively on wage income and negatively on effort. The output accruing from economies of scale, which was workers' collective good in the co-op, is now the owner's private good. The simple auction (the market nexus) of Roemer has become a contentious and complex social relation because of external effects from workers' effort, effort-sensitive productivity, and the intricate connections between remuneration schemes, morale, and worker effort.

This scenario negates Proposition 3 (the sufficiency of DOPA): the mere existence of DOPA is insufficient to assure that exploitation exists and profits are positive. Simply owning capital assets is insufficient to realize economies of scale; supervision and worker-motivation schemes are also required. Neither fits Walrasian individualism (Proposition 1).

Consider the case of capitalist/supervisor relationship in greater detail, leaving supervisor/worker relations to section 5.2. Here, the "principal/agent" problem arises when capitalist principals hire supervisor agents.⁴⁰ If supervisors' effort is *ex ante* determinate, then owners' class status is reproduced without violating Proposition 1. But the success of supervision is known only *ex post*, as above. Due to these complicated relationships with workers, supervisors' activities are usually more difficult to monitor than those of the workers. Thus, we cannot rule out a priori the problem of the supervisor "embezzling" part of profits, perhaps by "padding the perks" or stealing technology. Either might allow some hired supervisors to accumulate and enter the capitalist class, returning us to the problem of section 4.

There is no Walrasian market solution to this problem. Manager's effort and honesty depend in part on their personal character, about which there is necessarily imperfect information. Further, high salary demands would be an important signal of supervisory ability. For example, a supervisor willing to accept a low salary might be more prone to embezzlement, implying adverse selection in the supervisory labor market. Price incentives alone would then not suffice for hiring the best managers: the profit-maximizing outcome would involve rationing in the managerial labor market, even in equilibrium.⁴¹ This would contradict methodological Propositions 1 and 2, since both those hired and those left unemployed are "coerced" in equilibrium.

Nor can these problems be solved using an insurance scheme. With such schemes, moral hazard problems arise: if there were 100% insur-

40. See Jensen and Meckling (1976) and Fama (1980). We should emphasize here that the possibility of problems between principal and agent arises because of the costliness of transactions; as noted above, if all *ex post* contingencies and actions could be efficiently (in the limit, costlessly) specified in advance by contracts between principals and agents, no "problems" between these two parties could arise. The inability of principals to write such contracts allows for the indeterminacy in agents' behavior, which agents may try to exploit to their own advantage.

41. See Stiglitz (1987) for development of this argument.

ance, utility-maximizing capitalists would have the incentive to act as passive *rentiers*, giving hired managers free rein to embezzle. Thus, no prior guarantees can be total. Some group of capitalists must be actively involved in controlling hired supervisors' activities.

5.2. The Economy's Absolute Productivity

This brings us to the first of the two questions about production – that is, why is a surplus feasible in the first place? Roemer simply assumes that his Models produce a surplus. In Roemer's steady-state models, the assumption that average productivity exceeds the real wage, or that the technology matrix is "productive," is just as important to the existence of exploitation on the aggregate level as the introduction of DOPA. Without that assumption, exploitation in Roemer's Models is mere "unequal exchange," that is, the redistribution of existing output among agents, what Dymski and Elliott (1989) dub "secondary exploitation." But *with* that assumption, "primary exploitation" exists; that is, new output beyond subsistence is created through the extended use of labor, as in Marxian theory. So the assumption must be explained.

Suppose that we replace Roemer's "black-box" explanation of the economy's productivity, which relies solely on technological determinism, with an alternative explanation within Marxian discourse. This returns us immediately to the discussion of why workers produce a surplus for capitalists. If the explanation of the surplus is not to be found in technology per se, it must rest either in the labor exchange or in the labor process. Roemer follows Marx to rule out unequal exchange (cheating, theft, monopsony, etc.). A worker resists greater effort if she perceives that incremental effort will not be adequately rewarded. As above, a principal/agent problem arises; in this case, the managers are principals, not agents. As before, principals cannot be passive; they must actively intervene to shape agent behavior.

Managers may use a wide variety of means to increase worker effort. A management scheme must be set up to prevent workers from viewing production as *their* collective good (as in the co-op) and excluding the capitalist. The available approaches range from using team spirit to maximize worker effort, on the one hand, to the use of "divide-and-rule" strategies on the other.⁴² Such strategies involve monitoring worker effort, and hence are subject to the complications discussed above.

