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Source: *History and Theory*, Vol. 18, No. 2 (May, 1979), pp. 155-176

Published by: [Wiley](#) for [Wesleyan University](#)

Stable URL: <http://www.jstor.org/stable/2504754>

Accessed: 19/06/2014 23:30

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“THE HANDMILL GIVES YOU THE FEUDAL LORD”: MARX’S TECHNOLOGICAL DETERMINISM

WILLIAM H. SHAW

Technology discloses man’s mode of dealing with Nature, the process of production by which he sustains life, and thereby also lays bare the mode of formation of his social relations, and of the mental conceptions that flow from them.¹

The aggregate of productive forces accessible to men determines the condition of society.² Social relations are closely bound up with productive forces. In acquiring new productive forces men change their mode of production; and in changing their mode of production, in changing the way of earning their living, they change all their social relations. The hand-mill gives you society with the feudal lord; the steam-mill, society with the industrial capitalist.³

A specter is haunting Marxism — the specter of “technological determinism.” All the friends of old Marx, it seems, have entered into a holy alliance to exorcise this specter. Commentators of almost every stripe consider it wrongheaded to interpret Marx’s theory of history as one of technological determinism, and Marxists themselves — who otherwise disagree on so much — unite in condemning adherence to such a perspective as “vulgar” Marxism, a debased version of Marx’s true position. Some reject a technological-determinist rendering of Marx because of its technological emphasis, others because of its determinism. Such views are so widespread, especially as the expanding secondary literature on Marx increases in sophistication, that there is little use in naming names; the shoe fits many feet.

In what follows, I argue, against this stream of orthodoxy, for just such a technological interpretation of Marx. Although a full defense of Marx’s theory cannot be undertaken here, I do try to show that the view I have ascribed to him is not patently untenable. This is necessary, since those who resist the interpretation in question frequently do so because they feel it is obviously false and — loyal to Marx — do not wish to saddle him with it. Such charity is misplaced. No doubt, it makes Marx less contentious and more palatable, but the price is a less accurate — and less interesting — account of his theory of history. To concede, for instance, that the

1. *Capital*, Vol. I (London, 1970), V, 372 n.

2. *Collected Works* (Moscow, 1975-), V, 43.

3. *Ibid.*, VI, 166.

notion of a determining factor in history is incoherent and then to argue that Marx must have had something else in view is to kill Marx with kindness. Marx was surely concerned to say more than simply that technological factors ought not to be ignored by historians, or that everything is related to everything. I offer, by contrast, a more "fundamentalist" interpretation of Marx than many of his students have felt comfortable defending. But by simultaneously suggesting the extent to which Marx's technological perspective can be upheld against his critics, I believe that I have done him no disservice.

After discussing a few terminological matters, I shall proceed by citing some passages from Marx which underscore his allegiance to the thesis with which I am crediting him. Since some writers doubt, not that this is what Marx said, but that it is what he meant, I adduce considerations to show why it was natural for Marx to hold such a view. I continue this line of reasoning by arguing that a commitment to technological determinism is compatible with several of his important historical claims which have been thought inconsistent with it. Finally, I situate Marx's technological determinism within the more general framework of historical materialism and offer some remarks on the scientific evaluation of his technological thesis.

I

If investigation shows that Marx's technological determinism is far from the manifest absurdity it is often taken to be, then less need will be felt to rescue Marx from himself. Faulty conceptions of his position, however, have frequently been triggered by a misconstruction of the basic terminology of historical materialism. Marx's historical materialism and his technological-determinist thesis receive their classic formulation in a famous, but very compressed, passage from his "Preface" to the *Critique of Political Economy*. This reads in part:

In the social production of their existence, men inevitably enter into definite relations, which are independent of their will, namely relations of production appropriate to a given stage in the development of their material forces of production. The totality of these relations of production constitutes the economic structure of society, the real foundation, on which arises a legal and political superstructure and to which correspond definite forms of social consciousness. . . . At a certain stage of development, the material productive forces of society come into conflict with the existing relations of production. . . . From forms of development of the productive forces these relations turn into their fetters. Then begins an era of social revolution. The changes in the economic foundation lead sooner or later to the transformation of the whole immense superstructure.⁴

4. *A Contribution to the Critique of Political Economy* (London, 1971), 20-21.

As we shall see, the themes of this passage recur throughout Marx's corpus. Crucial to an understanding of Marx's theory of historical change and development, in all its different formulations, are the concepts "productive forces" and "relations of production."

Given the importance of these concepts, it is surprising that their meaning is not widely understood. Since a textually based explication of these two key concepts cannot be undertaken here, I must present rather dogmatically what I believe to be their most accurate interpretation and refer the reader elsewhere for a justification of it.⁵ Briefly, then, the productive forces include human labor-power and the means of production. Labor-power is the capacity to labor, the abilities upon which one draws in producing something. The instruments with which persons labor and the raw materials on which they work comprise the means of production. The forces of production, thus, are the basic elements of any labor process.

The relations of production, on the other hand, are the relations within which production is carried on; they link the productive forces with human agents in the process of material production. Production relations, essentially, divide into two types: work and ownership. These are, respectively, the actual technical relations which are materially necessary for production to proceed, and the social relations which govern the control of the productive forces and the products of production. Broadly speaking, "work" relations designate the technical, material, or natural side of production, while "ownership" relations mark its socially determined character. Although the two types are intimately connected, the distinction between them is central to Marx's thought, and he criticizes those who confuse society's technical, material work relations with its socially specific ownership relations — that is, with the socio-historical integument of those work relations.

