

As Quantity Theory of Money Is Illogically Derived from Definition Instead Premises, Marx Illogically Constructed the Whole Book of Das Kapital on Inconsistent Premises

Chao Chiung, Ting¹

¹ Graduated from Michigan State University, USA

Correspondence: Chao Chiung Ting, Graduated from Michigan State University, 63 33 98th Place 1E, Rego Park, NY 11374, USA.

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Abstract

The objective of this paper is to examine the truth of the whole book of Das Kapital instead the truth of a particular theory subordinating to the whole book of Das Kapital (e.g., labor theory of value and transformation problem). Theory is composed of logical inferences by which we derive conclusions from premises. One of methods that test the truth of a theory is to investigate the consistency of premises because a theory that is constructed on inconsistent premises will lead to contradictory conclusions. Labor theory of value and profit pursuing based on the analysis of supply and demand (i.e., maximum return rate on capital) are two premises in Das Kapital. This paper shows that labor theory of value and maximum return rate on capital are inconsistent logically because maximum return rate on capital does not operate under labor theory of value and this conclusion is logically contradictory to the premise that maximum return rate on capital operates. Further, shifting in supply curve or demand curve leads to logical contradiction between market monetary price and value while Marx stated that market monetary price is value in money form. Thus, the whole book of Das Kapital is illogical. I also demonstrate that dialectical contradiction and logical contradiction are different. Thus, Marxian cannot deny this paper by the argument that all logical contradictions are dialectic contradiction so that all logical contradictions in Das Kapital are not wrong because real world is dialectical.

Keywords: Marx, Das Kapital, methodology, inconsistent premises, economic thought, political economy, exploitation, surplus value, labor theory of value, return rate on capital, dialectic

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1. Introduction

1.1 Preface

Karl Marx is the most politically influential economist in the world I have ever known because both his scholar contributions to disclose essential characteristics of capitalist economy and his ardent advocacy to politically revolute induce fulfillment of communism in twentieth century, especially Soviet Union and China. But capitalism does not collapse and then vanish all over the world as Karl Marx predicted even we have observed many economic crises and depressions, which are forebodings of collapse in capitalist economy, since the beginning of nineteenth century. Conversely, Soviet Union dissolved in 1990s due to poor performance of its centralized economy and China has reformed its own socialistic economy by capitalism since 1979. Besides, Heinrich (2013) pointed out that the quick over of the crisis of 1857-1858 did not lead to politically revolutionary movement anywhere as Marx hoped so that Marx no longer linked crisis to final resolution in Marx's theoretical development after 1858. In short, Marx's theoretical predictions do not fit into history well.

Since Marx provided explanations for many important issues of capitalist economy (e.g., crisis, impoverishment of labor, income inequality and class struggle between worker and capitalist), Das Kapital is still a book which is so fascinating as to attract attention from many economists until now although Marx's predictions about the destiny of capitalist economy in Das Kapital fail. In order to settle contradictions between predictions made in Das Kapital and facts observed by us, Marxian and non-Marxian have kept debating since nineteenth century.

1.2 Brief Review of Debate

1.2.1 Dialectic Contradiction Versus Logical Contradiction

Marxian and scientists, especially those who have ever learned mathematic logic and form logic, debate the validity about the law of non-contradiction (*A and $\sim A$ cannot coexist*) in formal logic because Marxian declares that contradiction exists universally without exception (i.e., every object has its own opposition so that dialectic is super to rules in logical deduction) while logician insists that logical deduction should not tolerate any contradiction. Although both dialectic and logic use the same word “contradiction”, both Marxian and scientists have not answered following questions since the beginning of debate. Is the “contradiction” in dialectic identical to the “contradiction” in formal logic? Is dialectical contradiction super to logical contradiction (e.g., dialectic deny all rules of deduction in formal logic, especially law of non-contradiction)? Are dialectical contradiction and logical contradiction mutually exclusive? For instance, Popper (1940) is a crucial paper to attack dialectic in which Popper did not distinguish essential characteristics of dialectical contradiction from logical contradiction. Similarly, the conclusion of Du (1982), Wilde (1991) and Inoue (2014) that dialectical contradiction does not deny the law of non-contradiction in formal logic is not persuasive enough to make Marxian not only abandon superiority of dialectic but also accept the law of non-contradiction because they did not distinguish dialectic from logic.

“Contradiction” in dialectic means opposition, e.g., Wilde (1991) in the section of Logic of Marx’s Political Economy wrote “In the Grundrisse Marx described the antithesis between exchange value and use value as the first contradiction in the money form. The second contradiction is the separation of purchase and sale.” It is worth noting that supply and demand is a contradiction in the sense of dialectic because supply and demand corresponds to sale and purchase respectively. Therefore, Marxian cannot but fully comply with the analysis of supply and demand in microeconomics instead antagonism because the analysis of supply and demand in microeconomics is built on dialectic although microeconomics usually objects to *Das Kapital*. In addition, if *Das Kapital* and anti *Das Kapital* should coexist according to dialectic, why does Marxian debate with non-Marxian? It suggests that Marxian insists that *Das Kapital* should be true and anti *Das Kapital* should be false. It also implies that anti *Das Kapital* does not actually and substantially exist in Marxian’s mind because the false anti *Das Kapital* is not antithesis. Thus, Marxian implicitly denies dialectic by himself because dialectical contradiction is not universal (thesis may not coexist antithesis) and then there is no synthesis of *Das Kapital* and anti *Das Kapital*.

Sayer (1991), who supports dialectic, showed us an example of dialectical contradiction: Euclidean geometry versus non-Euclidean geometry. Sayer’s example is different from use-value versus exchange-value and sale versus purchase because the latter simply describe phenomena observed by us and do not involve logical deduction while the former refers to the conclusion derived from premises based on logical deduction. Euclidean geometry is built on two dimensions plane by mathematicians. Mathematicians construct Non-Euclidean geometry on the surface of three dimensions ball. Since the premise of Euclidean geometry and the premise of non-Euclidean geometry are different, it is not a logical contradiction that mathematician deduced that the sum of three interior angles is equal to 180 in Euclidean geometry from two dimensions plane versus mathematician deduced that the sum of three interior angles is greater than or equal to 270 in non-Euclidean geometry from three dimensions ball surface. In short, *if A then B* and *if C then $\sim B$* are not two logically contradictory statements because *B* and $\sim B$ are not logically deduced from the same premises although *B* and $\sim B$ are dialectical contradiction due to opposition. Thus, the case of Euclidean geometry versus non-Euclidean geometry does not violate the law of non-contradiction. Besides, I do not know any mathematician who constructs a geometry on not only two dimensions plane but also three dimensions ball surface (i.e., synthesis of Euclidean geometry and non-Euclidean geometry) because it is impossible due to the reason that we shall definitely derive logical contradiction from inconsistent premises, *If A and C, then B and $\sim B$* .

Kazumi (2014) discussed another example of dialectical contradiction provided by Kant (1787). Kant argued that there are two dialectically contradictory statements to explain why moon constantly turns the same side to face earth. One suggests that moon revolves on it its axis. The other declares that moon does not rotate on its own axis. Kant stated that both conclusions are correct because you will observe what motion the moon takes according to what viewpoint you take. I translate Kant’s arguments into two statements in the sense of form logic and mathematic logic.

1) *If moon turns the same side to face earth, then moon rotates on its own axis.*

2) *If moon turns the same side to face earth, then moon does not rotate on its own axis.*

The first statement is equivalent to “*If A, then B*” and the second statement means “*If A, then $\sim B$* ”. Evidently,

Kant's example is a logical contradiction because these two contradictory conclusions are derived from the same premise. Thus, law of non-contradiction is violated in Kant's case due to *If A, then B and ~B*. Kant's example and Sayer's example help us to distinguish dialectical contradiction from logical contradiction. *B* and *~B* are two symbols to represent two opposite objects not only in formal logic but also in dialect. But the sentence "*B and ~B*" is dialectical contradiction, not logical contradiction, because the sentence "*B and ~B*" are not deduced from the same premises, e.g., black versus white and use-value versus exchange-value. The conditional sentence "*If A, then B and ~B*" is logical contradiction because conclusions derived from premises are not only true (*B*) but also false (*~B*). In other words, the law of non-contradiction actually means: "*If A, then B and ~B*" is impossible, not "*B and ~B*" is impossible, while dialectic states that "*B and ~B*" always exists without condition. Thus, dialectical contradiction is not related to any rule of logical deduction. The key point is: since Marxian ignores the difference between conditional sentence and non-conditional sentence, Marxian mistakes "*If A, then B and ~B*" for a subset of "*B and ~B*" because Marxian recognizes that both two sentences contain "*B and ~B*". In short, dialectical contradiction and logical contradiction are mutually exclusive.

Since any dialectical contradiction must be built on facts due to materialism (e.g., use-value versus exchange-value) and the matter of fact is that moon empirically revolves its own axis so that the second logical statement given by me about Kant's example is false and invalid (i.e., the second statement is an illusion, which exists in the imagination of human beings instead reality), Kant's case is not dialectical contradiction but logical contradiction actually. Thus, logical rules of deduction and inference are super to dialectical contradiction because logical deduction and inference are able to deny dialectical contradictions which are inappropriately created by imagination of human beings as Kant's case.