Further, managers may engage in wage setting to raise motivation rather than letting wages be set by the Walrasian auction: the "efficiency wage" hypothesis suggests that equilibrium wages will exceed market-clearing wages, since the former assure firms of a queue of unemployed

42. See Marglin (1974) and Devine and Reich (1981) on the latter strategy.

workers ready to take the place of workers whose effort the managers deem unsatisfactory. The positive "cost of job loss" motivates workers and raises productivity.⁴³ In addition to evoking effort, this provides one explanation of the existence and persistence of unemployment, which in section 3.2 keeps wages from squeezing profits and in section 4.2 helps prevent sustained worker accumulation.

The question of why a surplus is produced also has a *dynamic* aspect. While the economy's absolute productivity might occur *accidentally*, why does it persist across time?⁴⁴ This returns us to a point from section 3.1: why is the growth of labor productivity (coefficient *m*) positive, allowing capitalist accumulation to avoid triggering wage increases that squeeze profits and thus end accumulation?

One answer is that managers often change the organization of the labor process – decreasing the amount of worker discretion, setting the pace of work with assembly lines, and so forth – to get better control over it and to raise labor productivity.⁴⁵ The normal existence of unemployment gives the capitalist greater ability to introduce technical or managerial change: fearful of job loss, individual workers are more willing to give up in any resistance to such introduction as capitalists tell them "take it or leave." This makes it more likely that labor productivity will rise, containing any wage squeeze on profits.

Note the phrase "more likely": the absolute productivity of capitalism has not been *proven* in any logical sense. It is possible that fears of unemployment could instead spur workers to unite to resist the introduction of new technology and management systems, to introduce featherbedding (and so forth) to save jobs. All that we have shown are the conditions required for absolute productivity to persist; this is a step beyond Roemer, who simply *assumes* them. In fact, the economy's absolute productivity is proved only *in practice* in the conflict between workers and owners: can the owner succeed at getting workers to accept management's changes?

5.3. Exploitation and Production

This section has shown that Roemer's assumptions about the nature of the production process are *fully as important* as DOPA for his conclusions about the origins of exploitation in the capitalist economy. We have seen that once transactions are costly and firms exist, overturning Roemer's technological determinism about absolute economic productivity and his view that economies of scale are unimportant to the existence of ex-

43. See Katz (1986), Stiglitz (1987), and Bowles and Gintis (1990).

44. Two "accidental" causes of absolute productivity are technology introduced either before the rise of capitalism or by noncapitalist scientific laboratories.

45. See Braverman (1974) and Edwards (1979).

ploitation leave us with unanswered questions. Trying to answer those questions, in the context of a general Marxian understanding of the economy, leads to models of production relations at odds with his methodological Propositions. Walrasian individualism (Proposition 1) fails, as before, because economic outcomes are irreducibly social in a way that market outcomes are not: arrangements among only some individuals affect outcomes for all, without all individuals having a chance to affect those arrangements. Further, the notion of restricting attention to market-clearing equilibria (Proposition 2) fails, since unemployment – a condition that violates the noncoercion condition embodied in Corollary 1.A – may be a persistent feature of economic outcomes. This discussion also sheds doubt on Corollary 3.A (the inessentiality of the labor relation), though the disproof of the credit/labor market isomorphism theorem is beyond the scope of this paper.⁴⁶ Proposition 3 fails as well, since DOPA alone is no longer sufficient to assure the economies of scale or performance of surplus labor: sufficient effort must be evoked from workers. Further, Proposition 4 is threatened, since the reproduction of absolute productivity is contingent on the set of social relations that surround production.

In sum, production outcomes cannot be reduced to the effects of market exchanges and the use of pre-existing technology; the nature of capital must be redefined to go beyond Roemer's definition. Whereas he treats it as merely a legal form, "capital" here involves sustaining a social relation of control over both managers and workers.

6. THE HISTORICAL AND INSTITUTIONAL BASES OF EXPLOITATION

This critique of Roemer's models of capitalist exploitation has shown how narrow a range of the conceptual concerns of Marxian theory can pass through the screen of Walrasian individualism. Nonetheless, despite his cautionary that his theory is abstract and does not incorporate "economic history or anthropology but [is] an investigation of the institutions that are logically necessary to produce exploitation and . . . class" (*GT*, p. 62), he argues that DOPA deserves theoretical precedence over other phenomena emphasized by the Marxian tradition. But *logical necessity* here means that substantive propositions are admissible only if they are derived from Roemer's premises, that is, if they conform with Walrasian individualism. This leads, first, to a restricted conception of what capital is, which forms a second screen restricting analysis. For Roemer, the capital at the heart of the capitalist economy is a legal form and a *thing*: a specialized commodity required in advance for production.

46. Bowles and Gintis (1990) argue that active intervention and the use of power is also required in the creditor/borrower relationship, so a certain isomorphism is maintained.