As the "Preface" states, the relations of production comprise the economic structure of society, which in turn shapes the nature of society. The productive forces are not part of the economic structure, but they determine it. As the productive forces develop, the relations change in order that these forces be adequately harnessed in production. Work relations are frequently modulated to accommodate this productive advance. The given ownership relations may facilitate this, or they may be under pressure to evolve — either to allow the necessary work relations, or to correspond to the already changed work relations. Thus, an alteration of the social form of the economic structure itself may be required if the work relations appropriate to the productive forces are to obtain. An era of social revolution begins.

Notice first the elegance of Marx's theory when these two concepts are

5. See my *Marx's Theory of History* (Stanford, 1978), esp. ch. 1.

unpacked. The development of the productive forces through history tells the story of man's evolving dialectical intercourse with nature. This development necessitates adjustments in men's relations to each other and to the productive forces. With these changes in the social relations of production, the rest of the social world alters. Perhaps Marx's theoretical ship will not ultimately remain afloat, but its parts fit together and — contrary to what some critics say — no conceptual ineptness prevents its launching.

The second thing to be noticed is that technological determinism is a slight misnomer since Marx speaks, in effect, of productive-force determinism. More important than the label is the point that for Marx the productive forces include more than machines or technology in a narrow sense. In fact, labor-power, the skills, knowledge, experience, and so on which enable labor to produce, would seem to be the most important of the productive forces. The forces of production are, for Marx, thoroughly human. They are the powers which society has at its command in its continuous struggle with nature, in the ongoing, and distinctively human, activity of material production. Though Marx does hold a technological (or productive-force) determinist thesis about human history, he would be surprised at what a bugbear this has become. Ironically, Marx's interpreters take the alienation of man's productive forces under capitalism and their domination over the direct producers during that epoch as the model of productive-force determinism.

II

The "Preface" makes it clear that Marx saw the key to human history in the development of man's productive forces. They are "the material basis of all social organization"; their improvement explains the advance of society.⁶ Expositors of Marx who for various reasons have wished to circumvent the ascription to Marx of such a thesis have underplayed the "Preface," treating it as an anomaly. However, the "Preface" states a view to which Marx subscribed throughout his writings. In addition to the epigraphs with which this essay began, consider this passage from *The Poverty of Philosophy*, an early work which Marx continued to value in later years: "The mode of production, the relations in which productive forces are developed, are anything but eternal laws, but [rather] . . . they correspond to a definite development of men and of their productive forces, and . . . a change in men's productive forces necessarily brings about a change in their relations of production."⁷ On December 28, 1846 as he was starting work on this book, Marx expressed a similar thought in a letter to P. V.

6. *Capital*, I, 372 n.

7. *Collected Works*, VI, 175.

Annenkov: "As men develop their productive faculties, that is, as they live, they develop certain relations with one another and . . . the nature of these relations must necessarily change with the change and growth of the[ir] productive faculties." Again the point is stressed that "with the acquisition of new productive faculties, men change their mode of production and with the mode of production all the economic relations which are merely the necessary relations of this particular mode of production."

This further elaborated the materialist position upon which Marx and Engels had agreed a couple of years before. Although they originally used *Verkehrsform* ("form of intercourse") and some similar expressions to label what they would later term *Produktionsverhältnisse* ("relations of production"), they clearly believed that the evolution of man's organization of production is dependent upon the expansion of his productive faculties, as these two early passages from *The German Ideology* show:⁸ Thus all collisions in history have their origin, according to our view, in the contradiction between the productive forces and the form of intercourse.

An earlier form of intercourse, which has become a fetter, is replaced by a new one; corresponding to the more developed productive forces, and hence, to the advanced mode of the self-activity of individuals — a form which in its turn becomes a fetter and is then replaced by another.

Throughout Marx's mature works runs the theme of the development and transformation of production relations as a result of man's expanding productive forces. Part one of the *Communist Manifesto*, for instance, describes how "the feudal relations of property became no longer compatible with the already developed productive forces" and how today "the productive forces of society no longer tend to further the development of the relations of bourgeois property." In both cases, the relations of production fetter the productive forces and are "burst asunder." In addition, consider these examples from various writings of Marx:

In the last analysis, [the] community, as well as the property based upon it, resolves itself into a specific stage in the development of the working subjects.⁹

Each specific historical form of [the labor] process further develops its material foundations and social forms. Whenever a certain stage of maturity has been reached, the specific historical form is discarded and makes way for a higher one . . . [because of] the contradictions and antagonisms between the distribution relations, and thus the specific historical form of their corresponding production relations, on the one hand, and the productive forces, the production powers and the development of their agencies, on the other hand.¹⁰

Thus the social relations within which individuals produce, the social relations of

8. *Ibid.*, V, 74 and 82.

9. *Grundrisse* (Harmondsworth, 1973), 495.

10. *Capital*, Vol. III (Moscow, 1971), 883-884; also 878.

production, change, are transformed, with the change and development of the material means of production, the productive forces.¹¹

The [economic] relations and consequently the social, moral, and political state of nations changes with the *change* in the material powers of production.¹²

The point made in the "Preface" is illustrated in all these passages. While allowing for reciprocal influence and dialectical interplay between the relations of production and the productive forces, Marx always considered the productive forces to be the long-run determinant of historical change.

III

Many passages support a technological-determinist reading of Marx. This cannot be denied. What can be denied, of course, is that Marx meant what he said or that these passages are compatible with the spirit of his work, viewed as a whole. Commentators making this move are mistaken, however, as I shall show in this and the following section.

Although Marx frequently asserts that production relations do change as a consequence of the growth of the productive forces, he only drops clues as to why this should be so. The paucity of argument for the general thesis of productive-force determinism, rather than counting against the ascription of such a thesis to Marx, shows that Marx considered the pre-eminence of the productive forces within material production to be intuitively and obviously true.

