

New Directions in the Marxian Theory of Exploitation and Class

JOHN E. ROEMER

AN important problem confronting Marxists today is to explain adequately the political and economic developments of modern socialist societies. Another problem is to explain clearly why workers in modern capitalist societies should be considered exploited: Marxists insist that a certain share of the workers' labor is "unpaid," and workers are thereby exploited; non-Marxists point out that everyone gains from the trade of labor, and therefore workers are not exploited. The link between these problems is the failure of Marxian economics to state precisely what are the causes of exploitation under capitalism; from that might follow an understanding of which of those causes remain under socialism.

To clarify these problems, I propose in the following a general theory of exploitation. The proposed theory of exploitation is general in the sense that "Marxian exploitation" (the type of inequality that Marxists consider exploitative) is one special case of it. Other special cases are feudal exploitation, socialist exploitation, status exploitation, and "neoclassical exploitation" (the type of inequality that neoclassical economists consider exploitative). By embedding both Marxian and neoclassical exploitations in a more general setting, we are able to contrast the ethical principles that lie behind the two ideologies. By embedding socialist exploitation in the same general model, we gain greater understanding of the types of inequality and perhaps class formation that exist in modern socialism.

My approach to developing a general theory of exploitation is

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similar to that of Marx in his study of capitalism. The economic problem for Marx was to explain the persistent accumulation of wealth by one class and the persistent impoverishment of another, in an economic system characterized by voluntary trade. Under feudalism, it was no surprise that the lords became ~~rich from~~ serf labor, since the institution of labor exchange was a coercive one, characterized by bondage and requiring the serf to perform *corvée* and *demesne* labor. It was, then, perfectly clear where the locus of surplus expropriation was. Obviously, the same is true of societies where the institution of labor exchange was slavery. Capitalism, however, rendered labor exchange noncoercive: wage workers voluntarily trade labor power on the labor market. Perhaps the bargaining power of the two sides is not in balance, but the institution itself remains noncoercive. The riddle for Marx was how to explain the systematic expropriation of the surplus product (beyond subsistence requirements of the workers) by one class, that is, by one side of the market, when the institution for labor exchange is not coercive. To answer this riddle, Marx constructed his theory of value and exploitation. According to this theory, exchanges under capitalism are not coercive but competitive, and all commodities exchange "at their values." (Coercive exchange would, on the contrary, involve one side being forced to exchange its service for less than its value.) Despite these competitive exchanges in the labor market (and elsewhere), Marx maintained, a systematic expropriation of surplus value emerges, and upon this understanding, he based his theory of exploitation.

The institutional culprit in the Marxist idea of exploitation was private ownership of the means of production or, more accurately, the concentration of such ownership in the hands of a small class. Accordingly, if the means of production were socialized and put in the control of the working class, then capitalist exploitation would cease. Although this recipe was shared by many socialists of the period, Marx and Engels took it a step further by claiming that such a development was possible, perhaps inevitable, and by displaying the mechanism by which the transformation would occur.

We face a parallel problem in the study of modern socialism. We understand the locus of surplus expropriation under capitalism, as Marx did for feudalism. In the transition to socialist society, the institutional culprit responsible for capitalist exploitation, that is, private ownership of the means of production, has been eliminated. Nevertheless, we observe certain systematic types of inequality and certain political behavior that are less than ideal—we might wish to think of them as an indication of exploitation (which, of course, is an undefined

term in this context). The institutional dimension that we are now required to vary is the one labeled "ownership locus of the means of production" and not the one with which Marx was concerned, labeled "coerciveness of the institution of labor exchange." The formal problem, however, has the same abstract structure for us as for Marx. He required a theory of exploitation that was robust even without a coercive institution of labor exchange; we require a theory of exploitation that is robust even without private ownership of the means of production.

Which institutions and characteristics of an economy are essential for a conception of exploitation to make sense, and which are incidental? Can we conceive of a theory of exploitation sufficiently general to permit definition even under conditions of considerable institutional variation? Such a theory should apply not only to Marxian exploitation, when the institutions are capitalist, but to neoclassical exploitation, when, roughly speaking, labor is not paid its marginal product, and to socialist exploitation, when the institutions of the economy are socialist.

I have arrived at such a theory only after experimenting with many models that were designed to study Marxian exploitation. My approach to these models was to change the institutional environment in which Marxian exploitation resides and then to ask if Marxian exploitation continues to exist. How robust is the Marxian phenomenon with respect to changes in its usual institutional habitat? The models that discuss the variants of Marxian exploitation are presented in sections 1 through 4. Through these institutional experiments with Marxian exploitation, I have been able to develop an endogenous theory of class formation and to demonstrate the relationship between exploitation and class.

Moreover, this approach resolves several classical questions in the Marxian theory of value by showing that, in a general setting, labor value depends on equilibrium prices (sections 5 and 6). This dependence is exactly the reverse of the orthodox Marxian view of the relation between price and labor value. I also present a new argument supporting labor as the value numeraire in the Marxian system (section 7). Indeed, the corollaries of the approach for classical issues in the Marxian theory of value and exploitation constitute the major part of this paper. My general theory of exploitation is outlined in section 8.

In the final section, I offer a defense of my methodology. Here, however, I would like to mention also that while the models I use employ two techniques of modern mathematical economics—general equilibrium theory and cooperative game theory—I have, nevertheless,

presented the material in a nontechnical fashion in this paper. A more thorough and rigorous treatment of this material will be found in my book, *A General Theory of Exploitation and Class*.¹ In addition, various parts of the theory have been expanded in other articles.² A very slight amount of formalism is introduced in this paper, which will be clarifying to some readers. These passages may be skipped without loss of comprehension by those readers who are unaccustomed to mathematical notation.

Although two problems are referred to in the first paragraph, I will deal only superficially with how the theory applies to the problem of understanding socialist society.³ Here I will concentrate on what the theory has to say concerning Marxian exploitation and on how that concept compares to the prevailing neoclassical notion of exploitation.

1. EXPLOITATION WITHOUT A LABOR MARKET

What economic institutions appear to be necessary for one producer to appropriate the labor of another? As has been discussed, Marx's task was to construct a theory of exploitation that was operative even when a coercive institution of labor exchange was absent. Our task will be to propose a theory of exploitation that is operative even when private property in the means of production is absent. Our first step, however, is not to abstract from private property, but to investigate models of precapitalist, subsistence, private ownership, and exchange economies. In the first of these models there is no accumulation and no labor market or institution for labor exchange. Yet, surprisingly perhaps, Marxian exploitation does emerge. This suggests that there is a theory of exploitation considerably more general, in terms of the institutional variation permitted, than the Marxian theory.

The precapitalist economy without a labor market is defined as follows. There are N producers, each holding an initial endowment of produced goods and his own labor power. Although each producer has one unit of labor power to dispose of, they possess, in general, different vectors of produced goods. The goal of each producer will be to produce goods with sufficient exchange value, net of replacing what he used up in production, that can meet his subsistence needs at going

1. John E. Roemer, *A General Theory of Exploitation and Class* (Cambridge: Harvard University Press, 1982).

2. John E. Roemer, "Origins of Exploitation and Class: Value Theory of Precapitalist Economy," *Econometrica*, vol. 50 (1982); idem, "Exploitation, Alternatives and Socialism," *Economic Journal*, vol. 92 (1982); idem, "Labor Migration, Capital Flows, and Unequal Exchange: A Theoretical Synthesis," in *Marxism, Central Planning and the Soviet Economy*, ed. P. Desai (Cambridge: M.I.T. Press, forthcoming).

3. See Roemer, *General Theory*, chap. 8, for a more thorough discussion of this problem.

prices. Subject to producing goods that can be traded for his subsistence, each producer *minimizes the labor he expends* on production.

All producers have the same subsistence needs and face the same technology. They differ only in their initial endowments of produced goods. These enter into the problem in the following way. Production takes time, and a producer must lay out the costs of production today, while not receiving revenues until the end of the period. The current costs of production must be financed out of current holdings. A producer's endowment thus becomes finance capital, valued at the given prices, and this finance capital limits the production activities he can engage in. A wealthy producer will, therefore, have more production options than a poor one and hence will be able to produce goods worth the market value of his subsistence needs by working less time than the poorer producer. (He can, essentially, choose capital intensive activities to operate.)