Capital, for him, is thus not a social relationship. Indeed, capital can only be a thing, since the only admissible social relations are those appearing in generalized Walrasian settings, which must be noncoercive and the result of free atomic movement.

Roemer's methodological and definitional screens lead, in turn, to axiomatically rigorous conclusions that apply only in restricted domains. His principal substantive achievement is to demonstrate, in a series of models, that the Marxian phenomena of exploitation and class are the effects of DOPA.

But if anything, these models prove the limits of pursuing Marxian questions with Walrasian methodology. Section 3 showed that overrapid capital accumulation jeopardizes the dynamic consistency of his Models. Only "golden-age" growth can be considered, for when the stock of capital grows faster than limits set by the growth of labor supplies (adjusted for productivity increases), capitalists no longer earn a positive return, and the economy ceases to be capitalist. Worker participation in labor markets is understood as voluntary: as a result, unemployment and coercive labor processes in production are ruled out as objects of theoretical interest, even though they are needed to explain the persistence of exploitation. Section 4 demonstrated that Roemer's models trivialize the question of the dynamic reproduction of classes, even when capitalist accumulation follows "golden-age" strictures: he does not take up the issue of the barriers to entry into the capital class through worker appropriation of technology and accumulation in any depth. Finally, section 5 showed that Roemer's purely technical view of capital – as an inherently productive thing, whose use in isolated, nonsocial, processes is determined in costless market transactions – is inadequate for a truly general theory of exploitation. Richer conceptions of production that allow for the influence of human teamwork and effort on the productivity of capital assets overturn Roemer's methodological and substantive assumptions.

In this concluding section, we suggest a set of Alternative Propositions, paralleling those of Roemer, that lead in the direction of a dynamic and historical theory of exploitation and class. These eschew Walras in favor of Marx, and suggest that a much richer range of analytical possibilities opens up when we consider models and explanations in which Roemer's methodological Propositions and his definitions of capital need not hold. Though not a complete theory of exploitation, it suggests preliminary answers to the questions posed by our critique of Roemer.

An alternative conception of capitalism. The following Alternative Propositions (AP1 to AP4) both parallel those formulated in section 2 and summarize the main positive conclusions from our critique of Roemer.

Alternative Proposition 1: Capitalism must be examined as a social system, which cannot be reduced to the *ex ante* properties of individuals and nature – that is, to technology, preferences, and endowments. Coercion and restricted choice – including involuntary unemployment and coercive domination – are as much a part of capitalism as voluntary market exchanges.

Alternative Proposition 2: Capitalism as a dynamic system of accumulation is characterized by recurrent disequilibria and/or crises. Accumulation and class relations are sometimes in harmony and sometimes in conflict. No ontological primacy is given to the concept of equilibrium or market clearing.

Alternative Proposition 3: The existence of DOPA is not the sole cause of exploitation, class, and accumulation. Rather it is a part, albeit important, of a complex dynamic and social process.

Alternative Proposition 4: DOPA is a dependent, not an independent, variable.

Although setting out a complete alternative “general theory” of exploitation would be the most decisive way to counter Roemer’s conception, this is not the place to do so. Instead, we highlight three aspects of these alternative propositions, which contrast sharply with Roemer’s approach: the emphasis of historical grounding for theory construction, the treatment of dynamic growth, and the role of capitalist coercion in economic outcomes. The ensuing discussion weaves together some of the threads of an alternative perspective, which have been introduced throughout the previous sections.

The historical grounding of theory. AP1 suggests that a theory of capitalist exploitation should take account of the specific historical setting of the capitalist economy, in contrast to the timeless and institution-free approach in Roemer’s models. Figure 1 represents one account, based largely on Marx (1977), of the historical origins and persistence of DOPA and capitalist exploitation over time. Some elements in this account, denoted by double boxes, are “historically exogenous” in that they precede the development of full-scale capitalism. The subsequent development of this process is path-dependent. While Figure 1 also ignores many historical and institutional elements, it can be used to illustrate how a historically informed theory of exploitation might differ from Roemer’s and to point to directions for future research radically different from those suggested by his model.