He certainly thought it obvious that men change their relations of production to correspond with advances in the productive forces. The effective harnessing of improved productive forces as well as the utilization of now available, but untapped productive capacities may require alterations in society's relations of production — in either its work relations or ownership relations or both. Since men are rational, they will make these changes: "Men never relinquish what they have won. . . . [Thus] in order that they may not be deprived of the result attained and forfeit the fruits of civilization, they are obliged from the moment when their mode of carrying on commerce no longer corresponds to the productive forces acquired, to change all their social forms."¹³ The theoretical status of Marx's remark is not obvious. It is best seen, perhaps, as a rough empirical generalization, rather than a piece of philosophical anthropology, and Marx would have wished to distinguish it from the objectionably speculative claims made by others about the human condition. At any rate Marx is describing how

11. *Selected Works* (Moscow, 1969), I, 160; author's emphasis omitted.

12. *Theories of Surplus Value*, Vol. III (London, 1972), 430.

13. Marx to Annenkov, December 28, 1846.

humankind in general responds to productive progress, not offering a rule about individual behavior.

No society utilizes all its available productive forces, nor are all the forces it does put to work placed in optimally productive and efficient relations. But, broadly speaking, a society can be characterized as managing the productive forces at hand either successfully or unsuccessfully. When the economic structure fails to exploit society's productive capacity adequately, when there is a dislocation of the forces and relations of production, then systemic difficulties in the socio-economic organization of society become apparent and dissatisfaction with the old way of doing things grows. The existing social equilibrium is disrupted, and impetus given to the reorganizing of material production. Equilibrium can be restored only by bringing the relations of production and productive forces into correspondence. Since men do not wish to sacrifice their productive gains, they alter their relations of production to accommodate their productive forces — even when this transforms the basic character of production. "As the main thing is not to be deprived of the fruits of civilization, of the acquired productive forces, the traditional forms in which they were produced must be smashed."¹⁴ Only a new economic order can restabilize society.

Sometimes the work relations of production can be adjusted to exploit more effectively the available productive forces within the existing framework of ownership relations. Capitalism, for example, has the characteristic of seeking the most productive work relations possible for its forces of production; its advances in the technical organization of production — from simple cooperation through the manufacturing system to the modern factory — constitute an important part of what Marx saw as its historic role. By contrast, the feudal system of production made available productive forces which could not be harnessed effectively in work relations which were compatible with it; and as individuals (the incipient entrepreneurial class) attempted to take advantage of these productive forces, feudal society was undermined and eventually destroyed.¹⁵ Although capitalism is able to utilize and develop society's productive forces in a way which was well beyond the reach of the feudal system, although it produces the technical work relations which are appropriate to the modern forces of production (and, indeed, are seen by Marx as providing the infrastructure of socialism), at a certain stage of capitalist development these work relations are unable to proceed smoothly within the frame of private ownership. Crises and attendant socioeconomic difficulties impede the functioning of

14. *Collected Works*, VI, 175.

15. The full story is rather more complicated; see *Marx's Theory*, 133-148.

the capitalist mode of production, and pressure mounts for a fundamental change in the relations of production.

Because a serious discrepancy between the forces and relations of production disturbs society's equilibrium and because men, being rational, wish to restore equilibrium in a way which does not sacrifice society's productive gains, the relations of production are brought into harmony with the productive forces. This point, however, needs to be clarified in three related ways. First, society is divided into classes marking the different connections which individuals have to the productive forces and thus to the products of productions, connections which reflect the given structure of ownership. And classes do not have identical interests — especially when it comes to a contradiction between the forces and relations of production. The old ruling class strives to preserve the existing system or modify it in ways that retain the present class structure, while this effort is resisted by other classes, with different ideas about how best to resolve the fundamental contradiction that is rocking society.

Secondly, history is on the side of that class which has both an interest in and the capacity to bring about (or sustain) the relations of production appropriate to a society's productive level. "The conditions under which definite productive forces can be applied are the conditions of the rule of a definite class of society."¹⁶ The rebellions of subordinate classes founder — for example, slave uprisings in the ancient world — when those classes do not represent an historically feasible alternative to the existing organization of production. In this vein, the *Communist Manifesto* observes that "the first direct attempts of the proletariat to attain its own ends . . . necessarily failed, owing to the . . . absence of the economic conditions for its emancipation, conditions that had yet to be produced."¹⁷ Later, the productive forces developed by capitalism underwrite the victory of the working class, just as earlier productive-force advances secured the rise of the bourgeoisie. Thirdly, when men resolve a productive forces/relations of production disjunction, they are rarely fully aware of what they are doing. The "Preface" refers to "the legal, political, religious, aesthetic or philosophic — in short, ideological — forms in which men become conscious of this conflict and fight it out"; and Engels wrote that "according to Marx's view all history up to now, in the case of big events, has come about unconsciously, that is the events and their further consequences have not been intended."¹⁸

16. *Collected Works*, V, 52.

17. *Selected Works*, I, 134; *Collected Works*, VI, 319.

18. *Critique*, 20-21; Engels to Sombart, March 11, 1895. Engels says "up to now" because Marxist theory holds that the proletarian revolution is an exception, thanks in part to the informing of working-class consciousness by the theory itself.