Further, I want to demonstrate that dialectical contradiction is not universal (i.e., antithesis does not always exist so that synthesis also does not always exist). Consider the case that $\sqrt{2}$ is not a rational number. If dialectical contradiction is universal, then we get a dialectically opposite statement that $\sqrt{2}$ is a rational number. Greek mathematician used this dialectically opposite statement to prove that $\sqrt{2}$ is not a rational number by the method of indirect proof. What is indirect proof? Suppose that we intend to prove "*If A, then B*". First, we introduce *~B* as a new premise. Next, we add *~B* to the original premise, *A*. Then, we derive *B* from *A and ~B* (*If A and ~B, then B*). This conclusion violates law of simplification, *If A and ~B, then ~B*. Thus, *B* is true and *~B* is false. Consequently, "*If A, then B*" is a true theory because both premise and conclusion are true. Indirect proof is completed. In short, indirect proof is the formal proof that we are impossible to logically infer dialectical contradictions from premises in formal logic.

Assume that $\sqrt{2} = P/Q$ where both *P* and *Q* are odd. Then we get $2Q^2 = P^2$. Thus, P^2 is even. Since P^2 is even, *P* is even. Assume that $P = 2^x p$ where *p* is odd. Then, we get $Q^2 = 2^{2x-1} p^2$ and *Q* is even. Thus, we get a logical contradiction because the conclusion that both *P* and *Q* are even is derived from assumption that both *P* and *Q* are odd. We conclude that $\sqrt{2}$ is not a rational number. If Marxian insists that dialectical contradiction should be universal, Marxian must shows us that $\sqrt{2}$ is a rational number. If Marxian irrationally asserts that $\sqrt{2}$ is rational number based on his dialectical ideology instead a formally mathematical proof, Marxian's irrational assertion implies that the assertion of universally dialectical contradiction destroys all sciences based on logical deduction and inference completely. Besides, if Marxian insists that dialectic is universally true, why do Marxian debate with non-Marxian in order to reject non-Marxian's anti Das capital theory?

To summarize, dialectic regards factual oppositions (e.g., class struggle is created by the opposition between worker and capitalist for distributing output whether class struggle is caused by exploitation based on labor theory of value or productivity built on functional distribution in microeconomics), which we have observed empirically instead we infer from premises logically, to explain developments and evolutions in human society so that dialectic does not relate to the validity of any rules of deduction and inference established by formal logic. Thus, dialectical contradiction and logical contradiction are mutually exclusive. In other words, a theory that originates from logical deduction based on dialectical contradictions (e.g., the analysis of functional distribution is derived from supply and demand while supply and demand is a dialectical contradiction) are subjected to all logical rules of deduction and inference (e.g., Kant's case of dialectical contradiction is invalid because it violates law of non-contradiction and the analysis of supply and demand obeys formal logic). Thus, Marxian is wrong to justify Marx's logical contradictions in *Das Kapital* by the argument that Marx's contradictory conclusions in the sense of logic are naturally correct because all logical contradictions in *Das Kapital* are dialectical contradiction and dialectic is super to formal logic due to the reason that dialectical contradiction (e.g., control versus freedom and supply versus demand) causes evolution of economy and society historically.

For example, this paper will show the combination of pursue profit and labor theory of value, like the combination of two dimensions plane and three dimensions ball surface, will lead to a logical contradiction (e.g., there are two different sums of three interior angles in a triangle) that capitalists are not able to maximize their profit (i.e., not able to pursue their own profit). In order to defend the truth of the whole book of *Das Kapital*, Marxian will interpret this logical contradiction to be a dialectical contradiction and then declare dialectical contradiction is unnecessary to obey formal logic. Marxian's argument is equivalent to declare that Kant was correct about why moon always turns the same side to face earth because dialectical condition is super to logical contradiction.

Further, scientists frequently combine two logically true theories to explain real world. But scientists are easily to be deceived by their intuition that the combination of two logically true theories is also a true theory (e.g., Marx combined labor theory of value with the analysis of supply and demand to explain capitalist economy) because it is possible that there are two premises, which are inconsistent, and each premise (e.g., axiom) generates a logically true theory by logical deduction (e.g., we cannot combine Euclidean geometry with non-Euclidean geometry to become a new theory although Euclidean geometry is a true theory derived from two dimensions plane while non-Euclidean geometry is also a true theory derived from three dimensions ball surface). Thus, we shall definitely get logical contradiction, which are usually presented by paradox, myth and controversy because they are not caused by errors of logical inference, under the circumstance of inconsistent premise due to the reason that the combination of two logical true theories is identical to combination of all premises in two theories and inconsistent premises lead to contradictory conclusions.

Das Kapital is an excellent example. Labor theory of value generates logically true theories, e.g., fluctuation of market monetary price occurs when value of commodity changes because commodities exchange with equal value. Change in supply and demand also causes fluctuation of market monetary price. Instinctively, Marx used not only value but also supply and demand to explain fluctuation of market monetary price. Consequently, I will show in section 4 that the exchange ratio determined by value (labor hours embodied in product) is different from the exchange ratio (i.e., relative price) determined by supply and demand, which is a logical contradiction because market monetary equilibrium price deviates from value permanently while Marx stated that market monetary equilibrium price is equal to value. Thus, exchange ratio based on value is different from exchange ratio derived from relative price determined by market monetary equilibrium prices. But exchange ratio should be one and only one if value is logically consistent with supply and demand. In short, there are different exchange ratios in *Das Kapital*, which are not caused by errors of logical inference but by inconsistent premises.

Finally, I would like to remind readers that form logic and mathematic logic was established by logicians from the end of nineteenth century to the beginning of twentieth century. Besides, form logic and mathematic logic are different from logic developed in ancient Greek (e.g., definition in form logic and mathematic logic is different from in ancient Greek logic according to Suppes (1957, Chapter 8)) although form logic and mathematic logic are based on the logic developed in ancient Greek. Therefore, it is reasonable that not only Marx knew nothing about inconsistent premises in formal logic but also Kant, Hegel and Marx did not fully understand the relationship between dialectic and logical inference. Despite the misconception about logical contradiction and dialectical contradiction leads to many controversies, this paper does not deny any scientific effort and contribution arising from dialectical analysis to explain real world, e.g., freedom versus control, because mistakes caused by dialectic inevitably and indispensably results from evolution of social science, not intention of social scientists.

1.2.2 Historical Debates about *Das Kapital*

Böhm-Bawerk (1898) argued that Marx's analysis of production price (sum of constant capital, variable capital and profit, Vol. III, p. 257) is irreconcilable with labor theory of value. Böhm-Bawerk (1898, p.63) addressed "commodities which embody the same amount of labour must on principle, in the long run, exchange for each other. And now in the third volume we are told briefly and drily what, according to the teaching of the first volume must be, is not and individual commodities do and must exchange with each other in a proportion different from that of the labor incorporated in them, and this is not accidentally and temporarily, but of necessity and permanently." Bukharin (1927) responded Böhm-Bawerk as below. Marx considered the social (macro) relation between productivity of labor and value while Böhm-Bawerk concerned the individual (micro) relation between use-value (i.e., utility) and price. That is, Marx related labor theory of value to supply but Böhm-Bawerk linked use-value to demand. Further, Bukharin pointed out that the need of people (i.e., use-value) is subjective and psychological in the system of Böhm-Bawerk versus labor theory of value is objective and sociological in Marx's theoretical framework.

Regarding transformation problem mathematically, Sraffa (1960) demonstrated that relative price and profit rate are determined by real wage and technical condition of production. Sraffa's work leads Steedman (1977) to declare that labor theory of value is redundant. Samuelson (1971) disagreed with Marx's conclusion that surplus value is the ultimate source of profit and expressed that exploitation is obscure. Mandel (1990, Chapter 4) defended *Das Kapital* by the argument that Marx talked about transformation from labor value into production price from the view point of input, not transformation from labor value into market monetary price of output on which Sraffa and Samuelson focused. Besides, Mandel's argument is also a response to Böhm-Bawerk's critique on *Das Kapital*. Further, Bortkiewicz (1907) showed that production price can be explained without labor theory of value and temporal single system (e.g., Freeman and Carchedi (1996)) denied Bortkiewicz's argument by reinterpreting labor theory of value as a single system with two expressions – market monetary price versus value and market monetary price is value in money form.

But the concept of production price is the sum of constant capital, variable capital and surplus value, which is equivalent to the concept of sum of cost and profit because constant capital and variable capital are cost for output and surplus value is the source of profit in *Das Kapital*. Thus, production price corresponds to value. Market monetary price is also equal to the sum of cost and profit for a single unit product. Further, Marx transformed value into production price because Marx wanted to establish profit equalization in Vol. III, Chapter 9. Market monetary price regards factor price equalization (i.e., two countries have the same return rate on capital and wage for labor due to adjustment in market monetary price). Thus, factor price equalization implies profit equalization. Moreover, transformation from value into production price and transformation of value into market monetary price are equivalent from the view point that market monetary price is value in money form. I will argue in section 4 that market monetary equilibrium price, which is equivalent to value in *Das Kapital*, deviates from value permanently due to shifting in supply curve and demand curve so that exchange ratio between two commodities determined by value will be different from the exchange ratio determined by market monetary equilibrium price. Further, the most important reason that is against the role of production price playing in transformation problem is that all empirical data about price fluctuation in *Das Kapital* provided by Marx are market monetary price. If production price is different from market monetary price, Marx should tell us production price, which is estimated by Marx himself, instead of market monetary price. But Marx did not estimate production price in *Das Kapital* definitely. Thus, I disagree with Mandel.