In Marx, “Primitive Accumulation” – the creation of the capitalist property system from the “feudal” background – is the rough historical analogue to Roemer’s purely logical introduction of DOPA into the Egalitarian Economy. In Roemer’s theory, the transition between economic

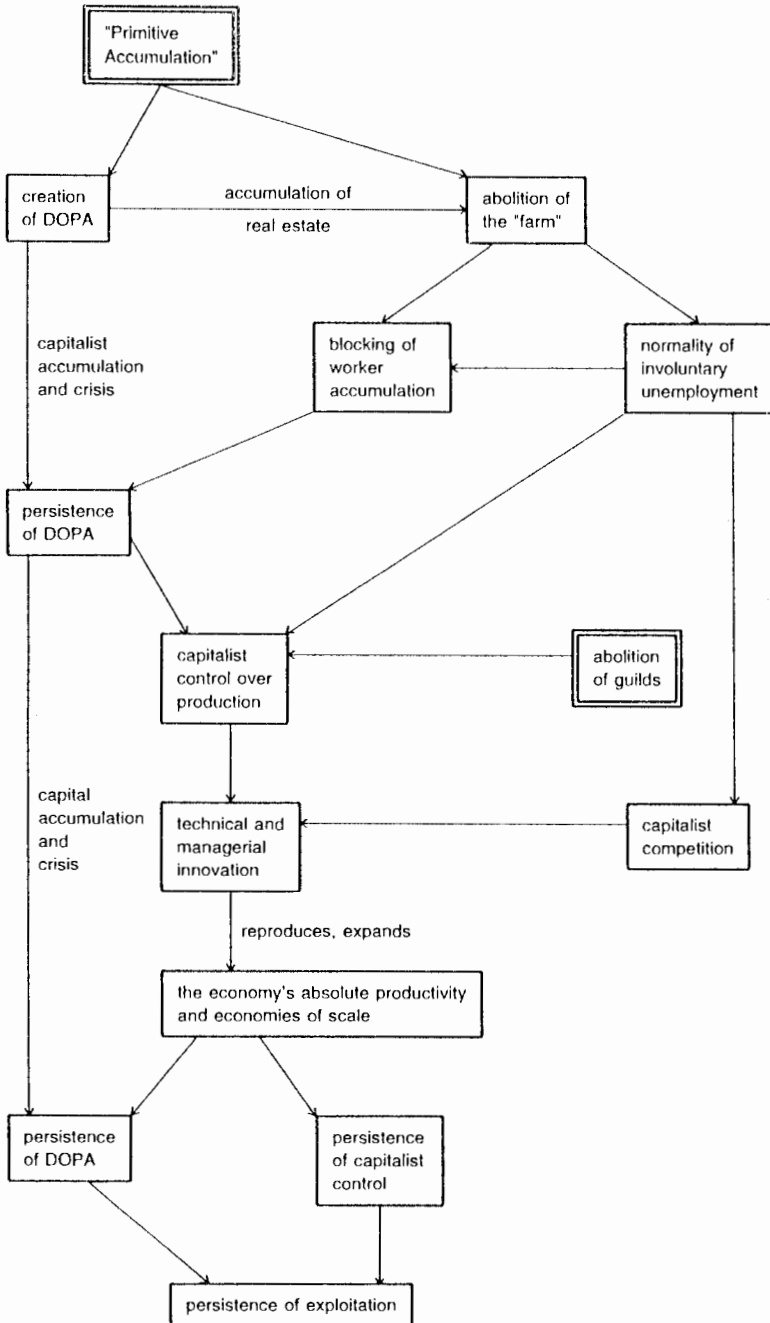


FIGURE 1. Rudiments of a Marxian theory of exploitation.

systems is voluntary, and is completely analogous to a process of unfettered market choice: "the class best able to develop the productive forces will be able to offer the highest standard of living to the direct producers, and this higher standard of living will act as a magnet to draw the producers into its mode of production" (*FTL*, p. 115).

In the alternative view represented in Figure 1, by contrast, coercion is central to the transition to capitalist production relations. Primitive accumulation is not simply a redefinition of ambiguous precapitalist rights in favor of the landlords; it also entails the forcible abolition of the "farm," that is, of the possibility of autonomous worker production, that makes unemployment more like (cf. Marx, 1977, chap. 33; Lazonick, 1974). Capitalists then use their initial advantage in property ownership to accumulate *both* real property and other assets through the market. The foreclosure of the option to produce autonomously, together with the threat of unemployment, not only forces workers to labor for the capitalists as a class (Roemer's emphasis) but also, as discussed in section 3.2, puts them at a disadvantage vis-à-vis individual capitalists; as a result, capitalists gain control over production processes. Further, as suggested in section 4.2, the resulting insecurity severely limits worker's ability to accumulate, as does the strict limits on earning income from noncapitalist sources. This, along with capitalists' accumulation, reproduces DOPA over time.