Viewed from Marx's perspective, there is no plausible alternative to the thesis that the productive forces determine the relations of production. Every interpreter of Marx agrees that economic relations are supposed to structure the social world generally, but what would remain of the explanatory primacy of material production if this realm were itself determined by superstructural or non-basic factors? Even if this determination were unsystematic and haphazard, the materialist import of Marx's theory would be undermined. On the other hand, the relations of production cannot be said to be self-evolving, since this would permit no explanation of why specific systems of production emerge when they do. Marxists do speak, for example, of the unfolding of the inherent contradictions of capitalist relations, but it is the level of productive-force advance which explains why and when these contradictions appear. The relations of production develop not as a result of their own momentum, but under pressure of the productive forces, and a new, "higher" level of productive organization cannot enter before the productive-force carpet has been laid down. This is transparent in the case of work relations, where new technical arrangements presuppose the requisite productive forces, but it is true as well of ownership relations of production. As an illustration of this, Marx points to Rome as a society in which many of the prerequisites of capitalism obtained — a labor force divorced from the means of production, accumulations of wealth suitable for industrial investment, developed commodity exchange; yet, capitalism failed to take root because of an insufficient level of the productive forces.

Some recent Marxists have maintained that the relations of production and the productive forces should be seen as mutually determining. Without having any rival textual evidence to offer, they simply ignore the passages previously cited — and more could be produced — which underscore Marx's allegiance to productive-force determinism. Moreover, this interpretation prevents historical materialism from offering a general, theoretical account of why any economic structure arises when it does. Marx, of course, allows instances where the relations of production affect crucially the productive forces, just as he permits the superstructure to have a decisive impact in certain circumstances on the economic base, but nowhere does he elevate such cases to a general relationship. In his programmatic proclamations Marx always accents the determination of the relations of production by their forces, and never the reverse. He clearly believed that the relations of production were dependent on the productive forces in a way in which the former were not dependent on the latter. Although he tolerates (and seeks materialist explanations of) exceptional cases, he never awards equal status to both the forces and the relations of production.

The productive forces are obviously influenced by production relations. This point, however, is compatible with the thesis that the productive

forces tend to bring about the relations which are adequate for their utilization and further development; indeed, it would seem to be entailed by that thesis. In a particular historical transformation, modifications in the relations and forces of production will be intricately interwoven, and any satisfying Marxist study of such a period will have to illuminate these interconnections. Given this point and given the fact that the level of the productive forces is at least in part due to the nature of their relations of production, which, in turn, evolved under pressure from productive forces that had themselves been shaped by . . . and so on, does it really make sense for Marx to lay his emphasis on *productive-force* determinism?

The historical question whether it was the relations of production or the productive forces that were first to influence the other — like the old conundrum about the chicken and the egg — invites no answer. In any case, it is irrelevant here. Like the scientist he aspires to be, Marx tries to ascertain the most explanatorily useful relationship, to find the connective thread which will allow him to illuminate best the diverse and interacting phenomena before him; he is not seeking an historical prime mover. Although Marx identifies some nomological correspondences — for example, that feudal economic arrangements are incompatible with a world of factories and machines — which in themselves do not single out either the forces or relations as primary, he believes that there are crucial respects in which the development of the productive forces constitutes the (relatively) independent explanatory variable. His commitment to the thesis of the determination of the relations of production by the productive forces lies at the center of his historical vision; this development unifies history and explains its basic contour.

Does this imply that the productive forces have a certain developmental autonomy? The correct answer here is a firm yes and no. On the one hand, any improvements in the productive forces, whether in labor skills or tools, take place within the framework of not only a definite set of production relations but of a whole social context, and thus the productive forces cannot be said to advance in an independent or self-contained fashion. Indeed, Marx acknowledges the existence of societies in which a virtual stagnation of the productive forces had been brought about.¹⁹ On the other hand, Marx does have a conception of human nature in which man is seen as inherently expanding (or having a propensity to expand) his capacities, and so it could be said that the productive forces have a natural *tendency* to advance. The production and reproduction of material life is the basic function of society; but unlike other animals, man does not rest content with a given mode of subsistence. The cycle of production is not stationary. As man produces, as he utilizes his own productive abilities and

19. See *Marx's Theory*, 124-129.

manipulates the world around him, his powers tend to increase. Nor should it be surprising that the productive forces have a propensity to expand, given the incremental nature of human knowledge and skill, and the relative permanence of the means of production. For Marx, human production itself seems almost intrinsically to involve an expansion of productive capacity, and he sees the relations of production as generally changing only in response to the possibilities opened up by man's improving productive forces. Thus, in his eyes the growth of the productive forces is tied to the nature of production in a way more fundamental than the evolution of production relations.

IV

Marx's productive-force determinism, however, is thought by many to conflict with several of his important historical theses. As a result they conclude that Marx's theory of history is inconsistent with his own results, or else they are led to deny — in the face of the textual evidence — Marx's technological determinism. They are right that these historical claims are important ones for Marx, but wrong to think they cannot be squared with his theory. Consider four such issues.

1. Sustained and rapid technological growth is characteristic of capitalism only. This is, for Marx, an important fact about capitalism. The technological innovations and rapid productive advance prompted by the profit motive contrast sharply with the more traditional economies of earlier modes of production. The fact that the *rate* of productive expansion may vary, however, does not in itself tell against the thesis of technological determinism.

2. The productive forces characteristic of capitalism — the productive forces associated with large-scale, industrial production — arise long after the introduction of capitalist relations of production. Marx affirms this, too. The determination thesis, though, requires only that the installation of capitalist relations be a response to the (then) existing level of productive forces and Marx states that this was the case.²⁰ Developments in the productive forces are responsible for the demise of feudalism and the rise of capitalism.