Heinrich (2013) stated that Marx did not prove tendency of rate of profit to fall. Ting (2020) demonstrated that profit rate will not tend to fall if capitalist economy keeps growing. Thus, Marx's prediction that tendency of rate of profit to fall will lead capitalist economy to collapse is in question. But Sweezy (1942, p. 30) defended Marx's tendency of rate of profit to fall. He wrote "Like all other laws it is modified in its working by many circumstance, the analysis of which does not concern us here. It would be impossible to have a plainer warning not to interpret the law as a concrete prediction."

Das Kapital is an incomplete work wrote by Marx. Mandel told us that Marx did not leave us a fully workout theory of crisis in the introduction for *Das Kapital* Volume III in page 38 Penguin 1991. Besides, I do not find any statement in *Das Kapital* that financial crisis is caused by fluctuation of commodity value. Heinrich (2017) stated that *Das Kapital* is a book which is far from finished (e.g., credit theory). Lenin seemed to agree with Heinrich according to citation from Lenin in encyclopedia Britannica (<https://www.britannica.com/topic/russian-and-soviet-marxism>), "We do not consider the theory of Marx to be a complete, immutable whole. We think on the contrary that is theory has only laid the cornerstone of the science, a science which socialists must further developed in all directions if they do not want to let themselves be overtaken by life. We think that, for the Russian socialists, an independent elaboration of the theory is particularly necessary." Consequently, Marxian reinterprets critical concepts in *Das Kapital* and reconstructs theoretic framework of Marx so as to defend the truth of *Das Kapital* (e.g., Mandel (1990, Chapter 4)) as Sowell (1967, p. 50) stated "Its difficult method of presentation, the numerous myth about it which have grown over the years, and recent tendencies to mathematicise popular conceptions of Marxian economics in lieu of digging into Marx's own writings have together made this work almost as little understood today as it has ever been."

To summarize, all examples of theoretical debate above are dialectical contradiction as Kant's case because they are opposite viewpoints before we can identify which one is true and which one is false so that the debate between Marxian and non-Marxian has been inconclusive and endless since the beginning of debate. It implies that Marxian and non-Marxian seem to apply inappropriate methodology to study the whole book of *Das Kapital*.

1.3 Methodology of This Paper

Rather than Marxian and non-Marxian internally investigate the truth of a particular theory subordinating to the whole book of *Das Kapital* (e.g., trend of rate of profit to fall and transformation problem), I would take the whole book of *Das Kapital* as a theory and externally examine it. What does external examination mean? For example, Ting (2017) externally examined the truth of quantity theory of money by mathematic logic instead internal investigation of theories subordinating to quantity theory of money (e.g., Goldfield (1976) found that money demand function is unstable in his celebrated paper, “The Case of Missing Money”). $MV = PY$ is transformed from $V = PY \div M$. The latter is the definition of income velocity. Ting challenged the methodology of arithmetic conversion from definition into theory by a simple example: it is wrong that we transform $F = ma$ into $m = F \div a$. In $m = F \div a$, mass is indeterminate when acceleration is zero. But mass is definitely determinate under constant velocity and static (i.e., zero acceleration). Thus, there is a logical contradiction between conclusion deduced from a theory and fact we observe so that we have to reject the methodology of arithmetic conversion built on definition. Beyond the example of $F = ma$ versus $m = F \div a$, Ting provided the formal explanation that we are not permitted to derive a theory (e.g., $m = F \div a$) from definition (e.g., $F = ma$) if the theory is not proved to be true before we define according to Suppes (1957, Chapter 8). As a matter of fact, we do not prove $MV = PY$ before we derive $MV = PY$ from $V = PY \div M$. Thus, quantity theory is false. Since there is no causal relation between M (money supply) and both Y (GDP) and P (inflation), the empirical relation between money and GNP is statistical correlation. It explains why continuous QE in USA after 2008 and Japan after 1980s cause neither prosperity nor inflation and why money demand function is unstable. In short, Ting uses mathematic logic to examine the truth of quantity theory of money externally because mathematic logic is beyond quantity theory of money. In addition, monetarists may argue that long and variable lag explains failure of QE but monetarists forget that long and variable lag is the evidence that monetary disturbance is not the ultimate source to cause inflation and GDP fluctuation declared by monetarists.

How to examine the whole book of *Das Kapital* as a theory externally? Theory is composed of logical inferences from premises to conclusions. The true theory is composed of both true premises and true conclusions because we can derive true conclusions from false premises. For instance, we can derive that sun rises in the east and sun sets at the west from the false premise that sun rotates earth from east to west. Thus, true conclusion does not guarantee the truth of a theory. It implies that Friedman (1953) is wrong because Friedman focused on true conclusions but disregarded true premises so that economists would develop false theories (e.g., quantity theory of money is developed based on a false premise that we are allowed to derive a theory from definition) rather than true theories if economists follow Friedman’s methodology.

Further, empirical study cannot prove the truth of a theory, too. For instance, Shaikh (1984, P.64) suggested to test labor theory of value by the correlation between market monetary price and value. Ting (2020) derived equation (6), $\gamma = (P - c)(1 + \frac{1}{\eta}) \frac{\partial Q}{\partial K}$ and equation (7), $N = \frac{(P-c)Q - \gamma K}{w}$, from maximum return rate on capital hypothesis. Where P , Q , c , w , γ , N , K and η are market monetary price, quantity, distance of shifting of demand curve, wage rate, return rate on capital, labor hours (i.e., value), capital and price elasticity respectively. Let c be zero so that demand curve is given. By equation (6) and (7) in Ting (2020), we have

$$N = \frac{PQ - P(1 + \frac{1}{\eta}) \frac{\partial Q}{\partial K} K}{w} = P \frac{Q - (1 + \frac{1}{\eta}) \frac{\partial Q}{\partial K} K}{w} \quad (1)$$

Equation (1) predicts that price and labor hour (i.e., value) is closely correlated under the hypothesis of maximum return rate on capital. Thus, the high correlation between market monetary price and value (i.e., labor hour) empirically supports both labor theory of value and the hypothesis of maximum return rate on capital. Thus, Shaikh’s approach is invalid.

If we derive a false conclusion from true premises, we definitely make mistakes during the process of logical inference. Suppose that we find logical inference errors made by Marx in transformation problem. It is not equivalent to the disproof of transformation from value into price because we are able to prove the truth of transformation from value into price if we correct Marx’s logical inference errors. Even if we confirm Marx’s logical inference errors and then disprove transformation problem, it does not lead us to conclude that truth of the whole book of *Das Kapital* is denied completely due to the reason that labor theory of value, which is a premises of *Das Kapital*, may be true and transformation problem is just a particular conclusion of all conclusions in *Das Kapital*. Since logical inference errors are fixable, the theory with true premises and false

conclusions will become an absolutely true theory (i.e., true premises plus true conclusions) sooner or later after we correct logical inference errors. For example, supposed that if A then B is a theory while A is true premise and B is false conclusion (e.g., if labor theory of value is true, then we can transform value into price). After we correct logical inference errors, the true theory is *If A , then $\sim B$* (e.g., if labor theory of value is true, transformation from value into price is impossible). Thus, logical inference error is not the criterion to fully deny the truth of the whole book of *Das Kapital*. To summarize, it is necessary to examine premises in *Das Kapital* externally if we devote ourselves to intentionally examining not only the truth of the whole book of *Das Kapital* but also the endless and inconclusive debate between Marxian and non-Marxian. It is worth noting that both Marxian and non-Marxian applied inappropriate methodology to debate because they focus on conclusions and logical inference errors in particular theory of *Das Kapital* instead premises.

Labor theory of value is the crucial premise of *Das Kapital*. If labor theory of value is false, then the whole book of *Das Kapital* is false definitely. Labor theory of value states that all values are created by labor in terms of working hours embodied in products as well as products exchange each other with equal value. Unlike supply and demand determines market monetary price, Marx did not tell us what mechanism makes products exchange each other with equal working hours embodied in products. As Stanford Encyclopedia of Philosophy – Value Theory states “not only normative but also a subject in philosophy”, both all value created by labor and exchange with equal value are a normative statement so that labor theory of value is an axiom in *Das Kapital* because we are not able to either prove or disprove the truth of labor theory of value. In other words, it is hopeless to examine the truth of whole *Das Kapital* as a theory by discussing the truth of labor theory of value.

Certainly, there are extra premises in addition to labor theory of value in *Das Kapital*. For instance, supply and demand is a premise in addition to labor theory of value in *Das Kapital* because Marx (Vol. III, p. 286) wrote “If however the quantity supplied is less than the demand, or alternatively more, this market price deviates from the market value” and (vol. III, p.489) “ We have seen that although it is a category absolutely different from commodity, interest-bearing capital becomes a commodity sui generis with interest as its price, and this price, just like the market price of an ordinary commodity, is fixed at any given time by demand and supply.” Here, Marx introduced supply and demand in addition to value to analyze market monetary price. Once there is more than one premise in a theory, it induces the problem of premise inconsistency in form logic and mathematic logic. Suppes (1957, Chapter 2) stated that a theory which is constructed on inconsistent premises is false because we can derive contradictory conclusions from inconsistent premises in the sense of logic and mathematic logic (i.e., *If A and B , then C and $\sim C$*), not in the sense of dialectic (i.e., *C and $\sim C$*).