Formally, the model is represented as follows. Let:

A = the $n \times n$ Leontief input matrix describing production

L = the $1 \times n$ vector of direct labor inputs into production

b = the $n \times 1$ vector of subsistence needs for a producer

ω^v = the $n \times 1$ vector of produced endowments of the v^{th} producer

Facing a price vector p for produced goods, a $1 \times n$ vector, producer v chooses

x^v , an activity vector in R^n , to $\min Lx^v$

subject to

$$p(I-A)x^v \geq pb \quad (1.1)$$

$$pAx^v \leq p\omega^v \quad (1.2)$$

$$Lx^v \leq 1 \quad (1.3) \quad (P)$$

$$x^v \geq 0$$

Inequality (1.1) states that v must operate the technology at activity levels x^v so that the net exchange value he produces at going prices p is sufficient to purchase subsistence bundle b . Inequality (1.2) is the capital constraint. Producer v is constrained to choose a vector of activity levels that he can afford to operate; pAx^v are the costs of inputs at activity levels x^v ; and $p\omega^v$ is the producer's wealth, his finance capital. Inequality (1.3) is simply the labor constraint. Subject to the constraints, the producer minimizes labor expended. This is the form the assumption of a subsistence economy takes.

The equilibrium in this model is a vector of commodity prices p ,

which allows all markets to clear while every producer optimizes. There are two sets of markets. First, producers come to the market to trade their particular endowments of produced goods for what they need to operate their chosen production plan; then, at the end of the period, they return to the market to trade what they produce for their subsistence needs. An equilibrium price vector must clear both markets, while allowing all stocks used up in production to be replaced as well. Since all stocks are replaced at equilibrium and since each producer subsists, I call the equilibrium a *reproducible solution*.

Formally, a reproducible solution is a price vector (p) for which the following hold:

- (1) Each producer possesses an optimal solution x^v to his program (P)
- (2) Let $x = \sum x^v$. Then, $Ax \leq \omega = \sum \omega^v$ (production feasibility)
- (3) $(I-A)x \geq Nb$ (reproducibility)

Equation (2) states that the total demand for production inputs can be satisfied with existing capital stock, and equation (3) states that the aggregate net output is sufficient to satisfy total consumption demand.

It is important to reiterate that no producer works for any other producer in this economy. All producers operate their own shops. That they choose to operate different processes, and hence work different amounts of time, is a consequence of their different financial constraints, which determine the scope of production possibilities open to each.

It is well known that the vector of labor values for produced commodities in this economy is $\Lambda = L(I-A)^{-1}$. It is not surprising that one can prove that at a reproducible solution in the precapitalist subsistence economy total time worked is precisely $N\Lambda b$; that is, precisely *socially necessary labor time* in the Marxian sense. (Λb is the labor embodied in subsistence needs and is defined as socially necessary labor.) This is because there is no surplus produced.

The following is a dichotomous description of reproducible solutions that occur. Either such a solution is *egalitarian*, when each producer works exactly time Λb at the equilibrium, or the solution is *inegalitarian*, when some work less than Λb and others must, therefore, work longer than Λb .

Consider an inegalitarian solution in an economy with two producers. At the solution, Mr. i works more than Λb , and Ms. j works less than Λb . Then j is exploiting i , in the sense that she is able to work less than socially necessary labor time because i is working more; somehow, i is working "for" j , and i 's surplus labor time is transferred to j through

the market. Suppose j killed i and took i 's endowment and then tried to reproduce herself in the economy where only she existed; she would then have to work time Δb to reproduce herself. Thus, j is able to work less than socially necessary labor time (when i is present) because i is there; she is somehow expropriating labor from i . Thus this exploitation can exist even though there is no surplus and no institution for labor exchange. The institutions of the model that produce exploitation are competitive markets and differential private ownership of the means of production, which is to say, differential financial capital. While Marx could produce a theory of exploitation appropriate when the institution of labor exchange was noncoercive, we can produce a theory of exploitation, defined as the expropriation of labor, even in the absence of an institution for labor exchange. Exploitation can be mediated entirely through the markets for produced commodities.

This forces a reconsideration of the classical Marxist claim that exploitation takes place primarily in the labor market and in the extraction of surplus labor at the point of production. Indeed, the chief culprits seem to be competitive markets and private property in the means of production. The advent of a labor market does enrich our understanding of exploitation, however, since it brings about a decomposition of society into classes, which do not exist in the model described thus far.

2. THE LABOR MARKET AND THE EMERGENCE OF CLASS

It is not intended that the foregoing model describe actual pre-capitalist history; it is a hypothetical inquiry into the logical prerequisites for a general theory of exploitation. I continue by introducing next a labor market. On Labor Market Island, producers are still operating a subsistence economy, availing themselves of a common technology, and working only long enough to provide the funds to purchase their common subsistence requirement b , after replacing materials used up. They have, however, one more option than the inhabitants of the economy in section 1: they can hire or sell labor power. Another market has opened, which increases the opportunities of the producers. Now a producer must decide what vector of activities to operate himself, what vector of activities to hire others to operate on his funds, and what amount of labor power to sell on the labor market.

Let:

x^v = the n -vector of activities that producer v operates himself
(there are n processes in the Leontief matrix)

y^v = the n -vector of activities he hires others to operate

z^v = the amount of labor time he sells.

The producer's optimization problem is now to choose a production plan that will minimize the total labor he expends (in his own shop plus on the labor market), subject to the financial constraint that the production inputs he requires to operate activities himself and to equip those whom he hires can be paid for out of his current wealth. The structure of the problem is the same as in the first economy (without labor market) except now there is a labor market.

Formally, the program for producer v is represented thus. Facing a price-wage vector (p, w) , producer v chooses

$$(x^v, y^v, z^v) \text{ to min } (Lx^v + z^v)$$

subject to

$$p(I-A)x^v + (p-(pA+wL))y^v + wz^v \geq pb \quad (2.1)$$

$$pAx^v + pAy^v \leq p\omega^v \quad (2.2)$$

$$Lx^v + z^v \leq 1 \quad (2.3)$$

The three terms on the left-hand side of inequality (2.1) are the net incomes from operating activities oneself in one's own shop at activity levels x^v , hiring others to operate activities at levels y^v , and selling labor power in amount z^v . The inequality states that this total net income must be sufficient to purchase subsistence b at going prices. Inequality (2.1) is the capital constraint. (Note wages are paid at the end of the period, by convention, and need not be advanced from capital.) The program directs the producer to minimize the time he works, subject to these constraints.

The definition of a reproducible solution, an equilibrium for this model, is analagous to before. A price and wage vector equilibrates the system if, when all producers optimize, aggregate production is feasible, global reproducibility is achieved, and the labor market clears. That is, the markets for inputs and consumption goods all clear. Formally, a reproducible solution is a price vector (p, w) , and an optimal solution (x^v, y^v, z^v) for each producer, such that when $x = \sum x^v$, $y = \sum y^v$, and $z = \sum z^v$:

- | | |
|---|----------------------------|
| (1) $A(x+y) \leq \omega \equiv \sum \omega^v$ | (production feasibility) |
| (2) $(I-A)(x+y) \geq Nb$ | (reproducibility) |
| (3) $Ly = z$ | (labor market equilibrium) |

Inequality (1) states that total production input demand can be satisfied from existing aggregate stock; inequality (2) states that total net output is sufficient to satisfy all consumption demand; and equation (3) states that the demand for labor equals the supply of labor so that every producer is able to realize his desired offer of labor power on the labor market.

At a reproducible solution, society works, as before, precisely $N\Lambda b$ labor time in total, just aggregate socially necessary labor time. Thus, at an egalitarian solution, society is divided into two groups of agents: the exploited, who work longer than Λb , and the exploiters, who work less than Λb . (There may also be some agents who are neither exploiters nor exploited, but work precisely Λb , socially necessary labor time.)

But there is a second decomposition of producers in this economy, a decomposition into *classes*. In the model of section 1, all producers are of the same class and relate to the means of production in the same way. In this model, however, producers can relate to the means of production in different ways; they can work in their own shop, hire labor, sell labor, or do some combination of these. Indeed, how he relates to the buying and selling of labor power defines an agent's class position. Schematically, this is represented as follows. To optimize, a producer chooses a long vector of the form $\langle x^V, y^V, z^V \rangle$ where x^V , y^V , and z^V are defined as above. We may represent a producer's optimal solution as a sequence of plus and zero symbols, such as $\langle 0, +, 0 \rangle$. If a producer has an optimal solution of the form $\langle 0, +, 0 \rangle$, that means he optimizes by making $x^V = 0$ and $z^V = 0$, but $y^V > 0$; that is, he optimizes by only hiring labor power, but not by working for himself or by selling labor power on the market. The particular sequence of pluses and zeroes defines the producer's *class position*. Thus, we might call a producer possessing an optimal solution of the form $\langle 0, + 0 \rangle$ a pure capitalist, as he optimizes by only hiring others.