While for Marx the productive forces seem to improve naturally through the activity of men (although this headway may be gradual), their progress may, of course, be stimulated to a greater or lesser extent by the existing relations of production. Different social formations, characterized by different modes of production, encourage the expansion of the productive

20. *Collected Works*, VI, 489, 175; *Capital*, III, 878; *Theories of Surplus Value*, Vol. I (Moscow, 1969), 389; "Resultate des unmittelbaren Produktionsprozesses," *Arkhiv Marksas i Engel'sa*, II (vii) (Moscow, 1933), 174.

forces to varying degrees, but acknowledging this does not subvert the thesis of productive-force determinism. Modern industry is the product of an already established capitalism, but the modern productive forces which it introduces require and ensure the realization of socialized production relations. Moreover, that production relations come to pass which have this characteristic of prompting rapid productive force advancement is itself a response to the previously existing level of productive development. As we have seen, far from it embarrassing Marx that the relations of production stimulate the productive forces, he, in fact, defends the thesis that the particular relations of production which evolve do so precisely because they are best suited, historically, to accommodate the continued development of the productive forces.

3. The basic contradictions of capitalist production are internal to its relations of production — in particular, to their tendency to promote unbridled expansion of the productive forces without regard to the limits posed by the need to preserve and expand capital. It is true that for Marx capitalist relations have mutually inconsistent propensities, and thus capitalism becomes increasingly unstable. To say this, though, is not to undermine the determining role of the productive forces. The downfall of capitalism and the inevitability of socialism are best characterized as resulting, in his eyes, from a conflict between the productive forces and relations of production, as the “Preface” requires. The capitalist system is undermined by its inability to manage the productive forces available to society.

4. “History is the judge — its executioner the proletariat.”²¹ The inauguration of socialism depends for its realization on the action of the working class. Class struggle in general, and revolutionary strategy under capitalism in particular, are familiar themes in Marxist literature. This emphasis is in no way incompatible with Marx’s productive-force (or technological) determinism. Productive progress makes possible a new socio-economic organization of society; moreover, it stimulates people to bring about the new order. The revolution is made by the working class, in Marx’s view, not despite it: determinism is not fatalism. Although this is not the place to analyze the role that Marx envisioned for the proletariat in the transition to socialism, it is simply a blunder to hold that a technological interpretation of Marx’s theory of history undermines its revolutionary content.

V

Marx’s technological determinism — his commitment to the determining role of the productive forces — is an integral component of historical

21. *Selected Works*, I, 501.

materialism; situating this productive-force determinism within Marx's broader, theoretical purview will help to delineate its features more sharply.

Historical materialism, of course, is not to be confused with some simple-minded economic materialism which declares that the only significant historical factors are economic. Superstructural relations are not epiphenomena of some more fundamental reality, nor ideology a simple reflex of production. In resisting the attribution of a dim-witted economic monism to Marx, commentators have frequently gone overboard in emphasizing his theoretical tolerance and the eclecticism of his historical explanations. Yet, historical materialism is no facile interactionism, which is content to assert merely that the economic realm must be given its due along with all the other spheres of social life.

Spelling out how Marx steers a course between an absurd reductionism and a vacuous pluralism is an important task, and Marxists themselves have too frequently been satisfied with the base-superstructure metaphor or else content to repeat vague formulae like "determination in the last instance by the economic." Yet, metaphor remains metaphor, and neither it nor any ritual answer can substitute for a precise rendering of the connections between the economic realm and the social world generally. Unfortunately, this subtle terrain cannot be explored here. What is relevant, though, is that Marx saw these interconnections as systematic and law-like. He was scientific in his temperament and would not have shied away, as some of his followers have, from the attempt to specify nomological relations operating from the economic to the super-structural realms. With regard to any specific period, of course, the general relationships identified by the theory would have to be refined into historically precise interconnections, but these too would be susceptible to nomic formulation. The fact that social processes vary with their institutional settings and that the specific uniformities found in one society do not hold in others is compatible with these specific uniformities reflecting invariant relational structures. Some commentators, however, repudiate the attempt to construe historical materialism as an empirical, social-scientific theory, which seeks lawful regularities, on the grounds that it does an injustice to the holistic, dialectical, and organic character of Marx's interpretation of society. But they err in doing so. The identification of systematic and law-like relationships, far from undermining a vision of the interrelatedness of the different areas of social life, presupposes it.

From the productive forces to the superstructure, human variables are involved at every level of Marx's analysis, so it cannot be said that Marx's deterministic model implies that history and society are ruled by non-human forces. There is no "society" standing above individuals, with a will of its own, and history itself "is *nothing but* the activity of man pursu-

ing his aims.’’²² Individual choices and decisions determine history; ‘‘man makes his own history’’ precisely because this is so. But to say that individual decisions influence things is not to say that those decisions are uncaused or unexplainable, nor that things turn out as any one individual or group chooses.

The base-superstructure metaphor in effect freed Marx to apply himself to the analysis of the economic realm, without worrying about secondary and tertiary considerations, and it cannot be said that he paid much attention to superstructural phenomena. Marx’s life study was directed to a level of reality which is, in its abstractness, remote from the experience of everyday life; and the deterministic mechanisms he located there — basically, the laws of capitalist production, supplemented by the main theses of historical materialism — do not suffice to explain the complete range of social phenomena and individual experience. Marx offers us a bird’s-eye view of history, and from this perspective many historical events are contingent. An account of any historical episode, if it is to capture its full individual richness, cannot rely only on economic analysis and the discoveries of historical materialism; rather, a complete explanation would have recourse to psychological laws as well. There is no reason to suppose that Marx would not have accepted this point. To account for the main developments and the broad contours of history may be to explain what is most important, but it is not to explain everything.

Marx, then, has a vision of the social world in which the realm of material production enjoys ascendancy. And it is within this realm that the productive forces are primary, for Marx’s technological determinism is a thesis about the structuring of the relations of production by the productive forces. It does not imply that productive force developments affect directly the arena of superstructural relations. This may happen, but in essence Marx’s view is three-tiered, with the productive forces determining the economic structure, to which the superstructure in turn corresponds; that is, the productive forces determine the economic determinator.