Inconsistent premise is easily mistaken for logical inference error. In Ting (2020), Ting did not recognize that he applied maximum return rate on capital to be a particular premise, which is different from labor theory of value that is the premise for tendency of rate of profit to fall in *Das Kapital*, and then reached the conclusion that return rate on capital will not fall if economy grows. Obviously, Ting’s conclusion is contradictory to Marx’s tendency of rate of profit to fall. Thus, Ting actually demonstrated that maximum return rate on capital is inconsistent with labor theory of value instead Ting (2020) believed that he disproved tendency of rate of profit to fall in *Das Kapital*. In addition, it is interesting that Marxian knew maximum return rate on capital. Sweezy (1942, p. 141) wrote “by the size of fraction $\Delta M/M$. Since this fraction is obviously nothing but the rate of profit, we may say that the capitalist is interested in maximizing his rate of profit.” It is worth noting that two dimensions plane and three dimensions ball are tow inconsistent premises in geometry because the sum of three interior angles will be equal to 180 as well as greater than 270, which is a logical contradiction. Therefore, mathematician distinguishes Euclidean geometry from non-Euclidean geometry. Thus, Ting’s tendency of rate of profit not to fall must be distinguished from Marx’s tendency of rate of profit to fall by us.

Böhm-Bawerk’s irreconcilability is another case that inconsistent premise is mistaken for of logical inference error. Böhm-Bawerk (1898, p. 61) wrote “equal rate of profit is only possible when the condition of sale are such that some commodities are sold above their value, and others under their value, and thus are not exchange in proportion to the labour embodied in them.” Böhm-Bawerk derived the condition of sold above or under value from equalization of profit rate. Pursue return rate on capital is the premise of equalization of profit rate. Thus, pursue return rate on capital leads to the conclusion of sold above or under their value, which is the dialectical contradiction (i.e., antithesis) to exchange with equal value because opposite conclusions are derived from different premises, exchange with equal value versus pursue profit. Actually, Böhm-Bawerk’s irreconcilability is inconsistent premises instead error of logical inference.

In this paper, the approach to test inconsistent premises in *Das Kapital* is indirect proof. Suppose that there are A (labor theory of value) and B (maximum return rate on capital does not operate) two statements and we wish to prove that *If A , then B* . Then we introduce $\sim B$ (maximum return rate on capital operates) into A and we will

get that *If A and ~B, then B*. Thus, *If A, then B* is a logically true statement, which means it is true that maximum return rate on capital does not operate under labor theory of value. Consequently, *A* (labor theory of value) and *~B* (maximum return rate on capital operates) are inconsistent premises.

The merit of this approach is that the truth of labor theory of value does not matter in this paper because the whole book of *Das Kapital* is logically false if labor theory of value is inconsistent with maximum return rate on capital in *Das Kapital* whether labor theory of value is axiom, true or false. It is worth noting that true premises do not guarantee consistency. For example, two dimensions plane and three dimensions ball surface are inconsistent premises although both two dimensions plane and three dimensions ball surface are true.

1.4 Organization of This Paper

The objective of this paper is to demonstrate that labor theory of value is inconsistent with supply and demand in the sense of form logic and mathematic logic from which all controversies, myths and logical contradictions in *Das Kapital* breeds. In section 2, I will substitute value, measured by working hours, for market monetary price so that the hypothesis of maximum return rate on capital (i.e., capitalists pursue return rate on capital) does not operate because capitalists cannot pursue profit, measured by working hour, by adjusting volume of product they supply under labor theory of value. Thus, labor theory of value is inconsistent with maximum return rate on capital. I will show how to transform market monetary price into value under maximum return rate on capital in section 3. Since my transformation is independent of labor theory of value (i.e., exchange with equal value), my transformation is not a proof to show that Marx's transformation is true. In section 4, I give another four examples of logical contradictions in *Das Kapital* when Marx combined labor theory value with supply and demand to analyze fluctuation of market monetary price. Since these four examples of logical contradictions are caused by inconsistency between labor theory of value and the analysis of supply and demand, these four logically contradictions are impossible to be eliminated by Marxian who devotes himself to accounting for fluctuation of market monetary price by labor theory of value as well as supply and demand. Finally, I remark conclusions in section 5.

2. Substitute Value for Market Monetary Price in the Model of Maximum Return Rate on Capital

Since capital only receives reproduction cost of capital (i.e., depreciation) in *Das Kapital*, capital does not receive anything from net GDP in Marx's mind. Thus, labor is the only input factor for the production function of net output under labor theory of value.

$$Q = f(N) \quad (2)$$

Where Q is net output, f is production function and N is labor in terms of working hour. The value of a single unit net output (v) is equal to average working hour expended in product and the value of total net outputs (V) are equal to total labor hours. We have

$$v = \frac{N}{Q} \text{ and } V = \frac{N}{Q}Q = N \quad (3)$$

Surplus value is equal to the difference between the value of total net outputs and total wage expenditure. Wage rate for per working hour (w) is equal to the value of total wage expenditure (W) divided by the number of labor hour employed by capitalist.

$$w = \frac{(1-S)V}{N} \text{ and } W = wN = (1-S)V \quad (4)$$

Where S is surplus rate and SV is surplus value. I substitute value of a single unit net output (v) for market monetary price in the simple model of maximum return rate on capital in Ting (2020), $\pi = \frac{PQ-wN}{K}$, to calculate return rate on capital.

$$\pi = \frac{vQ-wN}{K} = \frac{N-(1-S)V}{K} = \frac{N-(1-S)N}{K} = \frac{SN}{K} \quad (5)$$

$$\pi^* = \frac{vQ-wN}{K+wN} = \frac{N-(1-S)V}{K+(1-S)V} = \frac{SN}{K+(1-S)N} \quad (6)$$

In equation (5) and (6), vQ is sales and SN is equivalent to surplus value (SV). Surplus value is the ultimate source of profit in equation (5) and (6). π is the return rate on capital according to accounting so that K represents equity in equation (5). Ting (2020) pointed out π^* represents profit rate of a single unit output

following Marx's profit rate in Das Kapital Vol. III, Chapter 9 because constant capital represents depreciation in Marx's cost price. In equation (6), K represents depreciation accruing from utilization of constant capital and total wage expenditure (wN) is equivalent to variable capital. To maximize return rate on capital, we get

$$\frac{\partial \pi}{\partial N} = \frac{S}{K} \quad (7)$$

$$\frac{\partial^2 \pi}{\partial N^2} = 0 \quad (8)$$

$$\frac{\partial \pi}{\partial S} = \frac{N}{K} \quad (9)$$

$$\frac{\partial^2 \pi}{\partial S^2} = 0 \quad (10)$$

$$\frac{\partial \pi^*}{\partial N} = \frac{S[K+(1-S)N]-SN(1-S)}{(K+(1-S)N)^2} = \frac{SK}{(K+(1-S)N)^2} \quad (11)$$

$$\frac{\partial^2 \pi^*}{\partial N^2} = -\frac{2SK(1-S)(K+(1-S)N)}{(K+(1-S)N)^4} < 0 \quad (12)$$

$$\frac{\partial \pi^*}{\partial S} = \frac{N[K+(1-S)N]+SN^2}{(K+(1-S)N)^2} = \frac{NK+N^2}{(K+(1-S)N)^2} \quad (13)$$

$$\frac{\partial^2 \pi^*}{\partial S^2} = \frac{2(NK+N^2)N(K+(1-S)N)}{(K+(1-S)N)^4} > 0 \quad (14)$$

Since we substitute working hour embodied in a single unit product (i.e., value) for market monetary price so that Q is eliminated in equation (5) and (6), return rate on capital in terms of working hour is independent of supply and demand. Equation (8) and (10) do not tell us that equation (7) and (9) represent minimum or maximum when $S = 0$ in equation (7) and $N = 0$ in equation (9), which are necessary condition for maximum return rate on capital. The effect of surplus rate and number of working hour on return rate on capital is linear in equation (5) (i.e., marginal profit rate on labor will not diminish in equation (7) and (9)) so that quantity of output the firm plans to supply is indeterminate under labor theory of value. In other words, maximum return rate on capital is impossible. Besides, both $S = 0$ in equation (7) and $N = 0$ in equation (9) imply return rate on capital is equal to zero. Notice that $N = 0$ means no employment (i.e. no production) so that return rate on capital is equal to zero. But return rate on capital is positively related to surplus rate and working hours. Thus, equation (5) is minimum when $S = 0$ and $N = 0$.

Equation (11) and (12) require that π^* should be maximum when $S = 0$ in equation (11). But return rate on capital is equal to zero if surplus rate is equal to zero. If we assume that other things are given in equation (6), return rate on capital increases when surplus rate increases. Thus, $\pi^* = 0$ represents minimum in equation (11). This result is opposite to equation (11) and (12), which affirms that $\pi^* = 0$ is maximum. Why? Suppose that surplus rate approximates to zero and SN approximates certain real number while $N > 0$. We get

$$\lim_{S \rightarrow 0^+} \frac{SN}{K+(1-S)N} > 0 \quad (15)$$

$$\lim_{S \rightarrow 0^-} \frac{SN}{K+(1-S)N} < 0 \quad (16)$$

Equation (15) and (16) demonstrate that equation (6) is not continuous when surplus rate approximates to zero. Similarly, equation (6) is not continuous when N approximates to zero. In other words, derivative does not exist when $S = 0$ and $N = 0$ in equation (6). Thus, $S = 0$ in equation (11) is not the necessary condition for maximum. Besides, return rate on capital increases as surplus rate increases in equation (6) so that the maximum return rate on capital is equal to N/K because surplus rate is equal to one when return rate on capital is maximum. π^* is minimum when $N = 0$ in equation (13) because no employment means no production and then no profit. Consequently, equation (6) is logically contradictory to maximum return rate on capital, either. I conclude that maximum return rate on capital and labor theory of value are two premises which are logically inconsistent because maximum return rate capital does not operate under labor theory of value. Thus, the economic regime built on labor theory of value and the economic regime constructed on maximum return rate on capital are mutually exclusive each other. Besides, labor theory of value is also logically inconsistent with supply and demand because maximum return rate on capital contains the analysis of supply and demand. Thus, it is false that we apply labor theory of value to explain capitalist economy because supply and demand actually operates in capitalist economy so that labor theory of value does not operate in capitalist economy (i.e., products

do not exchange each other with equal value in real world) even though labor theory of value is true. Notice that the truth of premise does not lead to logical consistency between two premises, e.g., two dimensions plane and three dimensions ball surface in geometry.