There are, altogether, eight possible class positions, as there are eight ways of arranging pluses and zeroes in the three places in $\langle, , \rangle$. It can be proved, however, that every producer, at an equilibrium, is a member of precisely one of five classes (see table 1). The reader should check back against the definitions of x^V , y^V , and z^V to see the motivation for the names. The agricultural labeling is provided as well, because it coincides with the analysis Mao Zedong gave of the class structure of the Chinese countryside in his 1925 pamphlet.⁴

By optimizing against a wealth constraint, each producer has placed himself in one of these classes. Class position is endogenous to the model; we are not told before the action begins who is a capitalist and who is a proletarian. That emerges as a consequence of the individual's behavior facing competitive markets.

The first theorem relates a producer's class position to his wealth. It asserts that if we list all agents from richest to poorest, then they will

4. Mao Zedong, "Analysis of Classes in the Chinese Countryside," *Selected Readings of Mao Tse-Tung* (Peking: Foreign Languages Press, 1964).

TABLE 1

CLASS STRUCTURE ON LABOR MARKET ISLAND

		$\langle x^v \ y^v \ z^v \rangle$	
(landlord)	1.	$\langle 0 \ + \ 0 \rangle$	pure capitalist
(kulak)	2.	$\langle + \ + \ 0 \rangle$	small capitalist
(middle peasant)	3.	$\langle + \ 0 \ 0 \rangle$	petit bourgeois
(poor peasant)	4.	$\langle + \ 0 \ + \rangle$	mixed proletarian
(landless laborer)	5.	$\langle 0 \ 0 \ + \rangle$	proletarian

fall into classes in precisely the order indicated in table 1. The richest are pure capitalists, then come small capitalists, the petite bourgeoisie, the mixed proletarians, and, at the bottom of the wealth hierarchy, the proletarians. In fact, the proletarians are precisely those with no produced assets (zero wealth), those who have nothing to trade but their labor power (and nothing to lose but their chains). Thus, the classical ordering of classes by wealth is a theorem of this analysis, not a postulate or a definition.

The second theorem, which I call the Class-Exploitation Correspondence Principle (CECP), relates the two decompositions of society: the decomposition of society into exploiters and exploited and the decomposition of society into classes. The CECP states that *every agent who is in a labor-hiring class (classes 1 or 2) is an exploiter, and every agent who is in a labor-selling class (classes 4 or 5) is exploited*. The exploitation status of members of the petite bourgeoisie is ambiguous. (This turns out to be equivalent to the transformation problem, but that topic is beyond the scope of this survey.) Thus, we prove another classical Marxian idea—that the selling of labor power is associated with being exploited and the hiring of labor power with being an exploiter.

The CECP may strike some as obvious or trivial, but I must insist this is not the case. We are used to defining exploiters as those who hire labor power and the exploited as those who sell it. But in this analysis, both exploitation status and class status emerge endogenously from agents' optimizing behavior, given their differential wealths. An individual is exploited if at the equilibrium he works more time than is socially necessary, Δb , and he is an exploiter if he works less

than Λb . An individual's class position is defined by the relation to the labor market he has chosen in his labor-minimizing optimization. It is not a trivial statement to demonstrate a relationship between the two endogenously determined classifications. In this sense, the present analysis provides a foundation for the Marxian theory of exploitation and class, as it produces our intuitive conclusions about those concepts from prior institutional and behavioral specifications of the agents.

It is important to note that producers choose their own class position. Their problem is to optimize, in this case a labor-minimizing program of production choices, subject to a capital constraint. All that is specified a priori is the optimizing behavior of agents and their differential initial endowments of capital stock. Given this, some producers must hire labor power to optimize (the two top classes) and some must sell labor power to optimize (the two bottom classes). Compulsory labor hirers necessarily emerge as exploiters and compulsory labor sellers as exploited. This result is derived entirely from the differential distribution of endowments and therefore of wealths. (In particular, if all producers had the same wealth at a reproducible solution (p, w) then there would be no exploitation, and they would all be members of the *petite bourgeoisie*.) Optimization on competitive markets and differential ownership of the means of production result in producers sorting themselves into classes, with the classical association between exploitation and class.

In the economy described in section 1, I showed that exploitation emerges logically prior to the production of a surplus and prior to any institution for labor exchange. When a labor market is introduced, we generate not only exploitation but a class structure that relates to exploitation and wealth in the way it should, still without any surplus production. Although an institution for labor exchange was not necessary to produce exploitation, it does appear necessary to generate classes. In this sense, perhaps, the labor market is central to Marxian analysis. I next extend the heresy of section 1 by showing that even the Marxian class structure can be produced without any institution for labor exchange.

3. THE FUNCTIONAL EQUIVALENCE OF LABOR AND CREDIT MARKETS

Imagine that instead of opening a labor market as a way of broadening choices in the original subsistence economy of section 1, a credit market is opened. On Credit Market Island, we have the subsistence economy, with markets in all produced goods, plus one more market, whose price is an interest rate and on which agents can borrow or

lend finance capital. On Credit Market Island, there is, however, no labor market. Thus, a poor producer, who has few production options open to him because of his limited finance capital, can borrow more capital at the going interest rate to expand his production possibilities. As before, the goal of our typical agent is to minimize the labor he performs, subject to the constraint that he produce net exchange value sufficient to purchase his subsistence needs and that he finance production out of his capital plus loans. The poor agent who borrows capital will have to pay back interest, too, of course.

An equilibrium price vector now consists of commodity prices and an interest rate that clear all markets: the market for production inputs, the market for trades in final output against subsistence needs, and the credit market. As before, it can be proved that at an equilibrium, a reproducible solution, total labor time expended is just $N\Lambda b$. Thus, either a solution is egalitarian, when each worker works just socially necessary labor time Λb , or it is inequalitarian, when society is decomposed into exploiters working less than Λb and exploited working more than Λb .

There is also a class structure in this model. On Credit Market Island, there are several ways a producer can relate to the means of production: he can work borrowed capital, work his own capital, or lend his capital to others, or he can do some combination of these three things. Let, at given prices:

x^v = the vector of production activities that producer v operates using his own capital

y^v = the amount of capital (a number) that v chooses to lend others

z^v = the vector of activities that v operates on borrowed capital.

An optimal solution for producer v , facing prices p and interest rate r , is some long vector $\langle x^v, y^v, z^v \rangle$. We can schematically denote a solution as a sequence of pluses and zeroes. For example, producer v may optimize by choosing a solution of the form $\langle 0, +, 0 \rangle$, which means he is a pure lender, since $x^v = z^v = 0$ and $y^v > 0$.

It is proved that each producer, at a reproducible solution, belongs to precisely one of five classes (see table 2). Comparing table 2 to table 1, we find that the class structure appears formally identical. As on Labor Market Island, the ordering of the five classes on Credit Market Island, as presented in table 2, is faithful to the wealth ordering. Moreover, the Class-Exploitation Correspondence Principle holds on Credit Market Island in that any member of a lending class (class 1 or 2) is necessarily an exploiter, and any member of a borrowing class (class 4 or 5) is exploited.

TABLE 2

CLASS STRUCTURE ON CREDIT MARKET ISLAND

	x^v	y^v	z^v	
1.	<0	+	0>	big lender
2.	<+	+	0>	mixed lender
3.	<+	0	0>	neither borrower nor lender
4.	<+	0	+>	mixed borrower
5.	<0	0	+>	pure borrower

But a stronger statement can be made. The economies on the two islands are isomorphic. Suppose the inhabitants of Credit Market Island and Labor Market Island are identical, and their technologies and subsistence needs are identical. Each agent on one island has a twin on the other with the same endowment as himself. The only difference between the islands is that on one the labor market operates and on the other the credit market operates, in addition to the markets for produced goods. Let there be a reproducible solution on Labor Market Island, entailing a price-wage vector (p, w) . Then there is a companion reproducible solution (p, r) on Credit Market Island, such that every agent on one island works precisely as long as his twin on the other island and is, therefore, exploited or exploiting to the same degree. Also, each pair of twins occupies identical class positions on the two islands, according to the class definitions of tables 1 and 2. In class and exploitation properties, the two solutions are isomorphic; the credit market and the labor market are functionally equivalent. We can thus produce the highly articulated class structure usually associated with a labor market, with no institution for labor exchange, and using just a credit market. The heresy is complete. Not only does exploitation emerge logically prior to accumulation and institutions for labor exchange, but so does the articulation of exploitation into class.

It is worth modifying a venerable neoclassical adage at this point. On Labor Market Island, capital hires labor. On Credit Market Island, labor hires capital. The adage in question states, "it doesn't matter whether labor hires capital or capital hires labor in a competitive model." Truly, this is so, but it is our modification that the wealthy

exploit and the poor are exploited in either case. The neoclassical adage is often interpreted as implying there is nothing nasty about capital hiring labor, since labor could just as well hire capital. My conclusion, on the contrary, is that labor can be just as exploited if it hires capital as it is if it is hired by capital. The key question is the wealth position of the laborer and not which market is used.