In the main, Marx sees the economic structure as responding to the level of productive advance in general, not to the specific kinds of productive forces which have developed, although of course certain stages of productive progress imply definite sorts of productive forces. It is not the handmill itself as a specific productive-force innovation which gives you society with the feudal lord, but the general level of technology and labor skill which it represents. Naturally enough, changes in work relations are closely connected to the particular productive forces that are emerging; and it may be that some developments among the ownership relations of production as well could be said to be due to the specific, individual character of the

22. *Collected Works*, IV, 93; Engels to Borgius, January 25, 1894.

productive forces, rather than their general level. In regard to primitive societies that are at more or less the same backward productive level, Marx writes: "Different communities find different means of production, and different means of subsistence in their natural environment. Hence their modes of production, and of living, and their products are different."²³ This suggests that Marx was prepared to call on qualitative differences among the productive-force environments of societies that are at a similar stage in order to explain their variations in economic structure.

Although Marx acknowledges the importance of studying "the history of the productive organs of man, of organs that are the material basis of all social organization,"²⁴ he himself examined primarily social and economic relations, rather than technology. The province of *Capital* is political economy, and "political economy is not technology."²⁵ Moreover, in the Marxist schema the general stages of history are distinguished by their relations of production and not by their technologies. Some have been misled by these facts into supposing that Marx did not really take technological determinism seriously, that he did not really accord primacy to the productive forces. After all, should not a technological determinist devote his attentions to the productive forces? Should not he give technological labels to history's stages? We are not in a position to answer this. Marx's claim that the emergence of certain production relations can be explained by the level of productive forces does not imply that the study of political economy can be dispensed with in favor of an analysis of technology. The productive forces, unlike the relations of production, are not part of the social world; viewed in themselves, they are an abstraction from it. Marx is concerned with social relations, in particular with relations of production, since these are the building blocks of the human world. *Capital* thus attempts to unravel the innermost nature of capitalist production, and in Marx's view this knowledge is crucial to understanding the general nature of bourgeois society. This point does not mitigate his commitment to technological determinism.

Although by definition the relations of production comprise only productive forces and persons, production relations are not reducible to productive forces. They have their own economic logic, and the characterization of a specific mode of production cannot be deduced from the productive forces which bring it about. The relations of production are susceptible to scientific analysis in a way in which technology is not. Economic relations have certain regularities such that, abstracting from everyday contingencies, their recurrent and law-like features can be grasped. This fact makes scientific political economy possible. It does not seem that anything similar

23. *Capital*, I, 351.

24. *Ibid.*, 372 n.

25. *Grundrisse*, 86.

can be said about technology. (The development of technology may follow a rather loosely fixed sequence since some advances clearly presuppose prior ones and the general course of future developments is often roughly predictable, but too many factors affect technological growth for it to constitute an independent realm of scientific discourse.)

The relations of production, then, must be understood on their own level and not reduced to the productive forces to which they correspond. Marx groups ownership relations into a few main types, each marking a definite system of producing, a specific socioeconomic mode of production. The phrase "mode of production" is generally used by him to refer to the characteristic nature of production under an economic structure that is distinguished by a specific type of production relation. The economic structure of any actual social formation will most likely comprise different types of ownership relations, though it is reasonable to suppose that one of them will be dominant. (Thus, for example, simple commodity production and even feudal remnants survive alongside hegemonic capitalist relations in most bourgeois societies.) In writing *Capital* Marx directed his attention to England as the chief illustration of capitalist production, as the society in which the capitalist mode of production had the strongest hold. But a mode of production is a theoretical construction (like an ideal type), and no society will represent it in its theoretically pure and perfect form.²⁶ Yet the analysis of a mode of production may be germane to the understanding of societies in which it is not dominant or is present only in an undeveloped form. Thus, Marx thought that the results of *Das Kapital* were relevant to backward nineteenth-century Germany: *De te fabula narratur!*

A prime focus of Marxist analysis is the study of the various modes of production in history, of the nature and functioning of the main types of ownership relations. Each socioeconomic system has a distinctive productive logic, though the political economy of any non-market society would surely be strikingly different from that of capitalism. The expansion of mankind's productive abilities pushes society toward higher forms of productive organization, but this fundamental momentum must be understood in terms of the dynamics of particular modes of production. Although the level of productive-force development explains why certain production relations rather than others arise, to consider a specific social transformation we need a theoretical model that reveals the character of the modes of production involved if we wish to specify the interplay of the forces and relations of production. As is well known, the "Preface" to the *Critique of Political Economy* lists the Asiatic, slave, feudal, and capitalist modes of

26. *Capital*, I, 8, 648. "In theory it is assumed that the laws of capitalist production operate in their pure form. In reality there exists only approximation; but, this approximation is the greater, the more developed the capitalist mode of production and the less it is adulterated and amalgamated with survivals of former economic conditions." *Ibid.*, III, 175.

production as the major stages in mankind's advance (although it "by no means afford[s] a recipe or schema . . . for neatly trimming the epochs of history").²⁷ It seems likely that Marx would have been amenable to revising his tabulation of historical periods, at least the pre-feudal ones, because he did not spend much time on them, and indeed what he does say about the nature of these modes of production and their economic evolution is less than satisfactory.