3. Transformation Problem under Maximum Return Rate on Capital

Let's reconsider the model in Ting (2020) once again, especially Ting's equation (6).

$$\text{Max } \frac{Pf(N)-wN}{K} \quad (17)$$

$$w = P \left(1 + \frac{1}{\eta}\right) \frac{\partial Q}{\partial N} \quad (18)$$

I follow Ting (2011) in which Ting defined efficiency to be the maximum ratio of output to input

$$\text{Max } \frac{Q}{N} \quad (19)$$

$$\frac{\partial Q}{\partial N} N - Q = 0 \quad \text{i.e., } \frac{\partial Q}{\partial N} = \frac{Q}{N} \quad (20)$$

Then, I assume that the firm operates under both maximum return on scale and maximum efficiency. Equation (18) is transformed into

$$P = \frac{w}{\left(1 + \frac{1}{\eta}\right) \frac{Q}{N}} = \frac{w}{\left(1 + \frac{1}{\eta}\right)} \frac{N}{Q} = \frac{w}{\left(1 + \frac{1}{\eta}\right)} V \quad (21)$$

$$V = P \frac{1 + \frac{1}{\eta}}{w} \quad (22)$$

$$\frac{V_1}{V_2} = \frac{P_1 \frac{1 + \frac{1}{\eta_1}}{w_1}}{P_2 \frac{1 + \frac{1}{\eta_2}}{w_2}} \quad (23)$$

Equation (21) and equation (22) show that we transform value into market monetary price as well as we convert market monetary price into value under maximum return rate on capital. Since equation (23) proves that relative price between two commodities is not equal to the relative ratio of value embodied in each commodity (i.e., commodities do not exchange each other with equal value), both equation (21) and equation (22) are independent of labor theory of value. Since equation (21) and (22) are derived from maximum return rate on capital, maximum return rate on capital is cause and equation (21) and (22) are effect. Thus, there is no causal relation between value and market monetary price (i.e., market monetary price is not determined by value) but there are mathematically interdependent relations (statistical correlation) among wage rate, price elasticity of demand, value and monetary price as equation (21) presents. Consequently, there is no mathematically one on one transformation from value into monetary price as in form of $P = f(V)$ and $V = f^{-1}(P)$ but there is function

$P = \frac{w}{1 + \frac{1}{\eta}} V$ (i.e., $P = f(w, \eta, V)$ and its inverse function $V = \frac{1 + \frac{1}{\eta}}{w} P$ (i.e., $V = f^{-1}(w, \eta, P)$) under maximum

return rate on capital because it is many to many mapping between market monetary price and value, e.g., one value maps to many market monetary prices under inflation and one market monetary price maps to many value under price rigidity. As Ting (2018) demonstrated that Phillips curve is statistically negative correlation between inflation rate and unemployment rate instead causation between inflation rate and unemployment rate, there is significantly statistical correlation between value and market monetary price implied by equation (21) and (22) as Shaikh (1984) demonstrated because price elasticity of demand is stable and monetary wage rate and inflation rate is highly correlated. In short, labor theory of value is redundant when we transfer value into market monetary price under supply and demand so that we can prove that labor theory of value is a premise which is inconsistent with supply and demand through investigation of transformation problem because commodities do not exchange each other with equal value according to equation (23).

It is worth noting that working hour perfectly measures total output and GDP under growth of the firm by scale if labor is the only input factor for production.

$$Q = f(tN) = t^n f(N) \quad (24)$$

$$\frac{\partial Q}{\partial N} = \frac{\partial f(tN)}{\partial tN} \frac{\partial tN}{N} = \frac{\partial f(tN)}{\partial tN} t = \frac{\partial t^n f(N)}{\partial N} = t^n \frac{\partial f(N)}{\partial N} \quad \text{i.e., } \frac{\partial f(tN)}{\partial tN} = t^{n-1} \frac{\partial f(N)}{\partial N} \quad (25)$$

$$\frac{\partial Q}{\partial t} = \frac{\partial f(tN)}{\partial tN} \frac{\partial tN}{\partial t} = \frac{\partial f(tN)}{\partial tN} N = \frac{\partial t^n f(N)}{\partial t} = nt^{n-1} f(N) \quad \text{i.e., } \frac{\partial f(tN)}{\partial tN} = \frac{n}{N} t^{n-1} f(N) \quad (26)$$

$$t^{n-1} \frac{\partial f(N)}{\partial N} = \frac{1}{N} nt^{n-1} f(N) \quad \text{i.e., } f(N) = Q = \left(\frac{1}{n} \frac{\partial f(N)}{\partial N}\right) N \quad (27)$$

In this case, real net GDP would be measured by total working hours rather than nominal net GDP divided by inflation rate.

4. Fluctuation of Market Monetary Price

As Mongiovi (2002) stated “This method has been deployed within to mutually incompatible approaches altogether different supply and demand work of marginalist theory”, the purpose of this section is to literally demonstrate: it is wrong that Marx combined labor theory of value with supply and demand to explain fluctuation of market monetary price. Marx’s methodology leads to a problem: the exchange ratio determined by value is different from the exchange ratio determined by supply and demand (i.e., relative market monetary price) because changes in market monetary equilibrium price may be caused by either shifting in supply curve or demand curve instead change in value so that the new market monetary equilibrium price after shifting in supply curve and demand curve deviates from the old market monetary equilibrium price permanently while the old market monetary equilibrium price is equivalent to value. But Marx insisted that market monetary price should be value in money form and market monetary equilibrium price should be equal to value so that exchange ratio between two commodities should be one and only one. Thus, we reach a logical contradiction of exchange ratio because we can derive two different exchange ratios for the same two commodities from *Das Kapital*. In other words, deviation between value and market monetary equilibrium price is not a dialectical contradiction but a logical contradiction so that Marxian cannot unconditionally accept the deviation between value and market monetary equilibrium price. I use two logical statements to present this logical contradiction of exchange ratio as below:

- 1) If $V(\text{value})$ and $S\&D(\text{supply and demand})$, then we get one and only one exchange ratio.
- 2) If V and $S\&D$, then we get two different exchange ratios.

There are two independently theoretical systems in *Das Kapital*. One system is constructed on value only, e.g., production price and equalization of profit rate. The other is system of supply and demand. Each system is true because each system is derived from its own premise without logical contradiction like Euclidian geometry versus non-Euclidian geometry. Since Marx insisted that market monetary price is value in money form, Marx combined the value system and the system of supply and demand to explain capitalist economy. But scientists are deceived by these two not only true but also independent systems so that they believe Marx’s combination is valid and contradiction between value and market monetary price is dialectical. Therefore, I will give four examples that value is not equal to market monetary equilibrium price as below.

4.1 Use-Value (i.e., Utility and Demand) Plays No Role to Determine Market Monetary Price

Marx wrote (Vol. I, p. 138) “However, they are only commodity because they have a dual nature, because they are at the same time objects of utility and bears of value” and (Vol. I, p. 131) “Finally, nothing can be a value without being an object of utility. If the thing is useless, so is the labor contained in it; the labour does not count as labour, and therefore creates no value.” Let’s consider a case. Suppose there are two commodities, say A and B, with the same value but commodity A has 100 utilities and commodity B contains 200 utilities. If you were a consumer, you would not consume commodity A except that the exchange ratio between commodity A and commodity B is 2:1, which is different from the exchange ratio based on labor value, 1:1. Do suppliers of commodity A drop their market monetary price in order to make exchange ratio (relative price between commodity A and commodity B) become 2:1 for selling their stock of commodity A? If the answer is “yes”, we get two different exchange ratios. That is the reason why value is inconsistent with supply and demand.

Marx recognized that use-value (i.e., utility) and value (i.e., working hours contained in a product) is twofold of an article, what is the reason to make Marx ignore the role of utility and demand in market monetary price determination as neoclassical economics does (i.e., maximum utility hypothesis) but concentrate on the role of value in exchange ratio determination? Marx stated (Vol. I, p. 179) “For the owner, his commodity possesses no direct use-value. Otherwise, he would not bring it to market. It has use-value for others but for himself its only direct use-value as a bearer of exchange value, and consequently, a means of exchange” and (Vol. I, p. 182)

“They become exchangeable through the mutual desire of their owners to alienate them. In the mean time, the need for others’ objects of utility gradually establishes itself. In the course of time, therefore, at least some part of the products must be produced intentionally for the purpose of exchange. From the moment the distinction between the usefulness of things for direct consumption and their usefulness in exchange becomes distinguished from their exchange value.” Thus, Marx concluded (Vol. I, p. 128) “If then we disregard the use-value of commodities, only one property remains, that of being products of labour.” It is obvious that labor value is the only matter when two firms transact (e.g., Ford and GM sell their cars to their dealers or the firm who produces intermediate good x sells to the other firm who uses good x as input to product good y) so that we are allowed to disregard use-value under this circumstance.