4. SUMMARY: EXPLOITATION VERSUS ALIENATION

The models thus far show that if producers have differential ownership of the means of production then a regime of competitive markets is sufficient to produce the exploitation and class characteristics of capitalism as predicted by classical Marxism. It is more enlightening, perhaps, to emphasize what is *not* necessary to produce this result, namely, an institution for the exchange of labor. Exploitation can be mediated entirely through the exchange of produced commodities, and classes can exist with respect to a credit market instead of a labor market—at least at this level of abstraction.

In this analysis, coercion is still necessary to produce Marxian exploitation and class. However, it suffices for the coercion to be at the point of maintaining property relations and not at the point of extracting surplus labor directly from the worker. Although coercion in the work place exists also in capitalism, such coercion is of secondary importance in understanding exploitation and class. It is a mistake to elevate the struggle between worker and capitalist in the process of production to a more privileged position in the theory than the differential ownership of productive assets.

These results thus force a re-evaluation of the classical belief that the labor process is at the center of the Marxian analysis of exploitation and class, a belief that has become even more prominent since the pioneering work of Braverman.⁵ I have demonstrated that the entire constellation of Marxian “welfare” concepts can be generated with no institution for the exchange of labor. Furthermore, this has been done at the level of abstraction at which Marxian value theory is customarily performed. Just as Marx wanted to explain as much as possible about exploitation and class with the assumption of competitive markets, so I have tried to explain as much as possible without invoking the necessary existence of labor exchange.

To put the matter more sharply, this analysis challenges those who believe that the process of labor exchange is the critical moment in

5. Harry Braverman, *Labor and Monopoly Capital* (New York: Monthly Review Press, 1974).

the genesis of capitalist exploitation. Such a position cannot be maintained at the usual level of abstraction at which Marxian value theory is done. In particular, such a position would have to invoke critical differences between labor and credit markets. Certainly there are such differences; labor markets require supervision^x on the factory floor, while credit markets require collateral^x, and these two enforcement costs may differ. Furthermore, economies of scale enter differently in the two markets, for one capitalist can hire many workers and expand production indefinitely, but one worker cannot expand production indefinitely by borrowing a lot of capital.⁶ Informational constraints enter differently, also, in a less abstract picture of Credit Market Island and Labor Market Island. In short, there may well be reasons to focus on the labor market as a key moment in the genesis of capitalist exploitation and class. However, these reasons do not exist at the level of abstraction of classical Marxian value theory. A Marxian theory of class that gives priority to the labor market depends on the existence of transactions costs, economies of scale, information, risk.

A misplaced emphasis on the labor process can lead to a faulty, or at least a nonmaterialist, analysis. If, for instance, we observe that the labor process appears much the same in existing socialism as it does in capitalism, we might conclude that the exploitation of workers in existing socialist countries is essentially the same as in capitalist countries. This is, indeed, the inference of many Marxists who see the labor process and industrial democracy, rather than property relations, as the defining characteristics of the mode of production. A distinction needs to be made between *alienation* and *exploitation*. Workers may always feel alienated, to some extent, in a labor process that employs the detailed division of labor, one-man management, and so on, but whether exploitation exists (or whether, more precisely, it is capitalist exploitation) is another matter. There is not a one-to-one correspondence between regimes of property relations and organizational forms of work. When two different regimes give rise to similar organizational work forms, it is the property relations that define the nature of exploitation and surplus extraction, not the organizational work forms, which define the nature of alienation. The labor process approach, however, takes the organization of work as the touchstone for passing judgment on a form of economic organization. It thereby elevates

6. However, many workers could get together and take out a loan to run a factory, thus availing themselves of economies of scale by using the credit market. Why are there not more worker-owned firms under capitalism?

alienation in work to a higher analytical plane than the relations of exploitation.

Capitalist exploitation is the appropriation of the labor of one class by another class, realized because of their differential ownership of or access to the nonhuman means of production. This can be accomplished, in principle, with or without any direct relationship between the exploiters and the exploited in the process of work. One might argue that there is exploitation without alienation in the economy of section 1, since each producer is in control of the labor process in that economy, that is, each producer works for himself in his own shop. Conversely, as we know, capitalist exploitation can be eliminated, with or without eliminating relations of authority (and thereby alienation?) in the process of work. Given this muddy relationship between the organization of work (alienation) and property relations (exploitation), is one of these two criteria more relevant than the other for understanding the laws of motion of society? Historical materialism directs us to emphasize property relations (exploitation) as the more relevant. Historical materialism may be incorrect in so doing, but one must at least understand the implications of taking the other approach.

5. EXPLOITATION IN AN ACCUMULATION ECONOMY

Thus far, the analysis has been of subsistence economies. The next task is to consider an economy in which accumulation is the goal. In this section, I summarize briefly the treatment of exploitation in the model with accumulation, for it provides a definition of exploitation that is not only independent of any subsistence concept but is also independent of the subjective preferences of agents. This last I take as a requirement of a Marxian theory of exploitation, for whether a worker is exploited or not should not depend on what he chooses to do, if he has some choice, but should rather be an objective feature of his situation. The definition of exploitation provided here is more realistic for advanced capitalism, where workers in fact do choose to consume different bundles and are not limited to subsistence in any meaningful sense.

In the accumulation economy, all agents want to maximize their revenues. As in the subsistence economies, agents differ only in their endowment of produced goods and hence, their wealths. An agent's wealth constrains his choice of production activities, as he must finance the costs of production from his initial wealth. Assume there is a labor market. (We could just as well use a credit market.) At an equilibrium, producers choose to be in one of various classes, as before, defined by their relationship to the hiring or selling of labor power. How do we

define exploitation? Look at the revenues of a particular producer, which we shall call Π^v . These revenues come from various sources—profits and wages. Consider all possible bundles of goods that producer v can purchase with Π^v and evaluate the embodied labor time of each of these bundles. If the maximum of these embodied labor times is less than the amount of time producer v worked, then I shall call him exploited. If the minimum of these embodied labor times is greater than the amount of time he worked, then he is an exploiter. To put the case generally, an exploited producer is one who cannot possibly command as much labor value, through the purchase of goods with his revenues, as the labor he contributed in production, and an exploiter is one who unambiguously commands more labor time through goods purchased no matter how he dispenses his revenues. This is a generalization of the classical Marxian definition that the worker is exploited because the labor he expends is greater than the labor embodied in the only bundle he can feasibly purchase (and stay alive), his subsistence bundle.

Notice this definition is independent of any subsistence concept and also is independent of what bundle a worker actually chooses to consume. We do not call a producer exploited if he happens to like cantaloupes, which have a low embodied labor time but a high price (let us say); he is only exploited if there is no way he can possibly command, through his purchases of goods, labor value equal to his contributed labor.

Because an agent is only classified as exploited if he necessarily commands less labor power through purchases than he worked, and an agent is only classified as an exploiter if he necessarily commands more labor power through his purchases than he worked, there will in general be a large "gray area" of agents, who are neither exploiters nor exploited. If an agent can purchase some bundle embodying more labor than he worked and another bundle embodying less labor than he worked, then he is in the gray area, and if equilibrium prices are not proportional to labor values, there will be an interval of wealths corresponding to agents in the gray area. Because of the gray area, the Class-Exploitation Correspondence Principle for this model is a more delicate question than in the subsistence model. Will it necessarily be true that every member of a labor-hiring class is an exploiter and every labor-seller is exploited? Equivalently, will the gray area of agents be entirely contained in the class $(+, 0, 0)$ of petite bourgeoisie? It is a remarkable fact that this theorem is true.

The definition that has been proposed for exploiters and exploited in the accumulation model makes the group of exploited and the group

of exploiters as small as possible. Nevertheless, every agent who optimizes by hiring labor power is in the (small) group of exploiters. Alternatively, one could define the exploitation status of an agent by examining the labor embodied in the bundle he actually chooses to purchase. An exploited agent is one who chooses a bundle embodying less labor than he worked, an exploiter is one who chooses a bundle embodying more labor than he worked. I have already noted my objections to this more subjective definition of exploitation status. But for those who prefer it, notice that under this definition a fortiori the Class-Exploitation Correspondence Principle is true as well, for the group of exploiters and exploited will each be strictly larger than under the more objective definition. Thus, the verification of the Class-Exploitation Correspondence Principle based on the definition of exploitation that is independent of subjective preferences is the strongest possible verification we could ask for, as it gives rise to the largest possible gray area.

Notice the role the CECF now plays. Although its formal appearance is as a theorem, its epistemological role is as a postulate. We seek to construct models that allow us to prove this principle. The deep theory of Marxism says the correspondence between exploitation and class should hold, and this directs our choice of models to allow the theory to be verified.⁷ In the next section, we see the CECF again plays a role in directing our choice of model.