Accumulation as a dynamic, adaptive process. Another factor that reinforces the long-term persistence of unemployment, exploitation, and class is crisis (AP2). Recall from section 3.1, that Roemer's models disallow growth above Harrod's "natural rate." In real-world capitalism, by contrast, overaccumulation cannot be ruled out; indeed, the dynamic of (non-Walrasian) competition drives capitalists to expand, and makes overaccumulation likely.⁴⁷ When rapid accumulation runs against limits on the supply of labor, unemployment falls, wages rise, and profits are squeezed: a crisis occurs. The response to overaccumulation, as Marx (1977, pp. 785–86) pointed out, involves a cutback in accumulation, falling demand for labor, and rising unemployment. Eventually, profitability is restored as unemployment pulls wages down. In this account, crisis is not an *anomaly* as in Roemer, but an integral part of the theory, an occasionally dramatic mechanism restoring the preconditions for exploitation and allowing its long-term persistence.

Another aspect of the alternative propositions is that capitalism is adaptive and innovative: crises may not lead to its dissolution, but to

47. Two dynamic visions of capitalist competition are Weeks (1981, chap. 4) and Bowles and Edwards (1985, chap. 7). Weeks argues that the normality of unemployment allows new capitalist enterprises to be established, reproducing capitalist competition over time; thus, competition follows from the unemployment box in Figure 1.

the development of new forms of production. Recall from section 3.1 that for sustained capitalist accumulation to occur in Roemer's Model, Harrod's "natural rate" of growth had to be positive, and that Roemer had no explanation for its positivity. For Marx (1977, pp. 433ff.), by contrast, pressure from dynamic competition and the outbreaks of crises both push capitalists to innovate to avoid bankruptcy or takeover. This may involve implementing new technologies or management methods, i.e., increasing the detailed division of labor, introducing machinery and assembly lines, and so forth, which boost productivity and allow the persistence of the economy's absolute productivity. Marx also discusses how in the longer run, capitalism avoids labor constraints by either destroying barriers that keep people out of wage-labor markets or by moving capital past these barriers (cf. Marglin, 1984, pp. 63–66). In sum, Harrod's use of the word "natural" is inaccurate; *societal* processes help explain why $m + n$ is positive under capitalism.

Capital as a coercive relation. We have observed that Roemer defines capital as a legal form – that is, ownership of a set of productive assets. This is valid as far as it goes; but as emphasized in AP1, there is a coercive dimension to capital beyond the widely recognized use of coercion to protect legal property rights. In addition, violence must be used at critical historical junctures, in primitive accumulation, breaking down labor-market barriers, or in response to general strikes or working-class revolutions. This is usually sufficient to secure capitalist control of the conditions required for accumulation and the persistence of DOPA.

Further, as discussed in section 5, it is clear that the reproduction of capitalism over time requires capitalists' active and direct control over the work process. If, for example, production processes were controlled directly by feudal guilds, capitalists would lack the ability to implement the labor-saving technical and management innovations needed to ease labor-supply constraints. This control did not necessarily arise from some pre-given role for "capitalists" in production: it was achieved in part coercively, through the violent abolition of guilds and similar institutions. Once in control, capitalists' dynamic implementation of labor-saving innovation has steadily raised the capitalists' role in management. As part of this, the application of "scientific management" embeds a role for capitalist-owned technology in production (Braverman, 1974). Thus, capitalism creates institutions that help reproduce capitalist control of production and DOPA over time.

Under capitalism, coercion is "normal," built into the structure of the society, from its labor markets rife with involuntary unemployment, to the production processes in its factories, to its patterns of technical change and institutional evolution. Exploitation then involves this coercive relation fully as much as it does DOPA. The production relation is not merely one possible channel through which differential wealth own-

ership can be carried; it is the fulcrum for realizing the cumulative advantage gained by capitalists over workers, through a long history of social relations. Whereas for Roemer, DOPA is sufficient to produce exploitation, in the Marxian view, DOPA is only necessary.

In sum, dynamic historical processes and institutions of management control intermesh to solve the mystery of exploitation. Potential and actual labor shortages and the dynamic struggle of capitalist competition give capitalists the *motive* to innovate while their control over production and the existence of unemployment provide the *opportunity* to do so, by weakening worker resistance. Their *weapons* come from the physical and social sciences, which as Braverman (1974) argues, have increasingly come under capitalism's sway. None of this suffices for the deed to be always and everywhere done. Capitalists do not completely control production: as long as productivity depends on workers' subjective decisions, the workplace will be a "contested terrain" and not a purely technical process (cf. Edwards, 1979). Further, capitalists' accumulation will be sometimes disrupted by macroeconomic crises. In the end, as in the conclusion to section 5.2, there are no *ex ante* guarantees.