But Marx addressed (Vol. III, p. 283) “so that the commodity (seller) represents use-value and money (buyer) represents exchange-value.” Since commodity does not have direct use-value for seller in Vol. I, p. 179 and p. 182, they are contradictory to Vol. III, p. 283. But Marx understood that use-value (i.e., utility) has effect on exchange ratio. Marx expressed (Vol. I, P. 181) “The direct exchange of products has the form of the simple expression of value in one respect, but not as yet in another. That from was x commodity $A = y$ commodity B . The form of the direct exchange of product is x use-value $A = y$ use-value of B . The article A and B in this case are not as yet commodities, but become so only through the act of exchange.”

As x commodity $A = y$ commodity B means that the exchange-value of x units commodity A is equal to the exchange-value of y units commodity B , x use-value $A = y$ use-value commodity B expresses that the use-value of x unit commodity A is equal to the use-value of y units commodity B . Thus, “commodity” should refer to goods transacted between firms, not between the firm and consumers or between consumers and consumers (e.g., barter exchange), in *Das Kapital* because use-value operates when buyers purchase goods for their own consumption. Therefore, Marx excluded use-value from determination of exchange ratio as well as determination of market monetary price of commodities because Marx intended fit his arguments into labor theory of value. Consequently, utility are trivial in *Das Kapital* and Marx concentrated on supply-side analysis (e.g., surplus value, exploitation, cost price, production price, equalization of profit rate and tendency of rate of profit to fall) based on labor theory of value in *Das Kapital*. Recall section 1.1.1 in which I mentioned the first dialectical contradiction: exchange value versus use-value. Since we have two different exchange ratios if use-value and exchange value coexist, use-value and exchange-value are two inconsistent premises and two different exchange ratios is logical contradiction.

It is worth noting that market monetary price in microeconomics is determined by consumers and firms so that use-value (i.e., utility) plays the inevitable role to determine market monetary price in microeconomics. Besides, neither Marx understood that labor productivity depends on volume of output because Marx had no idea about production function nor Marx used supply and demand to determine volume of output because value determines exchange ratio so that value determines quantity of output instead supply and demand. But Marx did not tell us how many unit of output will be produced (supplied) when value is given.

4.2 The Role of Supply and Demand in Market Monetary Price Determination

When economists debate transformation problem, they seem to ignore Chapter 19 in Vol. I of *Das Kapital*, which is entitled to be “The Transformation of the Value (and Respectively the Price) of Labour-Power into Wage”. Transformation from the value of labor power into market monetary wage is a special case of transformation from value of a commodity into market monetary price. Thus, this transformation is against Marxian’s argument (e.g., Mandel in section 1.1.2) that Marx transformed value into production price instead market monetary price. Notice that subsistence wage (reproduction cost of labor power) does not include profit but product price includes profit (surplus value) so that market monetary wage, corresponding to subsistence wage, and production price are two different ideas.

Marx (Vol. I, Chapter 19, p. 678) wrote “It soon recognized that change in the relation between demand and supply explained nothing, with regard to the price of labor or any other commodity, except those changes themselves, i.e., the oscillations of the market price above or below a certain mean. If demand and supply balance, the oscillation of price ceases, all other circumstance remaining the same. But then demand and supply also cease to explain anything. The price of labour, at the moment when demand and supply are equilibrium, is its natural price, determined independently of the relation of demand and supply. It was therefore found that the natural price was the object which actually had to be analysed.” There are three features in this quotation. First, natural price of labor is supposed to correspond to subsistence wage. Second, I do not find any statement from *Das Kapital* about why natural price of labor makes supply of labor and demand for labor be balance as why value makes supply of commodity equal to demand for commodity. Third, Marx ignored shifting in supply curve

and demand curve completely because oscillations of market monetary price above or below certain mean requires that both supply curve and demand curve should be given; otherwise, each shifting in supply curve and demand curve creates a new mean.

Further, Marx emphasized (Vol. III, p. 208) “Our whole investigation has proceeded from the assumption that any rise or fall in price is an expression of real fluctuations in value. But since we are dealing here with the effect that these price fluctuations have on profit rate, it is actually a matter of indifference what their basis might be. The present argument is just as valid if prices rise and fall not as a result of fluctuations in value, but rather as a result of the intervention of the credit system, competition, etc”. Thus, Marx concluded (Vol. III, p. 295) “and price, in its general concept, is simply value in money form” as well as Marx recognized that fluctuation market monetary price is independent of fluctuation of value if fluctuation of market monetary price is caused by credit system, competition...etc. It is worth noting that Marx’s statement of (Vol. III, p. 208) is contradictory to (Vol. I, Chapter 19, p. 678) because oscillation of market monetary price (wage) is supposed to be change in value (value of labor power – subsistence) according to (vol. III, p. 208) but (Vol. I, Chapter 19, p. 678) argued that the certain mean, which is natural price – value of commodity and value of labor power, does not change while market monetary price and market monetary wage oscillate. The reasonable explanation is that Marx’s price fluctuation is different from Marx’s price oscillation because the former regards change in value and latter concerns price changes caused by supply and demand, not value. This explanation reflects two things. One is that there are two independent systems in *Das Kapital*, value system versus system of supply and demand. The other is that Marx combined these two independent systems to explain change in market monetary price and market monetary wage. But neither Marx and nor Marian recognized the problem of inconsistent premises which is caused by Marx’s combination of these two systems.

I translate these two Marx’s literal statements about value system and system of supply and demand into the following equation.

$$P = V + p(D - S) \quad (28)$$

The symbol of plus, “+”, means combination of value system and system of supply and demand. This combination seems not to cause any logical contradiction as well as inconsistent premises. P is market monetary price. V is value. D is demand and S is supply. $p(D - S)$ is the effect, arising from the imbalance between supply and demand, on market monetary price. $p(D - S) = 0$ if $D - S = 0$ and both supply curve and demand curve are given. Consequently, value is the certain mean (i.e., value is equivalent to equilibrium price) and market monetary prices oscillate above or below value. Change in value determines change in mean of market monetary price permanently because the probability distribution of market monetary price shifts. In equation (28), value, which is the source of fluctuation in mean of market monetary price, is independent of supply and demand and $p(D - S)$ is the source of oscillation of market monetary price above or below value.

It is worth noting that, in Vol. III Chapter 9, Marx’s objective is to show that each firm has its own organic compositions (ratios of constant capital to total capital) so that there are different values for the same commodity in market, which lead to different market monetary prices for the same commodity, while the value of a commodity is the average of values of each firm. Marx applied different organic compositions to cause distribution of market monetary price. The mean of market monetary price (i.e., average market monetary price) is equivalent to average value of a commodity in Vol. III Chapter 9.

Marx (Vol. III, p. 763) stated “the demand for workers may outstrip the supply, and thus wage may rise” and Marx (Vol. III, p. 295) addressed “If demand is greater than supply for this particular kind of commodity, one buyer outbids the others – within certain limits – and thus raises the commodity’s price above its market value for everyone, while on the other hand sellers all seek to sell at a high market price. If, reversely, the supply is greater than the demand, one seller begins to unload his goods more cheaply and the others have to follow, while the buyers all work to depress the market prices as far as possible below the market value.” Regarding excess demand under given supply curve and demand curve, we have: if $D - S > 0$, $p(D - s) > 0$. Referring to excess demand under shifting supply curve and demand curve, change in price will be greater than 0 or less than 0 even excess demand is equal to zero (i.e., supply is equal to demand). For example, we do not assure that change in market monetary price is positive when not only both supply curve and demand upward shift left hand side but also market is in excess demand (e.g., economy is in recession but starts to recovery through excess demand in markets while firms still try to get rid of extra inventory which had been accumulated preceding recovery).

I believe that Marx did not distinguish market disequilibrium under given supply curve and demand curve from disequilibrium under shifting in supply curve and demand curve. But I assure that Marx knew something else

affects change in price beyond Marx's idea of force arising from disequilibrium under given supply curve and demand curve in *Das Kapital*. Marx (Vol. III, p. 213) expressed "Violent fluctuations in price thus lead to interruptions, major upsets and even catastrophes in the reproduction process. It is particularly agricultural products, whose raw materials derive from organic nature, that are most subject to these fluctuations in value, as a result of variations in the harvests, etc. (Quite apart from the impact of the credit system.) The same quantity of labour may here be expressed in very diverse amounts of use-values, depending on uncontrollable natural conditions, the seasons of the year, etc., and a particular quantity of these use-value will accordingly have very different prices. If a value x is expressed in 1,000 lb. of a , the price of 1 lb. is $x/1,000$; and soon. This is one element in the price fluctuations of raw materials. A second element is this - and we mention it here only for the sake of completeness, since competition and credit system both still lie outside the orbit of our discussion."