6. THE DEPENDENCE OF LABOR VALUE ON PRICE

Until this point, it has been assumed that the technology producers face is a Leontief input-output matrix. This enables an unambiguous definition of the vector of embodied labor times Λ , hence of socially necessary labor time Λb , and hence of exploitation. A generalization is now in order to allow production sets to be more general than Leontief matrices. This can be accomplished but with some startling results for the venerable debate on the relationship between labor values and prices.

Marxian value theory has been generalized to a production environment of the von Neumann activity analysis by Morishima⁸ and to a general convex production set (constant or decreasing returns to scale) by myself.⁹ The importance of these generalizations is that they show

7. For more on the relationship between a theory and its models, see John E. Roemer, *Analytical Foundations of Marxian Economic Theory* (New York: Cambridge University Press, 1981).

8. Michio Morishima, "Marx in the Light of Modern Economic Theory," *Econometrica* 42 (1974): 611-32.

9. Roemer, *Analytical Foundations*, chap. 2.

the Marxian concepts of embodied labor time and exploitation are robust in technologies that are sufficiently general to include fixed capital, differential turnover times, and the like. Marxian value theory can be done in production models as general as the usual neoclassical analysis uses. The question posed by the previous sections is: Does the Class-Exploitation Correspondence Principle hold in an economy with one of these more general production sets? This is not a question of generalization for its own sake. The Leontief technology is terribly special, and a theory that is only true for that technology is a fragile theory.

To answer this, I study an economy where the production set is simply defined as constant returns to scale (a convex cone). This includes the von Neumann model as a special case; it also includes production with substitution, such as the neoclassical production function (Cobb-Douglas, for example). To define exploitation, we require first a definition of embodied labor time, for it is by looking at the embodied labor time of the bundle of goods that the producer can purchase that we can decide his exploitation status.

The standard definition of embodied labor time for general production sets is as follows.¹⁰ We start by defining the labor embodied in a given bundle of commodities, c . To do this, scan the entire production set for all possible ways of producing c as a net output. Among all these ways, choose the one that minimizes direct labor used. Define that amount of labor as the embodied labor of c . Once labor embodied is defined, exploitation can be defined as in section 5. An agent is exploited if the labor embodied in the bundles of goods he can purchase is unambiguously less than the labor he expends in production. In the various sources cited, it is shown that if this definition of embodied labor time is chosen, then the so-called Fundamental Marxian Theorem is true, the equivalence of positive exploitation and positive profits. Epistemologically, this has been taken by many (including myself) to indicate the "correct" nature of the definition of embodied labor time in the general model.

Here is the rub. *If we adopt the Morishima definition of labor value for the general technology, then the Class-Exploitation Correspondence Principle is, in general, false.* Are we to conclude that the CECP is so frail that it holds only for one very special technology, the Leontief one? In particular, does the CECP fail with fixed capital? This would, indeed, be a blow to the Marxian theory of exploitation and class.

10. This definition is presented in detail in Morishima, "Marx in the Light," and in *ibid.*

There is a way out, which entails choosing a different definition of embodied labor time. Assume we are at an equilibrium, which is to say, we know prices. To calculate the labor embodied in the given bundle c , do not scan the entire production set for ways of producing c as net output. Instead, limit the scan to those processes that produce c as net output and that achieve the maximal profit rate, at going prices. (Recall, for instance, that many processes in the von Neumann model will not be profitable at a particular price vector and hence would be ineligible in our evaluation of the labor value of c .) Define the labor value of c as the minimum amount of direct labor used in producing c , minimized over the set of maximally profitable processes. This generates a definition of exploitation for which the CECF is true in the general constant returns to scale model of production.

Now for the heresy. Notice that in this definition of labor value, that labor value depends on price. We can only decide which processes are maximally profitable if we first know equilibrium prices. In particular, the same economy (that is, one set of data) may support different equilibrium price vectors, each one generating different embodied labor values of commodities, as they each pick out different processes as maximally profitable.

Orthodox Marxism sees labor value as existing logically prior to price. A recent revisionist position states that labor value does not exist logically prior to price but that prices and labor values have a common ancestor.¹¹ Now I am forced to claim that prices emerge logically prior to labor values. If we wish to preserve the CECF, we must adopt the definition of embodied labor time that depends on price. The Fundamental Marxian Theorem was not a sufficiently discriminating tool to enable us to see this, but the Class-Exploitation Correspondence Principle is.

With hindsight, we can observe that the new price-dependent definition of embodied labor corresponds quite nicely to some ideas of Marx. Value, he claimed, was a concept that depended on the market and on commodity production. While the Morishima definition of value is a purely technological one, the new definition is market dependent. Socially necessary labor time is the time required to produce commodities by capitalists, who will only employ profitable processes, not time that is simply technologically feasible for the production of the commodities. Labor value thus adheres specifically to

11. See Ian Steedman, *Marx after Sraffa* (London: New Left Books, 1977); Michio Morishima, *Marx's Economics* (Cambridge: Cambridge University Press, 1973); and Roemer, *Analytical Foundations*.

capitalist commodity production under this definition, not to an abstract concept of technological production feasibility.

The epistemological role of the Class-Exploitation Correspondence Principle must again be emphasized. In trying to preserve this principle in a general model of production, we are led to a new definition of labor embodied in commodities, which necessarily depends on equilibrium prices. If we wish to preserve the fundamental relation between exploitation and class status, there is no choice but to make labor value depend on price. Although the formal appearance of the CECP is as a theorem, its informal role is the other way around—to direct us to choose definitions that will preserve it as a theorem. To use Lakatos's term, the dependence of labor value on prices is a "proof-generated definition."¹² Furthermore, the ability of the CECP to discriminate between the two definitions of embodied labor time increases our understanding of the theory of price and value. For this very reason, the CECP is a much more powerful concept than the so-called Fundamental Marxian Theorem with respect to the theory of value.

The implication of this result for those who continue to insist on the logical priority of labor values over equilibrium prices is, I think, devastating. Value is a concept useful in a theory of exploitation, but irrelevant as a theory of price, at any level of abstraction.¹³

7. WHY A LABOR THEORY OF EXPLOITATION?

Why do Marxists choose labor power as the numeraire commodity for defining value and exploitation? This is another venerable question in Marxian economics, and one upon which the CECP can again offer some insight. Neoclassical economists, for example, frequently ask why not choose corn or oil as the value numeraire?

First, it must be pointed out that Marx was completely wrong about one thing. Labor power as a commodity is not unique in its magical property of producing more value than it embodies. Indeed, in an economy capable of producing a surplus, any commodity has this magical property. If we choose corn as the value numeraire and calculate embodied corn values of commodities and the embodied corn value of corn, we can prove that the economy is capable of producing a surplus if and only if corn is exploited, in the sense that the corn value of a unit of corn is less than one.¹⁴ There is absolutely nothing special about labor power in this regard.

12. Imre Lakatos, *Proofs and Refutations* (Cambridge: Cambridge University Press, 1976).

13. This point is pursued in Roemer, *Analytical Foundations*, chap. 7.

14. A published proof of this appears in Roemer, *General Theory*, app. to chap. 6; and in

A second reason for choosing labor power as the value numeraire might be our interest in studying the history of people and not of corn. But this reason is superficial, because we could study the relations among people by studying their relation to corn. For instance, we could classify producers as corn exploited if the amount of corn value they can command through goods they purchase is less than the amount of corn they contributed to production, analogous to the definition of labor exploitation. This will provide a decomposition of society into exploiters and exploited. Thus our interest in the history of society or labor is not sufficient to mandate a labor theory of value.

Consider this modification of the model employed thus far. Assume producers differ not only in their endowments of produced goods but in their endowments of labor power as well. All labor is homogeneous, but some producers have the capacity to deliver^x more of it than others. (This is a crude way of capturing skill differentials.) Is the CECF true in this model? Yes. Labor sellers are exploited and labor hirers are exploited. What fails, however, is the correlation between exploitation status and wealth. There may be very wealthy and skilled producers who sell labor power and are exploited, and there may be poor, unskilled producers who hire labor and are exploiters. A skilled, wealthy architect or a rich surgeon may be exploited in this model.

What is needed to produce a "proper" theory of exploitation, by which I mean a theory that classifies the poor as exploited and the rich as exploiters, is a commodity that is uniformly distributed among the population. Now, according to the Marxian theory of capitalism, there is just one such commodity, and that is labor power. No produced commodity is uniformly distributed, since proletarians are dispossessed of all produced productive assets. Furthermore, labor power is indeed uniformly distributed, at least it may be appropriate to assume so for the study of capitalism at one level of abstraction. We assume, in other words, that agents differ only in their endowments of produced assets and not in their skills or labor power. (Workers are exploited under capitalism not because capitalists are especially skilled and endowed with entrepreneurial talent, but in spite of the fact that they are not.)