A general, not "general," theory. Roemer's Models have made an important contribution by exploring the applicability of Marxian features in a Walrasian world. But his analytical propositions depend on an extensive set of conditions concerning the relative volumes of labor and capital, the conditions under which labor is exchanged, and the conditions under which labor is performed. Relaxing these conditions to take account of phenomena in real capitalist economies, such as unemployment, dynamic inconsistency, and coercive domination, either invalidates Roemer's substantive propositions about exploitation or contradicts his methodology. This limited scope of applicability suggests Roemer's theory should be appropriately understood not as "general," but as a special, if interesting, case.

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APPENDIX: TECHNICAL CONDITIONS FOR DYNAMIC CONSISTENCY IN ROEMER'S PARABLE

The profit rate. All variables are assumed to be non-negative. Let profits/worker-day be denoted as s , net product/day as y , and wage/day as w . Then, by definition, we have the equation

$$s = y - w. \quad (\text{A1})$$

Let $d \leq 7$ equal worker-days per worker in a week, a constant. Then (A1) implies that total weekly profits $S = sd$. Now suppose the seed corn capital needed per worker-day is a constant k . So the seed corn needed in advance per worker-week hired, K , equals kd . Assuming full use of seed corn, the profit rate, r , equals S/K , and

$$r = sd/kd = s/k = (y - w)/k. \quad (\text{A2})$$

Accumulation. Assume that capitalists accumulate a fraction a of the surplus over their total weekly subsistence, B , where $B \geq 0$. No worker accumulation is allowed. Let $b = B/K$. Then total accumulation, the change in stock of seed corn per week, is $a(sd - B)$, and the rate of accumulation equals

$$\begin{aligned} g &= a(S - B)/K \\ &= aS/K - aB/K \\ &= ar - ab. \end{aligned} \quad (\text{A3})$$

This produces a variant of the famous "Cambridge Equation," i.e.,

$$r = b + g/a. \quad (\text{A4})$$

in which capitalists "get what they spend."

Dynamic constraints. With a fixed capital/labor ratio, avoiding labor scarcity in the long run requires a growth rate of the supply of worker-days, n , such that

$$n \geq ar - ab. \quad (\text{A5})$$

According to (A5), if $n = 0$, then the presentation of labor surplus (and of the low wages associated therewith) requires that $r = b$; that is, there must be no accumulation. If we introduce growth of labor productivity, which proceeds at

a constant rate (m), then condition (A5) becomes the condition used in section 3.1

$$n + m \geq ar - ab. \quad (1)$$

Worker accumulation. Suppose that, as in Roemer's accumulating models, both workers and capitalists save all of their income (so $a = 1$ and $b = 0$ for both classes). If so, it is easy to see the conditions allowing people's capitalism to arise. The rate of capitalist accumulation is as follows

$$gc = r. \quad (A6)$$

On the other hand, the rate of workers' accumulation is

$$gw = (W + rKw)/Kw = W/Kw + r. \quad (A7)$$

where W = the total wage bill, Kw = workers' capital (assumed to be positive), and it is assumed that workers receive the same return on their capital (r) as do capitalists.

In this case, workers' capital will grow faster than that of the capitalists (so that the workers' share of total capital will rise) if

$$W/Kw > 0. \quad (A8)$$

That is, if this condition is met, the workers will gradually enter the capitalist class, owning an increasingly large share of total capital. Given positive wages and noninfinite workers' wealth, this should occur if we accept the assumption that all income is accumulated.

WALRASIAN MARXISM ONCE AGAIN

A Reply to John Roemer

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John Roemer's comment (1992) succinctly summarizes the logical structure of his own theory of capitalist exploitation, but misunderstands the main points of our critique. He reduces his argument to two propositions. The first is an "empirical proposition" about the "root causes of exploitation": $X + Y \rightarrow Z$, where X is the existence of differential ownership of means of production (DOPA), Y is coercion in the labor process, and Z is the capitalist class structure and exploitation. The second is the strictly theoretical proposition $X + \text{not-}Y \rightarrow Z$, the truth of which he demonstrates, given most of the assumptions of a Walrasian economic model. He concludes that these two propositions, taken together, demonstrate the primacy of DOPA in explaining capitalist class relations. This much is true – subject to the various limitations we have indicated in our article – *but only within the restricted confines of a Walrasian framework*. This purely *theoretical conclusion* has no force as an *empirical conclusion*: this is the point at which Roemer's interpretation goes awry. For obviously, DOPA is a crucial element of empirical reality. But because Roemer's Walrasian framework precludes other equally crucial elements of empirical reality (which are also conceptually central to Marxian discourse), an irreducible distance remains therein between the theoretical and the empirical.