Marx knew value of agricultural commodities fluctuates and Marx believed change in value of agricultural commodities determines change in market monetary price of agricultural commodities in Vol. I, p. 678. It is interesting that Marx (Vol. III, p. 204) wrote "But when the American Civil War caused cotton to rise to prices almost unheard of in a hundred years". In the *New York Daily Tribune* 1861, Marx (<https://www.Marxists.org>>Marx>works) stated that British cotton price was rising from 6 1/4 d per lb to 9 d per lb. Since North blockaded ports of South for prohibiting cotton from export and South embargoed cotton export in order to win diplomatic recognition from Britain, blockade and embargo are Marx's second element which induced leftward shifting supply curve of American cotton in British market instead weather and harvest. Thus, British's cotton price rose while value of American cotton did not change. Besides, British increased cotton import from Egypt and Western Antiochia (Panza, 2013) and Indian (Logan, 1958). The case of British cotton price fluctuation caused by American Civil War demonstrates that fluctuation of market monetary price discussed in *Das Kapital* regard shifting in supply curve and demand curve caused by war instead change in value of cotton while war is one of Marx's second elements. The example of American Civil War demonstrates that market monetary price oscillation above or below certain mean under given supply curve and demand curve cannot explain all cases of market monetary price fluctuation. It is worth noting that Marx should use production price of cotton estimated by Marx himself instead market monetary price to refer fluctuation of cotton price in American Civil War if production price is different from market monetary price so that I object to Mandel's interpretation about transformation problem in section 1.1.2.

Business cycle is another Marx's second elements to cause price fluctuation through shifting in supply curve and demand curve instead change in value because Mongiovi (2002, p. 16) quoted from Marx "If price of commodities in one sphere are below or above price of production (where in we deliberately leave aside the fluctuations attendant upon the various phase of the industrial cycle in each and every enterprise) ... (1894: 367...)." Besides, Marx never showed us that the fluctuation of GNP and employment corresponds to the fluctuation of change in value, which implies that labor theory of value does not explain capitalist economy completely and soundly.

Ting (2012) explained decline in both employment and wage in recession by leftward shift in labor demand curve because increase in unemployment must link to increase in wage if both labor supply curve and labor demand curve are given. Ting (2012) also showed the essential characteristic of market monetary price fluctuation in business cycle that market monetary price in each market may rise simultaneously or fall together even quantity of money is given. Economists usually name it inflation and deflation respectively. Ting (2017) demonstrated that both supply curve and demand curve shift toward the same direction so that shifting in supply curve and demand curve induce price rigidity during business cycle. Although Marx recognized the phenomenon of general prices fluctuation in business cycle, Marx did not understand that both supply curve and demand curve are not necessary to restore its original positions and production function usually does not change during recession so that market monetary price will deviate from value permanently instead occasional and accidental oscillation above or below certain mean (value) under the circumstance that both supply curve and demand curve are given.

Since $p(S - D)$ cannot capture changes in price caused by shifting in supply curve and demand curve, equation (28) deals with oscillation of market monetary price, not fluctuation of market monetary price. Further, one value corresponds to more than one market monetary price during fluctuation of market monetary price so that we cannot transform value into market monetary price and vice versa. It demonstrates the failure of Marx's combination of value system and system of supply and demand.

Marx seems not to know general equilibrium and market interdependence in *Das Kapital* because Marx indeed wrote "all other circumstances remaining the same" in Vol. I p. 678. That is a standard assumption of partial equilibrium analysis in microeconomics. If market monetary prices deviates from equilibrium price under the

circumstance that both supply curve and demand curve are given, will equilibrium automatically restore? There is no definite answer to this question in neoclassical economics, e.g., Cobweb theorem shows that market monetary price may deviate equilibrium permanently versus equilibrium always exists based on Brower's fixed point theorem. Although Marx recognized that market monetary prices simultaneously rise or fall during business cycle due to the reason that shifting in supply curve and demand curve happens in every market, Marx believed that all market will automatically restore its original equilibrium under shifting in supply curve and demand curve so that fluctuation of market monetary price in a single market is trivial and natural price (value of commodity) is the central issue of capitalist economy. But Marx's belief is unreal. For example, growth population leads to permanent growth of GDP (i.e., rightward shifting in both supply curve and demand curve in every market) in a technologically static society.

To summarize, Marx argued that market monetary price oscillates around value (i.e., market monetary equilibrium price) transitorily because market monetary price will converge to value if both supply curve and demand curve are given but Marx omitted the analysis that market monetary price will deviate from value permanently if either supply curve or demand curve shift because the new market monetary equilibrium price after shifting in supply curve and demand curve is not equal to value anymore.

4.3 Inflation and Deflation versus Value

Marx (Vol. III, p. 681) stated "A general fall of commodity prices may be expressed as a rise in the value of money relative to all commodities, and, on the other hand, a general rise of prices may be defined as a fall in the value of money. Either of these statements describes the phenomenon but does not explain it..." It is crucial that Marx objected to quantity theory of money in Vol. III page 684-5 in which Marx listed empirical evidences that the relation between quantity of money and market monetary price, not production price, is not proportional in order to support Marx's own argument that fluctuation of market monetary price is caused by fluctuation of value. Besides, what is the value of money (i.e., what is the number of working hours expended in one dollar) under the circumstance that all contemporary monetary systems are no more dependent on any real goods (e.g., gold standard)?

In modern economics, this phenomenon that market monetary prices rise and fall generally and simultaneously is named to be inflation and deflation. For example, price dropped one third from 1929 to 1933 and hyperinflation occurred in Europe after World War I (Germany, Poland and Austria in Cagan (1956)). Thus, inflation and deflation is a second element omitted by Marx to settle down the problem that market monetary price deviates from value. Inflation and deflation make Marx's theory that fluctuation of market monetary price is caused by fluctuations of value breakdown because both values and production price are impossible to raise millions times simultaneously while market monetary prices do during hyperinflation. In other words, one value is related to many monetary prices under the circumstance of inflation and deflation. Thus, there is no function which maps value to market monetary price in form of $P = f(V)$ and $V = f^{-1}(P)$. Since it is not universally true that market monetary price is simply value in money form, temporal single system is wrong.

If Marxian argues that relative prices do not change during inflation and deflation so that the relation between value and relative market monetary price does not change, then Marxian is wrong because income effect and wealth effect caused by inflation and deflation will affect composition of goods consumed by people (e.g., Giffen goods) so that relative prices definitely change.

4.4 Natural Price versus Value of Labor

In Vol. I, Chapter 19, Marx continued to mention natural price. Marx expressed (Vol. I p. 675) "Thus people speak of the value of labour, and call its expression in money its necessary or natural price." Marx in Vol. I p.678 emphasized that market monetary equilibrium wage is not determined by supply of labor and demand for labor but determined by something else (e.g., subsistence wage). Since neoclassical economists believe that supply and demand determine fluctuation of market monetary price as well as market monetary equilibrium price, the difference in determination of market monetary equilibrium price distinguishes Marx's economics from neoclassical economics. Why are not we allowed to declare that supply and demand distinguishes Marx's economics and neoclassical economics? The reason is very simple because Marx indeed introduced supply and demand into his theoretical framework of *Das Kapital*, especially Vol. III, in order to explain an essential characteristic of capitalist economy that market monetary prices fluctuate frequently and severely.

Marx (Vol. I, p. 681) argued "The value of his labour-power may vary, with the value of his usually means of subsistence, from 3 to 4 shillings, or from 3 to 2 shillings; or, if the value of labour power remains constant, its price may rise to 4 shillings or fall to 2 shillings as a result of change in the relation of demand and supply." Mathematically, Marx's wage theory can be represented by a simple equation.

$$W = S + w(N^s - N^d) \quad (29)$$

Where W is market monetary wage, S is subsistence which is the cost to reproduce labor power and w is the function of oscillation in market monetary wage depending on the difference between demand for labor and supply of labor under given labor supply curve and labor demand curve. If labor market is under equilibrium in equation (29), market monetary wage is equal to subsistence while subsistence is not only the value of labor power but also the natural price that Marx intended to explain. In other words, market monetary wage is simply subsistence in money form under given labor supply curve and labor demand curve. Since Ting (2012) argued that unemployment increase during recession due to leftward shifting in labor demand curve, it is reasonable to assume a situation that labor demand curve shifts leftward and labor supply curve does not change. Since subsistence wage is independent of supply of labor and demand for labor, subsistence wage does not change but market monetary equilibrium wage in labor market (i.e., natural price of labor) changes due to leftward (rightward) shifting in labor demand curve during recession (boom). There was another example. There was the plague in the fourteenth century in Europe, which made population decline tremendously so that real wage and monetary wage rose while subsistence did not change in the fourteenth century. Thus, market monetary equilibrium wage is possible to deviate from subsistence wage and natural price of labor permanently.

Since there are many different market monetary equilibrium wages which correspond to one and only one subsistence wage due to shifting in labor demand curve and labor supply curve, subsistence wage (i.e., natural price for labor) cannot be transformed into market monetary equilibrium wage. Besides, Ting (2020) demonstrated that labor productivity (i.e., value) is cyclical due to increasing return to scale. If Marxian could recognize that labor productivity is cyclical, Marxian would predict that values of commodity and market monetary wage rise in recession (fall in boom) because labor productivity declines in recession (rises in boom) and subsistence wage does not change. Since market monetary prices and market monetary wage in fact fall during recession (rise during boom), Marxian's prediction fails. Thus, increasing return to scale is logically inconsistent with labor theory of value.