To complete the story, one need observe what the purpose of a theory of exploitation is. I take it as a theory that intends to explain class struggle. As Marxists, we look at history and see poor workers fighting rich capitalists. To explain this, or to justify it, or to direct

it and provide it with ideological ammunition, we construct a theory of exploitation in which the two antagonistic sides become classified as the exploiters and exploited. I have explained why labor power is uniquely suited as the numeraire for this task. If one believed that history was most fruitfully interpreted as the struggle of man against scarcity, rather than that of class against class, then another theory of value would be mandated, perhaps an energy theory of value in 1980 or a corn theory of value in 1800, whatever the scarce commodity is. Thus, different theories of history imply their respective theories of value, from which it follows that we would do better to debate our underlying theories of history than their corollary theories of value. There is nothing objectively correct about the labor theory of exploitation, in the sense of its being deducible from economic data. It is rather a particular theory of exploitation that corresponds to the interpretation of capitalism as a class struggle between poor workers and rich capitalists, which, according to historical materialism, is the most informative historical interpretation of capitalism.

In contrast, the choice of a *labor* theory of exploitation cannot be to explain the accumulation of capital, as is sometimes maintained. Such a claim would be sound if labor power were the only exploited commodity under capitalism. But as mentioned above, every commodity is exploited in a surplus-producing economy—labor power is not special in this regard, contrary to what Marx implied. The accumulation of capital can therefore be explained, as a technical fact, by choosing any commodity as value numeraire. But class struggle between proletarians and capitalists can only be explained by choosing labor as the value numeraire.

8. A GENERAL THEORY OF EXPLOITATION

In the previous section I claimed that the labor theory of value is the one to be adopted if one wishes to produce the decomposition of society into exploiters and exploited that corresponds to the class struggles of capitalism. In this section I characterize Marxian exploitation in another way, a way that makes clear what the ethical imperative of the theory is. That is, why do we choose, pejoratively, to call workers exploited? Why should the inability to command labor value in goods in an amount equal to the labor a producer expends be considered an exploitative transfer? The bourgeois thinker argues that the proletarian is gaining from trade, and his trade of labor power is voluntary, and so the transfer of "surplus" labor time should not be considered exploitative. The *quid pro quo* is surplus labor in exchange for access to the means of production. This is a serious objection, and

it is useful to clarify what one means by exploitation in general terms to understand the difference between Marxian and neoclassical views of exploitation. I shall outline below a general theory of exploitation that has various special cases of interest: feudal exploitation, neo-classical exploitation, Marxian exploitation, socialist exploitation, and status exploitation. Only the first three will be discussed in detail here, as the analysis of socialism is beyond the scope of this paper.

In virtually every society or economy, there is inequality. Yet not all inequality is viewed by a society as exploitative, or unjust. Certainly, however, the notion of exploitation involves inequality in some way. What forms of inequality does a particular society view as exploitative, and what forms does it not? The inequality of master and slave was viewed as nonexploitative in ancient society, as was the inequality of lord and serf in feudal society, although most inhabitants of the twentieth century consider both of these relationships exploitative. Similarly, Marxists view the inequality in the capitalist-worker relationship as exploitative, although this inequality is conceived of as nonexploitative by many people in capitalist society today. What device can be proposed that distinguishes accurately exploitative from nonexploitative inequality, according to the norms of a particular society?

To capture what is meant when it is said that a particular person or group is exploited, I propose that a group be conceived of as exploited if it has some *conditionally feasible alternative* under which its members would be better off. Precisely what is the alternative is left unspecified for the moment. The idea is that this device can be applied whenever people use the word "exploit" referring to the human condition. If two people disagree on whether a particular group is exploited in some situation, then our device leads us to ask if they are specifying the alternative for the group differently. I wish to propose different specifications of the alternative that will generate different definitions of exploitation.

Formally, this amounts to specifying a game played by coalitions of agents in the economy. A coalition can either participate in or withdraw from the economy. To define the game, I specify what any particular coalition can achieve on its own if it withdraws from the economy. Given these specifications, if a coalition can do better for its members by "withdrawing," then it is exploited.

This idea can be formalized using the idea of the core of a game, from the theory of cooperative games. We can specify the payoff or reward that each coalition would receive by "withdrawing" under hypothetical conditions. Under the conditions hypothesized, call this

payoff to coalition S in game v the amount $v(S)$. Now, in the economy as it exists, there is a certain distribution of income (or utility or whatever). We say that a coalition S is exploited if its payoff $v(S)$ is greater than what it currently receives in the actual income distribution. The *core* of a game is that set of income distributions for which no coalition is exploited; that is, an income distribution is in the core of game v if each coalition S , by taking its payoff $v(S)$, can do no better than it is currently doing. In game theory, we say S can "block" a distribution of income if it does better with payoff $v(S)$ than with its current income. A blocking coalition is an exploited coalition.¹⁵

As an example, consider the notion of the core of a private-ownership exchange economy. The private-ownership core is the set of allocations (say, of goods or income) upon which no coalition can improve should it refuse to participate in the society as a whole and given that it can take with it the original, private endowments of its members. Under these particular withdrawal rules, there is a certain class of distributions of goods available to any coalition. I say a coalition is exploited if it receives goods that can be dominated by some distribution that it could achieve after withdrawing with its own assets. If we adopt a different rule of withdrawal, that is, a different specification concerning the achievable rewards of the various coalitions on their own, we will have a different game and a different core.

15. More precisely, a coalition S is said to be exploited at an allocation if two conditions hold: (1) that S does better than at the current allocation by taking its payoff as specified by the characteristic function of the game; and (2) that the complement of S (called S') does worse than at the current allocation by taking its payoff. If the game is super-additive and the allocation under investigation is Pareto optimal, then condition (2) can be shown to follow from (1); hence, in the text above, I have mentioned only condition (1). What condition (2) does is assure us that if a coalition is exploited, then it is exploited by some other coalition; that is, S' is gaining (in the present allocation) at the expense of S . Without (2), this statement could not be made, and we would not have the exploitation of man by man, but (for example) of man by nature.

There are some situations where conditions (1) and (2) hold for a coalition S , but we do not wish to view S as exploited or S' as exploiting. For instance, let S' be a set of invalids, or of the aged, or of children, supported by S . According to the definition, one would consider the coalition of socially supported invalids to be exploiting the rest of society, under most rules of withdrawal. I will not pursue this problem here, but simply note the game-theoretic definition should be thought of as applicable in situations of arms-length economic transactions. One way to pre-empt the invalid example might be to require a third condition for exploitation, namely, (3) that S' be in a relation of dominance to S . Since dominance is undefined, and is as elusive a concept as exploitation, the addition of (3) is ad hoc, it seems, and reduces the sharpness of the game-theoretic characterization. (With respect to our earlier discussion domination exists at the point of maintaining property relations.)

This device captures the idea of exploitation as the possibility of a better alternative. Our proposal for what constitutes feudal exploitation and capitalist exploitation (and socialist exploitation) amounts to naming different specifications of withdrawal rules. We can then compare different concepts of exploitation by comparing the different rule specifications that define their respective games.

Feudal Exploitation

For a feudal economy, think of agents with various endowments, who are engaged in production and consumption under feudal relations. We say a coalition is feudally exploited if it can improve its lot by withdrawing from the economy and taking its own endowments. Thus, feudally nonexploitative allocations are the private-ownership core of the exchange game, as discussed above. This withdrawal specification correctly captures feudal exploitation because it gives the result that serfs are exploited and lords are exploiters. Moreover, non-serf proletarians, for instance, will not be a feudally exploited coalition, under these rules, and so the definition captures only feudal exploitation.

To support this conclusion, I will assume first that feudal serfs owned their own land. Feudal law required them to work the *corvée* and *demesne* not in order that they have access to the family plot, but in spite of this access. Thus, were a group of serfs to be allowed to withdraw from feudal society with their endowments, in which we shall include the family plots, they would have been better off, having the same consumption, but providing no labor for the lord. Withdrawal, under these rules, amounts to withdrawal from feudal bondage. It has also been argued that many serfs would have been better off withdrawing from bondage even without their land; surveillance of serfs was necessary to prevent them from running away to the towns, to which they could presumably carry only their nonland endowments. Indeed, one way capitalism improved over feudalism was to make such surveillance unnecessary; proletarians could not survive simply on their own endowments and so were forced to participate in a voluntary labor market.

