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MATHEMATICS AND DIALECTICS IN MARX: A REPLY

1. In February 2009, in a private communication, Russell Dale shared with me some pertinent and important remarks about my article, "Dialectics and Temporality in Marx's Mathematical Manuscripts," published in this journal in 2008. At that time, I could not answer properly because I was working on my latest book, *Behind the Crisis* (Brill, 2011). In the meantime, Russell Dale's remarks have been published in the October 2011 issue of this journal. This short note is my long overdue reply, with apologies for the delay.

2. My perceptive critic submits two orders of questions. The first relates to the more technical aspects of Marx's method of differentiation. I will not dwell on them because, as I mentioned in my article and as recalled by Russell Dale, I examine Marx's method of differentiation not as a mathematician would but because it reveals what I think is Marx's dialectical view of social reality. Rather, I will focus on the second order of questions because it is these that are central to my article. They are: What is dialectical logic? What is its relation to formal logic? Can mathematics asa branch of formal logic be applied to dialectical logic, and more specifically, is equilibrium applicable to a dialectical analysis of social reality? I investigate these topics in detail in *Behind the Crisis*, to which I refer the interested reader. Here, due to constraints of space, I can only provide some elements of a more complete picture.

3. Dialectical logic. In my view, Marx's dialectics as a tool of social research is based upon four principles. a) Social phenomena are always both realized and potential; *i.e.*, reality has a double dimension, what has become realized and what is potentially existent in what has become realized. b)

Social phenomena are both determinant and determined; *i.e.*, a realized social phenomenon is determinant if it causes the realization of its own potentialities through its interaction with other phenomena. These are the determined phenomena. Upon their realization, they become the conditions of reproduction or supersession of their determinant phenomenon as well as of other phenomena.

Consequently, c) social phenomena are subject to constant movement and change. d) Social phenomena's movement (change) is tendential, *i.e.*, at any given level of abstraction (given a section of reality under scrutiny), some social phenomenon is the tendency and other are the countertendencies.

These four principles are extracted from Marx's work and thus from a class analysis of social reality. They apply only to that reality and not to nature. True, there are similarities with natural phenomena. For example, water is potentially ice. Similarly, money is potentially capital. But water can turn into ice without human volition and consciousness. The same cannot be said of money becoming capital. These four principles are similar to the three principles of Engels' dialectics of nature. But the essential difference is human volition and consciousness. A theoryresting on human agency cannot be applied to phenomena, for example tidal waves, that are indifferent to that agency and to social classes. It would be mistaken to subsume the dialectics of nature to the dialectics of society or vice versa. The two worlds are radically different. Humans can change natural phenomena but this does not alter the ontological difference between society and nature. This is why Engels' dialectics of nature cannot be applied to society.

Of course, neither I nor anybody else can claim that this is (or is not) what Marx had in mind. But I have shown in various works that this view fits perfectly into his theory. Not only does it solve a number of problems, both imaginary and real, but it allows the development of his theory in conformity with its class content. It is in this sense that this approach can be considered to be Marx's own.

4. The relation of dialectical logic to formal logic. The difference between formal and dialectical logic can be exemplified by comparing the first principle of dialectical logic (social phenomena are always realized and potentially existent) with formal logic's first principle, the law of identity. This latter states that something is always equal to itself, *i.e.*, $A = A$. Then, A cannot be different from A. Either $A = A$ or $A \neq A$. For dialectical logic, on the contrary, $A = A$ and at the same time $A \neq A$ because A as a realized phenomenon is always equal to itself, but as a potential inherent in the realized A, it is different from the realized A. Let A^r indicate the realized A and A^p the potential phenomena inherent in A^r. Then, $\{A^r = A^r$ and $A^r \neq A^p\}$ is the famous unity in contradiction. For formal logic, A only exists without superscriptsso that $A = A$ is true and $A \neq A$ is a mistake. For dialectical logic

$A^r = A^r$ is true if we analyze the realized reality but $A^r \neq A^p$ is equally true if we consider both aspects of reality, the realized and the potential. A dialectical contradiction is a contradiction between what has become and what can become, as contradictory to what has become. In social reality it is the contradictory class content of social phenomena that makes them different from themselves and thus which can cause both their supersession and the supersession of other phenomena. A^r can cause the supersession B^r, but this is possible because B^p makes the supersession of B^r possible. Without B^p there would not be the supersession of B^r; without their inherent contradictory potentialities social phenomena could not change.

What is, then the relation between the two types of logic? Formal logic, by excluding the realm of potentialities and thus change, is a static view of reality. Therefore, it is functional for the theorization of the status quo. Conversely, dialectical logic is a dynamic view of reality. Nevertheless, if the class content of formal logic is the opposite of, and excludes, that of dialectical logic, the principles of formal logic can and should be applied within dialectical logic because the rules of formal logic, and only those rules, apply to the realm of the realized. To temporarily disregard A^p in order to analyze separately A^r and subsequently $A^r \neq A^p$ is a procedure that is not only valid but useful. One can analyze a certain state of affairs by taking a snapshot of it. But the latter, a static view, should not be mistaken for the real movement.

5. The theoretical status of equilibrium. It is from this angle that Marx's reproduction schemes should be seen. They are not a theorization of society moving towards equilibrium. They quantify the values and quantities of the means of production that have to be exchanged for the values and quantities of the means of consumption for the economy to reproduce itself, either on the same or on an extended scale. They show that exchange in these proportions is theoretically possible. But this is a static picture because it overlooks (purposely) the forces potentially present in the economy that propel it towards crises, so that the possibility of an equilibrium situation is not only improbable in reality but also irrelevant in theory. Within a dynamic view, this is a chance event and not the center of gravity around which those proportions fluctuate. Even if those quantities were to materialize, equilibrium in exchange could not stop the fall in the profit rate and thus the economy's march towards crises and self-supersession.

More generally, I do not object to using equilibrium in economic analysis. To consider social reality from a static perspective, through formal or mathematical logic, can improve our knowledge of that reality. But I do object to theorizing the economy or society as being in a state of equilibrium or tending towards it, as if a chance occurrence were the essence of a reality. Social reality and its reproduction or supersession cannot be theorized as being in (or tending towards) equilibrium, not even as a first step in the

inquiry. Let me make a comparison. I can theorize labor as all those who do not own the means of production and then proceed to disaggregate it as productive and unproductive, objective and mental, etc. These differences do not erase their common features, the lack of ownership of the means of production. Every step in the disaggregation builds upon the previous ones and on the results previously achieved and enriches our understanding of the object of analysis. Not so if the economy is theorized as a system being in or tending towards equilibrium. The reason is that equilibrium presupposes lack of time. Time eitherexists or it does not. If we assume that it does not exist, any results achieved by subsequently introducing time negate the previous ones. For example, for simultaneism the inputs of a production process can also be the outputs of the same process. But this is impossible within a temporal view. The choice is between two mutually excluding theorizations, one presupposing time and the other denying it.

In theory, one is free to choose either one or the other approach. But from the point of view of class struggle, if one chooses equilibrium, one explicitly or implicitly negates time. If there is no time, there is no change. If there is no change, labor's struggle is muted. It is not by chance that this is the view of bourgeois economics. But it is unfortunate that it has become the view also of many Marxists.

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