Marx's theory contends that the basic trajectory of human history is explained by the advance of the productive forces. The specific course of each society, however, does not simply repeat some universal dialectic of the productive forces and relations of production. Societies are rarely isolated, untouched and uninfluenced by productive advances outside them. Capitalism in particular affects backward countries in an aggressive, bloody, but ultimately progressive fashion, as Marx observed generally in the *Communist Manifesto* and specifically in his essays on British rule in India. The bourgeoisie "creates a world after its own image," and in so doing it builds up the productive infrastructure of the societies whose traditional economies it invades and undermines.²⁸ By contrast, "the victorious proletariat can force no blessings of any kind upon a foreign nation without undermining its own victory by so doing,"²⁹ though Marx does seem to hold that socialist nations can assist the productive advance of less developed societies. Thus, internal productive events and an endogenous productive-force development are not expected by Marx to explain the specific historical development of any society. The stages of socioeconomic evolution which the "Preface" mentions refer to human society as a whole; every society is not forced to follow the same identical steps of economic development. This is what Marx means when he denies propounding "an historico-philosophic theory of the general path every people is fated to tread, whatever the historical circumstances in which it finds itself."³⁰ This remark is not, however, a denial of productive-force determinism. Although Marx permits countries to lag behind or skip steps, their advance must still be accounted for within the over-arching pattern of socioeconomic evolution, and that development is due to the productive forces.

Marxist investigation begins with analysis of a mode of production as an ideal type, but in a given historical situation the economic structure of a society may comprise more than one type of ownership relation, and its functioning will surely be influenced by the (higher or lower) economies of

27. *Critique*, 21; *Collected Works*, V, 37.

28. *Selected Works*, I, 111-113, 488-489.

29. Engels to Kautsky, September 12, 1882.

30. Marx to the Editorial Board of "Otechestvenniye Zapiski," November, 1877; see also *Collected Works*, IV, 281.

the societies around it. It complicates the investigation to consider the interaction of different modes of production, in and outside the society in issue, and their connection to the expansion of the productive forces, but only this sort of analysis can tie the economic evolution of an individual society to the abstract study of ideal modes of production. Marx himself, devoted to the investigation of pure capitalism, never attempted more than an explanatory sketch of any nation's specific socioeconomic trajectory.

VI

Since the productive forces provide the underlying rhythm to the historical progress, Marx can be seen to be tendering a "technological-determinist" account of history. But what is one to make of it? I have tried to show that my technological interpretation does not impute to him a wildly implausible theory. But if Marx's position is not patently false, is it true? Does the handmill really give you the feudal lord? Unfortunately, however, the scientific evaluation of a writer like Marx, who advances such bold empirical claims about society and history, is well beyond the scope of this paper (not to mention its author's competence). Instead, I will limit myself to clarifying some of the issues involved in such an evaluation.

The first thing to note is that historical materialism attempts to address some very fundamental questions about history and society — such as, Why is there progress in history? What are the major stages of human development? How are they to be explained? Although Marx and Engels, as any student of theirs soon learns, elaborated historical materialism largely in hostile reaction to what they perceived as a predominantly idealist milieu in historiography, they joined their idealist rivals in seeking to answer the same basic and profound questions. Historical materialism does so by stressing the crucial role of material production in structuring society and by arguing that the development of mankind can be best interpreted as a series of materially necessary responses to advances in the productive forces. Any scientific paradigm or research program provides a methodological heuristic, recommending certain paths of research, discouraging others; similarly, historical materialism guides the investigation of history — just as an idealist theory might — by focusing research in definite directions, emphasizing favored topics, and seeking certain sorts of answers.

Contemporary historians, however, have not only eschewed the materialism-idealism opposition in historiography but also shied away from the general queries about human evolution to which historical materialism is, in large part, directed. Yet historians do sometimes attempt to cast light on broad historical issues like the decline of feudalism, and it seems only a short step from a topic like this — which appears perfectly legitimate — to

the question of why, in general, social formations flourish or decay. That historians should be cautious about leaving their specializations to deal with such intimidating problems is understandable, but their timidity shows neither that such issues cannot profitably be discussed nor that the answers to them are unobtainable. Of course it may be that Marx was mistaken in emphasizing the elements which he did as explanatorily primary, or that issues as broad as the nature of social transformation itself are too complex for any general theory to be successful, but this remains to be demonstrated. It has yet to be shown that Marx's project is, in principle, objectionable or that his materialist theory, when adequately reconstructed, is wrong.

Marx's conception of history is bold in intention and encompassing in breadth. Given this fact and the scope of the questions which Marx attempts to answer, can one plausibly maintain that historical materialism is an empirical theory? Is it not, as some have claimed, simply part of a grand, metaphysical view of history, one which can be neither proved nor disproved? Indeed, as has been mentioned, Marx's thesis of productive-force determinism appears to be entangled with an apparently philosophical vision of the nature of man and labor. Nonetheless, Marx always insisted that his materialist "premises can . . . be verified in a purely empirical way,"³¹ and both his technological thesis and historical materialism in general certainly seem to involve falsifiable claims about the way things are.

It is not so unusual for both empirical and non-empirical elements to be united in a scientific theory; nor is the theory made untenable as a result. Far from being a regrettable, if unavoidable, legacy of a pre-scientific birth, the existence of such non-empirical elements may be positively helpful.³² In any case, the relevant characteristics of a scientific theory are the empirical hypotheses and models it generates — not the logical status of its component parts. It is not obvious, in fact, that historical materialism is inextricably bound up with any metaphysical notions; but even if this were the case, it would not mean that the theory fails to be empirical, that the thesis of technological determinism is not falsifiable, nor that Marx's main claims could not eventually be elaborated into a formally-statable set of laws.

With this said, however, it must be acknowledged that the thesis of productive-force determinism is not testable in any straightforward fashion. In particular, the thesis does not stand or fall with Marx's historical pre-

31. *Collected Works*, V, 31.