A feudal ideologue might argue that serfs would not be better off by withdrawing with their own endowments, because they receive various benefits from the lord that they could not produce on their own. The most obvious of these is military protection. Also, he might argue, the lord possessed certain skills or abilities of organization of manor life, without which the serfs would be worse off. (Indeed, the story has a familiar ring.) I will not attempt here to rebut this argu-

ment.¹⁶ Let me simply observe that even were military protection necessary, the serfs' *corvée* labor produced a good deal more than that—witness the castles and extravaganzas of the lords. (One aspect of extravaganza was military adventure.) Furthermore, it can be maintained that large groups of serfs themselves possessed the requisite skills to organize military protection and to take advantage of other externalities and economies of scale accompanying manor life.

Capitalist Exploitation

To test whether a coalition of agents is capitalistically exploited, I specify a different set of withdrawal rules to define a different game. When a coalition "withdraws," it is allowed to take with it its *per capita* share of society's alienable productive assets, not its own private assets, as in the previous game. While the test for feudal exploitation amounts to eliminating feudal bonds in constructing the hypothetical alternative against which the current allocation is judged, the test for capitalist exploitation amounts to equalizing every agent's access to society's alienable property (means of production). For feudalism, we asked how well agents would do if relations of feudal bondage were abolished; under capitalism, we ask how they would fare if relations of alienable property were abolished. Given this phrasing of the alternative, it is not surprising that capitalist exploitation, as here defined, is equivalent to the usual Marxist definition of exploitation, which is in terms of socially necessary labor time and surplus value.

That, indeed, is the main theorem: capitalist exploitation is equivalent to Marxian exploitation, at least for simple models. Any producer or group of producers who is Marxian exploited, according to usual definition of surplus-value transfer, is capitalistically exploited, in that the producer or group in question could improve its income by withdrawing with its per capita share of society's alienable productive assets; conversely, any group or individual who is capitalistically exploited is Marxian exploited. To characterize capitalist exploitation in terms of an alternative egalitarian distribution of private property in the means of production captures precisely what Marxists mean by exploitation.¹⁷

16. See Douglass North and R. Thomas, *The Rise of Western Civilization* (Cambridge: Cambridge University Press, 1973), who maintain that serfs were not feudally exploited, in my sense; and Robert Brenner, "Agrarian Class Structure and Economic Development in Pre-industrial Europe," *Past and Present* 70 (1976): 30-71, for a rebuttal.

17. In the usual models, the game-theoretic and surplus-value characterizations of Marxian exploitation are equivalent. However, there are some important cases where the two definitions render different judgments on whether some groups are exploited. In these cases, I defend the

I would further argue that to characterize Marxian exploitation in terms of property relations is superior to doing so in terms of surplus value. The idea of property relations makes clear what is the ethical imperative when one speaks of exploitation in that it allows us to conceive^x of an alternative in which the proletariat (or the exploited coalition) has access to its per capita share of society's productive assets. We shall see shortly, in contrast, what the ethical imperative for a neoclassical economist is when he speaks of exploitation.

Just as the feudal ideologue argued that serfs would not have been better off had they withdrawn with their own endowments, so a bourgeois ideologue might argue that those who are Marxian exploited (that is, whose surplus value is appropriated by others) would not be better off were they to withdraw with their per capita share of society's produced goods. He claims, in other words, that the proletariat is not capitalistically exploited. He might argue that the surplus value workers contribute to the capitalist is simply in return for a scarce skill that the capitalist possesses and that is necessary for organizing production. In the models of Marxian exploitation discussed in this paper, this is not an issue, as capitalists are pictured as simply owning resources and not as the vessels of entrepreneurial talent. Nevertheless, the bourgeois argument is in principle a correct one; if equalization of produced assets^x would not be sufficient to make Marxian exploited workers better off on their own, then they are not capitalistically exploited. This is an important bone of contention^x between Marxist and bourgeois thinkers. I will call this the subtle disagreement on the existence of capitalist exploitation under capitalism.

Another disagreement, however, is much less subtle. A common neoclassical position, I believe, is that exploitation cannot be said to exist at a competitive equilibrium, because everyone has gained from trade as much as possible. How can one say *A* is exploiting *B* if *B* has voluntarily entered into and gained from trade with *A*? Now the models of Marxian exploitation referred to above show that *gains from trade and Marxian exploitation are not mutually exclusive*. The proletarian gains from trading his labor power, since otherwise he starves, but his surplus labor is nevertheless expropriated. What is at issue here is the difference between feudal and capitalist exploitation. The statement that no coalition can gain further from trade amounts to saying that the allocation is in the (feudal) core of the economy; no group of agents, withdrawing with its private endowments, can trade to a su-

property-relations approach as superior. (See John Roemer, "Property Relations versus Surplus Value in Marxian Exploitation," *Philosophy and Public Affairs*, forthcoming.)

perior allocation for its members. Hence, this variant of the neoclassical position says, "There is no feudal exploitation under capitalism," a statement that is indeed true since competitive equilibria lie in the core of the private ownership game.¹⁸

It is not always obvious whether objections to the Marxian notion of exploitation are of the subtle form (in which case there is a substantial disagreement about the contribution of agents' inalienable assets to production), or of the nonsubtle form (in which case there are two different varieties of exploitation under discussion). In the nonsubtle case, the antagonists are simply adopting different specifications for the hypothetical alternative to be used in testing for "exploitation." I would argue that the nonsubtle disagreement is quite prevalent. Indeed, if both antagonists agree that the hypothetical agents differ only in their ownership rights of produced goods, then the disagreement must be of the nonsubtle form. When a neoclassical economist says that the proletariat is not exploited by the capitalist because the latter requires a return to his capital (being, we insist, produced goods, not skills), he is also saying that ownership rights of produced means of production must be respected, and, therefore, the test for capitalist exploitation is not appropriate.

To be more precise in discussions of this nature, we should differentiate between the entrepreneurs and the rentiers among "capitalists." Entrepreneurs presumably earn a high return for their inalienable endowments, while rentiers earn a return only for their alienable endowments. If the capitalist class is predominantly composed of entrepreneurs, then the statement that "exploitation does not exist under capitalism," can be consistently interpreted as referring to capitalist exploitation; if the capitalist class is predominantly rentier, then such a statement could only refer to feudal exploitation.

There is, however, one most important piece of circumstantial evidence against the hypothesis that the prevailing disagreement about exploitation under capitalism is of the subtle variety. Prevailing ethical norms of liberal, pluralist social science accept private property in the means of production. (In contrast, they do not accept relations of personal bondage of either the slave or the feudal type.) Consequently, prevailing liberal philosophy cannot accept the test for capitalist exploitation just proposed, for that test nullifies property relations. Note that a proponent of the existence of capitalist exploitation would not judge all inequality under capitalism as being of the exploitative type. He

18. This is a well-known theorem of neoclassical economics. See, e.g., Hal Varian, *Microeconomic Analysis* (New York: W. W. Norton, 1978), p. 180.

would condemn only inequality that has its origins in capitalist exploitation and that could be eliminated by an egalitarian distribution of endowments of alienable resources. Differential reward to skill does not constitute capitalist exploitation.

I will, therefore, tentatively conclude that a fair summary of prevailing liberal opinion, which argues against applying the term *exploitation* to the idealized equilibria of a private-ownership market economy, is: "There is no feudal exploitation under capitalism." This is a true statement. Marxists would argue, however, that there is capitalist exploitation under capitalism, although—and this is critical—they would also argue that not all inequality would be eliminated by abolishing private ownership of the means of production.

Thus, the ethical imperative of feudal (or neoclassical) exploitation is to respect private property in the means of production while eliminating barriers to free trade—barriers of bondage, slavery, tariffs, and so on.¹⁹ This is what is implied by the private-ownership game. The ethical imperative of capitalist or Marxian exploitation is to eliminate other barriers to production and to income-generating activity—barriers that producers face as a consequence of their differential access to the alienable means of production.

This section has presented another reason for choosing the labor theory of value: the ensuing characterization of exploitation is equivalent to the property-relations characterization of capitalist exploitation in that both call for socialization of alienable productive assets. This is so in the sense that the Marxist surplus-value theory of exploitation is equivalent to capitalist exploitation, in which the ethical imperative is the pooling of alienable productive assets. Historical materialists contend, furthermore, that this imperative is not only ethical (some would say not at all ethical) but rather historical.

In this section I have briefly explained how both Marxist and neoclassical notions of exploitation can be seen as special cases of a more general approach to exploitation. A group is considered exploited with respect to a specific conception of alternative property relations. We can develop a formal conception of the alternative by using game-theoretic definitions. Nonexploitative allocations are those in the core of the game, and we vary the notion of exploitation by varying the payoffs of the game. This characterization of Marxian exploitation, which is in terms of property relations, is superior to the classical definition, which is in terms of surplus value, because it displays ex-

19. Exploitation due to monopoly, however, is not captured by the private-ownership withdrawal rule. That type of exploitation, which is of neoclassical concern, is qualitatively different.

plicitly the alternative that Marxists are comparing to capitalism, when they say proletarians are exploited.