Roemer's own economical presentation of his argument suggests a way to restate our critique in the starkest possible terms. Modifying Roemer's formalism for this purpose, let X , Y , and Z be defined as above;

and let S be the special assumptions preserving a positive rate of profit, and P the assumption that the economy has the technical capability of producing a surplus (is "absolutely productive"). We did not reject a role for X , and as Roemer elegantly shows, the empirical role of Y is not at issue here. Rather, our analysis of Roemer's argument in his various models found the following logical structure: $X + S + P \rightarrow Z$; $X + \text{not-}S + P \nrightarrow Z$; and $X + S + \text{not-}P \nrightarrow Z$. Since $\text{not-}S$ and $\text{not-}P$ are at least sometimes true of modern capitalism and theoretically important in a Marxian conception, we argue for an alternative to Roemer's view, which might include an explicit role for Y , and an acknowledgment of the importance and sources of S and P . Our argument makes clear that DOPA would lose its privileged position in this richer and empirically more relevant analytical framework.

The discussion in Sections II and III follows the outline of Roemer's comment, examining the roles of first S and then P . We then summarize our results and turn to his final comment on normative economics.

II

In our article, we never suggest that "the exploitation and class that come about in [Roemer's] model have nothing to do with the phenomena of exploitation and class in the real world" (1992, p. 152). Rather, we observe that the tendency of his models to self-destruct in the absence of restrictive assumptions points to a real-world problem of capitalism: competition tends to drive positive profits toward zero. So, a static analysis of a competitive market economy – or a dynamic analysis with time-consistent or stationary equilibria – will not suffice, as Roemer would prefer, when S does not obtain.

In Roemer's models, capitalists receive unearned incomes simply because of their ownership of assets that are both productive and scarce. Capital scarcity and positive profits can be preserved as features of a dynamic equilibrium model of a capitalist economy by exogenous *dei ex machina*. As Roemer himself notes, that is hardly satisfying. But Roemer himself must follow this route. Our article shows that his models use special assumptions (S) to guarantee the persistence of capital scarcity. These special restrictions are that the pace of capital accumulation is not overrapid (see our equation (1)) and that capital itself consists of physical commodities, not of technological knowledge. But if we assume $\text{not-}S$, then capital scarcity ends. For example, one might posit that agents will adjust their behavior when unutilized profit opportunities exist (as evidenced by a positive profit rate). If workers can appropriate the capitalists' technology, then both capitalists and workers might accumulate capital. If the pace of accumulation is sufficiently rapid, then unutilized profit opportunities disappear, along with capital accumulation and the qualitative distinction between classes. In this event, DOPA may persist,

but since capital is no longer scarce, profits will no longer be received for owning capital. So X may be necessary to Z , but it is not sufficient.

The alternative vision suggested in our article's final section argues that some empirically plausible countervailing forces (K) could explain why capital scarcity persists, without resorting to Roemer's exogenous S .

The broad trend of Marxian economics suggests some ideas about what these forces might be. For example, suppose involuntary unemployment is a normal feature of capitalism (once precapitalist sources of worker livelihood have been abolished). This would make worker entry into the capitalist class much more difficult and enhance capitalists' ability to introduce new methods for extracting profits. An equilibrium without full employment would, of course, be non-Walrasian. But then capitalists would also be free to use non-Walrasian techniques – that is, to coerce their laborers (Y) – to preserve their capital's scarcity. So, an alternative to Roemer's reasoning is $X + K + P \rightarrow Z$, where K represents aspects of capitalism inherent in the Marxian, but not Walrasian, vision of that socioeconomic system; K includes Y as an element.

Replacing Roemer's S with K introduces a non-Walrasian character into the logic of explanation. Freed from the substantive assumptions insuring general equilibrium, the methodological conventions of Walrasian economics might also be set aside. In our view, the "structure" of capitalism at any one time results from the interaction of multiple dynamic forces, with equilibrium being an abnormal state. In a world of constant change, there is no *a priori* reason to privilege equilibrating tendencies over forces tending toward disequilibrium.

A model of the capitalist economy might then encompass widely divergent states. Profits may not be received in all states. Under some circumstances, capitalism may fall apart. But this need not occur; indeed, a non-Walrasian model could encompass endogenous behavioral adjustments that avoid such draconian futures. For example, suppose overrapid capital accumulation (not- S) occurred. There is then a tendency for the rate of profit to shrink, putting capitalists in the situation of Alice in Wonderland: they must run as fast as possible simply to stay in the same place. In the limit, *ceteris paribus*, profits would disappear. But rather than acting as passive Walrasian rentiers, capitalists might actively seek out means of preserving capital scarcity – for example, new sources of labor supply or new technological means of raising productivity. Such innovations could stave off the disappearance of profit income over time, despite overrapid capitalist accumulation.