32. See R. Harré, *The Philosophies of Science* (Oxford, 1972), esp. chs. 4, 5; and Imre Lakatos, "Falsification and the Methodology of Scientific Research Programmes" in *Criticism and the Growth of Knowledge*, ed. Imre Lakatos and Alan Musgrave (Cambridge, 1970), 126-127.

dictions. For example, the failure of advanced capitalism to generate socialism, as Marx thought it would, would not (or, depending on one's perspective, "does not") show that the productive forces are not determining of historical development; it would imply, rather, that Marx was incorrect in thinking that capitalism was incapable of managing the further advance of the productive forces. The same can be said of most of Marx's other forecasts. Marx's theory also permits the relations of production a rather elastic time interval in which to adjust to the productive forces. This, along with the fact that a specific social formation may only imperfectly instantiate a given mode of production and that Marx sees progress itself as having a rather contradictory nature, qualifies further the testability of productive-force determinism. (Marx, of course, wished to furnish a materialist account of any discrepancies or delays permitted by his theory.)

The fact that Marx's technological thesis is never placed in a position where it could be neatly falsified suggests to many that it should be given up. A Popperian, in fact, would require that Marx specify the precise conditions under which historical materialism itself would be falsified, or else abandon his pretension of engaging in science. No doubt many share this sentiment. Recent work in the philosophy of science, however, has undermined this Popperian commandment, and it has been persuasively argued that science neither does nor should proceed as Popper decrees.³³

The history of science is the history of research programs or paradigms, each comprised of a series of theories (some of which are modifications of prior theories in response to counter-instances), and it is the research programs as a whole, not an individual theory, which is to be appraised. All research programs, even very successful ones like Newton's gravitational theory, are troubled by theoretical puzzles and apparent empirical counter-examples. They are born with these, and they grow up in an ocean of anomalies. These problems are solved, if at all, only with time, from success in heuristically favored research, as well as by advances in areas outside the paradigm. Sometimes a research program can successfully digest anomalies, turning them dramatically from apparent counter-examples to solid evidence for the paradigm; other times, it invents rescue hypotheses that merely explain away its difficulties. There are, in fact, no crucial experiments, which decide by themselves the fate of a research program. Scientists have thick skins and do not readily abandon their theories when faced with recalcitrant facts and adverse evidence. Endeavoring to protect their theories from refutation, they use *ad hoc* explanations and shelve problems which they cannot handle. Rather than being a sad comment on the scientific community, this tenacity is fortunate. Only by deflecting

33. The following three paragraphs are indebted to the ideas of the late Imre Lakatos, but see also the recent writings of Paul Feyerabend and Thomas Kuhn.

criticism from its "hard core" to its "auxiliary hypotheses" or by ignoring it altogether and directing its attention elsewhere is a scientific research program able to maintain its momentum, pursue its research heuristic, and make progress.

Evaluation must be directed to the positive results of the paradigm. What is important are the hypotheses, facts, models, and research generated by the program, not its unsolved theoretical and empirical difficulties. All scientific research programs fight to avoid falsification by developing new theories and hypotheses to deal with their problem areas. The crucial issue is whether a given paradigm does this in a progressive or degenerating fashion, whether or not it continues to make breakthroughs and produce fresh advances, whether it is growing empirically or lagging behind. A single, sensational prediction (like that of Haley's comet) may, in fact, suffice to show that the research program in question is alive and progressing.

In addition, no research program is ever rejected before the emergence of a better theory. Falsification, insofar as it can be said to occur, takes place only in the context of competing paradigms. All important criticism, then, is constructive, since there is no refutation without a satisfactory replacement. Budding programs must be treated leniently, for they may take decades to become empirically progressive, and it is not scientifically dishonest to stick with a degenerating program and try to turn it into a progressive one — as long as the public, experimental record is kept straight.

If historical materialism is interpreted as a scientific research program, the thesis of productive-force determinism is surely part of its hard core, part of its basic heuristic. Viewed in this fashion, it is not surprising that difficulties which have arisen for the thesis (as well as for other, crucial historical materialist claims) have been met with auxiliary hypotheses and theories; nor is this maneuvering *ipso facto* a bad thing. The relevant issue is whether this research program is stimulating fresh and useful research, uncovering new facts, and promoting empirical hypotheses and models. Even if the requirements are kept loose, however, one may well doubt that historical materialism could pass muster as a vigorous and progressive paradigm — in light of the relative paucity and contestability of its results over a fairly extensive period of time.

Yet the same could be said of the social sciences generally; a wealth of empirical information has been accumulated along with some useful generalizations, but there are few, if any, substantive laws or theories accepted by all the practitioners in any given discipline. Bearing this in mind, it is arguable that historical materialism has no real rival as a research program, that there is no comparable, competing paradigm which unifies the study of society and history. There are various schools of thought, but none as

comprehensive and cohesive. This suggests that Marx's theory cannot be rejected until a more satisfactory program appears, one which provides a better account of the phenomena to which historical materialism is addressed, or until it is demonstrated that such an account is in principle unavailable. Because of the relative backwardness of the social sciences, then, one can certainly not be criticized for adopting the perspective of historical materialism, for adhering to what is perhaps the only plausible, general research program in the field, even if it is not making clearly impressive progress. Recent years, however, have witnessed vigorous and encouraging developments in Marxist historiography, sociology, and economics, and this fact reflects favorably on the viability of historical materialism as an empirical research program. So, the verdict is not yet in. If Marx's theory of history gains empirical support, if progress is made in elucidating and applying its concepts, if it stimulates fresh insights and the development of constructive hypotheses and models, then and only then will its scientific status be vindicated. But that is how it should be.

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