Further Issues

Socialist Exploitation

A coalition is considered capitalistically exploited if it would be better off with access to its per capita share of society's alienable assets (means of production, resources). Note, however, that *inalienable* assets (skills) are not pooled in testing for capitalist exploitation. If capitalist exploitation were annihilated inequalities would continue to exist, due to differential inalienable assets possessed by individuals. This inequality I call socialist exploitation. A coalition is socialistically exploited if it could improve its lot by withdrawing with its per capita share of society's inalienable assets, once alienable assets are distributed equally. While carrying out such a redistribution of skills might be impossible, or at the least would involve formidable incentive problems, as a thought experiment the calculations can be made.

Socialist exploitation is supposed to exist in socialism, where people are to be paid "according to their work" and thus not in an egalitarian manner. The bourgeois argument is that what Marxists call capitalist exploitation is in reality socialist exploitation, that inequalities under capitalism are a consequence of competitive returns to differential skills.

If all individual endowments are of either the alienable or inalienable type, then a distribution of income is free of socialist exploitation when it is egalitarian. One should note how a certain classical conception of historical materialism is reflected in these definitions. The task of the bourgeois revolution is to eliminate only feudal exploitation, leaving capitalist and socialist exploitation. The task of the socialist revolution is to eliminate only capitalist exploitation. Each revolution eliminates the inequalities associated with its characteristic form of property (the feudal bond, alienable means of production, finally inalienable assets); the scope of assets that are allowed to be private becomes progressively narrower as history proceeds. Historical materialism asserts that forms of exploitation are eliminated in a certain order.

Status Exploitation

Yet much inequality in existing socialism is not of the "socialist" variety. In addition, remuneration is made according to status, where that status is not representative of a special skill. It is difficult to separate status from skill, but to the extent that special incomes attach themselves to certain positions, entirely independently of the skills

necessary to occupy those positions, I call the phenomenon status exploitation. Some people maintain that most inequality in existing socialist societies is of the status variety. Some maintain that it is of the capitalist variety, since bureaucratic status often gives its possessor some control of social capital.

Socially Necessary Exploitation

The withdrawal criteria proposed for testing the existence of the various forms of exploitation assume that incentives are unaffected by the new distribution of "property," whether it be alienable or inalienable property or property in position. If proletarians in early capitalism had withdrawn with their per capita share of capital, perhaps they would have been worse off than under capitalism, because of the alteration in incentives that would have accompanied socialization of the means of production. (Note, this is an entirely different argument from that of the bourgeois ideologue discussed earlier.) The test for exploitation should therefore be: if the coalition were to work just as hard after its "withdrawal," would it be better off (have more income)? If so, it is exploited, according to the particular exploitation concept in question. If, however, withdrawal altered incentives to the point that the coalition was worse off in terms of income (if not immediately, then soon), I refer to the exploitation as socially necessary. In general, Marxists believe early capitalist exploitation was socially necessary in this sense, and socialist exploitation is socially necessary in present-day socialism. Most bourgeois opinion maintains that capitalist exploitation is still socially necessary, that is, the abolition of private ownership in the means of production would render workers worse off due to failure of incentives of both capitalist and workers.²⁰

Increasing Returns to Scale

If an economy is characterized by increasing returns to scale, it may be that no individual would be classified as exploited by the game-theoretic test of withdrawal. Were any individual worker to withdraw with his share of the social assets, he would be worse off than at present because of the penalty he would pay for working alone. This problem can be resolved by speaking of the exploitation of suitably large coalitions of agents, not of individuals.

ON METHODOLOGY

It is still necessary, within Marxism, to argue for the usefulness of

20. These ideas are pursued more carefully in Roemer, *General Theory*, chaps. 7-9.

the analytical method, including the use of formal, mathematical models. A fundamentalist quarter continues to maintain that mathematics and models can only reify the essential social insights with which Marxism is concerned. I hope this paper (and its parent book) will not only provide some new insights into the questions of content with which Marxists are concerned but will present a methodological lesson of the usefulness of economic models, including the techniques developed by neoclassical economics. The two major tools that I have used are general equilibrium theory and game theory. Obviously, I do not believe use of these tools condemns my analysis, although it is also clearly true that not all questions of interest in Marxism can be attacked with these tools.

In this paper I have tried to summarize arguments without presenting the formalism, but I must emphasize that the development of these arguments would have been impossible (for me, at least) without formal modeling. Many will agree that formal models are a good language for convincing others of one's intuitions, because they are a language, that is, a commonly agreed upon standard of communication and rigor. What I claim, however, is that formal modeling is also useful in producing ideas. On a number of occasions, formalism led me to conclusions of which I had no prior inkling.

For example, in trying to demonstrate the Class-Exploitation Correspondence Principle for the general constant returns to scale technology, I was initially discouraged to discover the principle was false if one employed the Morishima definition of embodied labor time for the general technology. I eventually noticed, in a purely technical manner, that the crucial break in the proof could be repaired if I defined labor value after equilibrium prices were known. This discovery, then, was due in this instance to formal manipulation, although *ex post facto* I could find intuitive justification for the result.

More generally as well, the CECF played an important role in developing this theory. We chose models to make the CECF true. In doing so, we made a number of discoveries. We found, for example, that labor value depended on price. We found that exploitation depends neither on a subsistence concept nor on subjective preferences of agents. And we found a new argument for why and when labor is a good numeraire for a Marxian theory of exploitation. In each case, it was by examining the CECF and what happened to it when some aspect of the model was altered that led to a conclusion about the deep theory of Marxian economics. While the correspondence between class and exploitation is itself of interest, the point here is rather what we learn by forcing ourselves to construct models in which the corres-

pondence is maintained. The proof of an important theorem completes the circuit, as it were, and convinces us that the component parts are correctly built. It is for this reason that I say the epistemological role of the CECF is as a postulate, even though it appears as a theorem in the formal presentation.

I would like further to emphasize the superiority of the property-relations characterization of Marxian exploitation to the classical surplus-value characterization. The property-relations approach is superior for at least these following reasons.

It makes clear what the ethical imperative of the Marxian theory is, which the surplus-value theory does not. Although surplus value may also be produced under socialism and under feudalism, as well as under capitalism, the classical Marxian theory does not adequately distinguish among the different natures of surplus production in the three modes of production. For instance, because the classical theory does not adequately distinguish the different property relations under capitalism and socialism, some have argued that socialism must entail zero growth. The property-relations game-theory approach makes it completely clear that the production of a surplus under socialist relations of property cannot be construed as capitalist exploitation.

The property-relations approach also makes clear the link between the Marxian idea of exploitation and the idea of "unequal exchange" between countries. In particular, unequal exchange can be viewed as an instance of capitalist exploitation where the agents are viewed as nations, not individuals.²¹

Furthermore, the game-theory definition of capitalist exploitation generalizes immediately when heterogeneous labor and even many primary factors exist (such as land as well as labor). The test for capitalist exploitation remains identical: evaluate how well an agent or coalition can do if it withdraws with its per capita share of the nonhuman alienable assets. The surplus-labor theory of exploitation fails with heterogeneous labor, despite various attempts to save it. (Even if one disagrees with my diagnosis, it is uncontestable that the game-theory approach has the merit of much greater simplicity.) The surplus-labor characterization is useful only when capitalism is seen as a system with one primary factor, labor, which is homogeneous and equally endowed to all. With the property-relations characterization, Marxists are no longer forced to claim that capitalism actually looks like this special case, for the theory applies in a completely general environment.

21. The connection between the property-relations approach and unequal exchange is further developed in Roemer, "Labor Migration, Capital Flows and Unequal Exchange."

Thus, not only is the labor theory of value irrelevant as a theory of price, but its role in the theory of exploitation is superseded.

Most generally, the property-relations approach focuses on the differential ownership of the means of production as the culprit in capitalist exploitation, while the surplus-value approach focuses on the relations between agents (capitalist and worker) in a particular market and process (the labor market and process). I believe it is the ownership relations that are primary, with the particular markets and processes through which exploitation is mediated being somewhat incidental (as shown in sections 1, 2, and 3). Different regimes (capitalism, feudalism, and so on) are characterized by different property relations, and the kinds of exploitation characteristic of those regimes are best understood by taking the property-relations rather than the surplus-labor approach.

Only one set of conclusions from the general theory of exploitation has been explained in this paper. In *A General Theory of Exploitation and Class* I use the theory to develop a materialist analysis of the structure of inequality and class under socialism. In addition, I cast the major claims of historical materialism into the language of the general theory of exploitation and discuss the ethical posture of historical materialists toward the various kinds of exploitation, each of which in turn becomes important and the focus of class struggle, as history evolves.