Roemer observes that we "have not provided . . . a theory" of why capital remains scarce over time (1992, p. 151). This was not our article's intent. The point of our alternative propositions was to suggest non-Walrasian premises (K) for investigating such questions as why a positive profit rate persists in the capitalist economy. These alternative premises

may well lead to theoretical models that are explicitly incomplete. Such models' outcomes may be contingent on historical events; they may be path-dependent. If one does not give deductive logic *a priori* precedence over inductive reasoning, however, deductive ambiguity in a non-Walrasian setting is not a reason to limit theoretical investigations to Walrasian models. In our view, institutional and historical analyses are complementary to formal modeling. Conceptually rich models with indeterminate *a priori* outcomes may then be more useful than simpler models providing deterministic conclusions.

III

In addition to analyzing why profits persist in Roemer's models (*S*), our article probed into how his models explain the economy's absolute productivity (*P*). We found that absolute productivity is not explained at all by Roemer's models. It is simply assumed.

Further, as our article argued, Roemer's conclusions about DOPA leading to real-world phenomena of capitalism (*Z*) depend on these assumptions. Without *P*, his models represent mere "unequal exchange," the reshuffling of a fixed stock of commodities and not the creation of a surplus allowing accumulation and growth. Unequal exchange is important and interesting, but hardly suffices for a vision of capitalism as a growing system.

To explain *P*, three Walrasian assumptions must be dropped: production as a "black box," constant returns to scale, and zero transaction costs in labor markets. And if, instead, one makes non-Walrasian assumptions – production as a social process carried out by "teams," with the possibility of increasing returns, labor markets that are not self-enforcing – then preliminary explanations of *P* begin to emerge.

One can best understand *P* by opening the "black box" of production. At any point in time, *P* may be partially determined by coercion in production (*Y*), facilitated by the presence of involuntary unemployment. If this argument is warranted, then an essential, if unacknowledged, element in Roemer's explanation of capitalist exploitation (*P*) is a function of *Y*, the factor whose importance he denies in a theory of capitalist exploitation. Symbolically, $P = P(Y, \text{etc.})$, where "etc." refers to noncoercive elements of the economy's absolute productivity (e.g., technology inherited from the past).

Given this last function, the "reduced form" of our alternative starting point for analyzing exploitation and class, ignoring exogenous factors, is then $X + K(Y, \text{etc.}) \rightarrow Z$. (Here "etc." includes the noncoercive sources of *P* and also those aspects of capitalism mentioned in Section II.) Note that *X* is not forgotten, since *K* is not sufficient to ground a

theory of capitalism: that is, X and K are complementary aspects in a Marxian vision of the capitalist economy.

IV

We do not propose a blanket rejection of Walrasian models or of game theoretic approaches, as Roemer seems to think. We simply reject the proposition that Walrasian models of capitalist exploitation can suffice as truly general models of this phenomenon. Indeed, Walrasian models may be useful for some purposes. For example, the idealized world of Walrasian economics seems best adapted to normative welfare economics.

This brings us to Roemer's fascinating survey of his work in normative economics (the design of feasible socialism). We agree with him that workers' self-management of production is not sufficient to establish a just society.¹ We would add that the abolition of DOPA (and Roemer's vision of feasible socialism via profit redistribution) is not sufficient either: the sad history of USSR-style central planning indicates that the role of workers' control (acknowledged by Roemer) as "insurance against the consolidation of firm managers as a class" is as important as any redistribution of income or formal titles to wealth ownership.

Just as X and K are complementary in explaining the existence of capitalist exploitation, not- X and not- K are complementary aspects of socialism. So in hypothesizing a feasible socialism, the key issue is not whether abolishing DOPA, instituting planning, or establishing workers' control is the decisive step, but instead how these three elements would interact.

But we believe that further normative analysis of socialism is fruitful only if the traditional paradigm of welfare economics is surpassed. A normative theory of socialism should accept not only the social relations in the production process but also the real-world ubiquity of externalities, the endogeneity of preferences, and the importance of institutions. Albert and Hahnel (1990) adapted Walrasian welfare economics to begin developing such a theory. Though their scheme for "participatory economics" based on this framework (1991) may be too utopian for many, such ideals should be kept in mind when more "realistic" models of

1. However, we would argue, contrary to Roemer, that establishing workers' control broadly in the economy could raise absolute productivity by raising the motivation to work. We would suggest that production coefficients are not predetermined, as Roemer would have it, but are instead affected by social relations in production. In this event, workers' control may prove superior to coercion on the job (Y) and involuntary unemployment as work motivation.

socialism are developed. Otherwise, an apparently feasible socialism may in practice turn out to be a barrier to development of the ideal.

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