4.4 Summary: Inconsistent Premises Causes Logical Contradictions in Marx's Price theory

To summarize, there are five different price theories in Das Kapital to explain changes in market monetary price: oscillation of market monetary wage and fluctuation of market monetary wage. First, Marx assumed implicitly that market is in disequilibrium under given supply curve and demand curve. Consequently, market monetary price (wage) converges to value (subsistence). Second, there are different values for the same commodity because each firm has its own organic composition so that there are different market monetary prices in a single market. Third, both supply curve and demand curve shifts because of second elements (e.g., war, credit, competition, inflation and business cycle) but Marx did not analyze second elements in Das Kapital so that Marx omitted analysis for shifting in supply curve and demand completely. Fourth, Marx knew that market monetary prices of different commodities may rise together (i.e., inflation) or fall together (i.e., deflation) but Marx neither provided explanation for deflation and inflation nor concerned the problem of transformation from value into market monetary price caused by inflation and deflation. In addition, we have to consider both oscillation and fluctuation of market monetary price when we discuss transformation from value into market monetary or market monetary equilibrium price. Fifth, wage is price of labor and value of labor (i.e., value of labor power) is equal to subsistence while the concept of subsistence is another premise in Das Kapital because subsistence is determined by cost to reproduce labor power but subsistence is independent of not only exchange value but also supply and demand in Das Kapital. Besides, we can derive surplus value from subsistence and value because surplus value is the difference between subsistence and value.

5. Conclusion Remarks

5.1 Summary

There are two independent economic regimes in Das Kapital. One is built on labor theory of value only, e.g., surplus value is the source of profit and tendency of rate of profit to fall is constructed on constant capital, variable capital and surplus value. The other is constructed on supply and demand only, e.g., maximum return rate on capital and imbalance between supply and demand causes both oscillation and fluctuation of market monetary price. These two independently economic regimes are true because each regime is logically deduced from its own premises (i.e., axioms). Since Marxian believes that these two independently economic regimes coexist due to dialectic, Marxian succeeds all myths, paradoxes and confusions caused by Marx's inappropriate combination of labor theory of value and the analysis of supply and demand to explain phenomena in capital economy. For instance, surplus value is the ultimate source of profit but Marx never discussed the way that capitalists pursue profit following supply and demand (i.e., maximum return rate on capital). If labor theory of

value and the analysis of supply and demand are coordinated to determine profit like Bernoulli's principle and gravity cooperatively determine flying and landing of airplane, labor theory of value and the analysis of supply and demand coexist as well as the methodology of dialectic works. But I showed that labor theory of value and maximum return rate on capital cannot work together to determine on and only one return rate on capital in section 2. Thus, coexistence is impossible and dialectical approach fails to bring us true conclusions, which results from inconsistent premises.

It is worth noting for two points. First, Marx mentioned competition and monopoly frequently but Marx never analyzed difference in effects, arising from competition and monopoly, on return rate on capital or Marx's profit rate based on either labor theory of value or supply and demand (e.g., profit under monopoly is higher than competition) in *Das Kapital*. Second, Moseley (2016) and Green (1978) stated value is not directly observable and monetary price is the appearance of value so that we cannot empirically deny labor theory of value. But we can logically prove that labor theory of value does not operate in capitalist economy. Since I demonstrated that profit pursue is impossible under labor theory of value (*If A, then $\sim B$*) and we observe supply and demand operate (*B*) in capitalist economy, we conclude that *If B, then $\sim A$* . Thus, value does not operate to determine not only market monetary price and exchange ratio (i.e., relative price) but also profit and return rate on capital in capitalist economy. That is the reason why we have to reject labor theory of value to be a theory which explains capitalist economy and real world.

When we read Marx's labor theory of value and Marx's analysis of capitalist economy based on supply and demand separately, *Das Kapital* is true. But the falsity of *Das Kapital* emerges when we try to synthesis labor theory of value and the analysis of supply and demand to determine exchange ratio (i.e., transformation problem) and return rate on capital (i.e., profit). Despite no matter how hard we try, myths, paradoxes and confusions in *Das Kapital* will not be eliminated due to the reason that it is impossible to delete inconsistent premises from *Das Kapital* because labor theory of value cannot explain everything (e.g., inflation, financial crisis and business cycle) so that the debate between Marxian and Non-Marxian will not end.

Since we can replace the analysis of supply and demand in *Das Kapital* by modern economics and we know that labor theory of value does not logically operate in capitalist economy because labor theory of value and the analysis of supply and demand are exclusive and supply and demand operate in capitalist economy, inconsistent premises makes *Das Kapital*, at best, be a book in which Marx theoretically construct an economic regime on exchange with equal value and subsistence wage in which some economic phenomena (e.g., impoverish of labor and antagonism between capitalist and worker) that are actually observed in capitalist economy can be logically derived from the economic regime constructed on labor theory of value and subsistence wage. But this economic regime is exclusive from capitalist economy because exchange with equal value and subsistence for wage do not logically operate in capitalist economy (i.e., Marx's economic regime based on labor theory of value is logically different from real world because the matter of fact is that capitalist economy operates under supply and demand in real world). Thus, *Das Kapital* is not a book to truly explain capitalist economy. But dialectic is not wrong methodology and labor theory of value is not logically false theory in *Das Kapital*. The fatal mistake that Marx made in *Das Kapital* is to combine two inconsistency premises (value versus supply and demand), which is a logical contradiction.

As Wilde (1991) stated "Social theorists tend to be remembered for their conclusions rather than the way in which they conducted their inquiries, but if we neglect to study the latter it is quite likely that we will misunderstand or misconstrue the former," *Das Kapital* has been misunderstood to be a book which truly explains capitalist economy by economists for centuries because economists have never recognized that inconsistent premises exist in *Das Kapital* yet. Thus, we should reject Marx's explanations (e.g., exploitation) and predictions (e.g., tendency of rate of profit to fall), which are constructed on labor theory of value and subsistence wage only, for capitalist economy in *Das Kapital*. But we keep Marx's theories which are based on supply and demand only.

Finally, labor theory of value and surplus rate (i.e., exploitation rate and subsistence wage) is not the ultimate reason for antagonism and class struggle between worker and capitalist because antagonism and class struggle, which are dialectical contradiction, is caused by opposition between labor share (wage) and capital share (return to capital), not the method (e.g., labor theory of value versus supply and demand) to distribute output into labor share and capital share. Increase in labor share implies decrease in capital share and vice versa, which is the essential characteristic of opposition between worker and capitalist. Marx used surplus rate to determine labor share and capital share. Productivity of labor and productivity of capital (functional distribution in microeconomics) decide labor share and capital share in capitalist economy. Since labor theory of value and the analysis of supply and demand are inconsistent and capitalist economy operates under supply and demand, labor

theory of value is not the way by which income is distributed into wage and return to capital in capitalist economy but functional distribution is so that labor theory value is not the reason to cause antagonism and class struggle between worker and capitalist in capitalist economy. In other words, subsistence wage, surplus value and exploitation do not logically exist in capitalist economy which is real world, but in the illusory dialectical contradiction created by Marx's imagination like Kant's imagination.

5.2 Communism under Supply and Demand

The failure of Das Kapital does not imply that communism will be impossible to replace capitalism in the future. Ting (2020) understood that automation is possible to make wage below subsistence if income is functionally distributed by productivity of input factors and productivity of capital is so high that labor share is below subsistence for living. Consequently, automation would make capitalist economy collapse because workers cannot survive while wage is below subsistence. It is worth noting that industrial revolution and technology progress is equivalent to automation – labor is replaced by machine. Thus, collective property right is inescapable under this circumstance. Since Ting's argument about collapse of capitalist economy is different from Marx's argument that tendency of rate of profit to fall leads capitalist economy to collapse, Ting (2020) demonstrated that it is possible we derive the same conclusion from (e.g., collapse of capitalism) different premises (e.g., tendency of rate of profit to fall derived from value versus low labor share derived from functional distribution under supply and demand) while these premises are inconsistent. It coincides with the statement above that we can derive whatever conclusions, true or false, from inconsistent premises.

To raise productivity and promote innovation and technology are critical for the efficient resource allocation and the growth of the society under collective property. Besides, Adam Smith is dialectic because egoism is opposite to altruism but egoism (e.g., profit pursue) may promote altruism (e.g., consumers welfare). Thus, we ought to investigate the role of supply and demand in the society under collective property right in order to work out economically optimal regime.

5.3 Equalization of Profit Rate and Tendency of Rate of Profit to Fall

Marx (Vol. III, p. 297) wrote "Capital withdraws from a sphere with a low rate of profit and wends its way to other that yield higher profit." That is the fundamental idea of capital mobility and Marx's equalization of profit rate. Equity is the amount of monetary capital that entrepreneurs invest in order to establish the firm. On balance sheet, asset that is equal to the sum of equity and borrowing is the amount of monetary capital needed to operate the firm. The firm intends to maximize return rate on equity instead return rate on asset. Return rate on capital is the key factor to determine capital mobility while the firm is also devoted itself to maximizing return rate on asset which determines the size of the firm and efficiency of production (i.e., maximum ratio of output to input).

Since Ting (2020) concluded that Marx's definition of profit rate is identical to the profit rate of a single unit product instead return rate on equity, Marx's profit rate is not necessary to be equalized and capital mobility does not obey Marx's profit rate. Even Nordhaus (1974) and Feldestein and Summers (1977) confused Marx's profit rate of a single unit product with return rate on equity. Besides, return rate on equity could be high even if profit rate of a single unit output is low because the volume of output is sold under such large quantity that induces huge absolute amount of profit when profit rate of single unit product approximates to zero, e.g., Google, Facebook and Youtube. Since low profit rate of a single unit product does not imply low return rate on equity, tendency of rate of profit to fall does not lead the firm to be bankrupt. Thus, the crucial conclusion of Marx that tendency of rate of profit to fall does cause crisis and collapse of capitalist economy is false even some economists (e.g., Basu et.al, 2013) found empirical evidence for rate of profit for a single unit product to fall.

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