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# The Falling Rate of Profit Thesis Reassessed: Toward a Sociology of Marx's Value Theory of Labor

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To the Graduate Council:

I am submitting herewith a thesis written by John Hamilton Bradford entitled "The Falling Rate of Profit Thesis Reassessed: Toward a Sociology of Marx's Value Theory of Labor." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Arts, with a major in Sociology.

Harry F. Dahms, Major Professor

We have read this thesis and recommend its acceptance:

Stephanie Ann Bohon, Robert Gorman

Accepted for the Council:

Dixie L. Thompson

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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Accepted for the Council:

Carolyn R. Hodges

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Carolyn R. Hodges, Vice Provost  
and Dean of the Graduate School

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**The Falling Rate of Profit Thesis Reassessed:  
Toward a Sociology of  
Marx's Value Theory of Labor**

A Thesis  
presented to  
for the Master of Arts degree  
the University of Tennessee, Knoxville

**John Hamilton Bradford**  
**August 2007**

## Abstract

Marx considered his theory of the falling rate of profit to be one of the most important discoveries in the field of political economy. According to Marx's theory, productivity increases put downward pressure on prices and hence profits. Recurrent crises of capital devaluation are both the consequence and solution to this pressure, aggravating the loss of profits initially, but enabling the pursuit of profits via accumulation to once again ensue. Marx's argument, however, has been the subject of intense dispute for over a century. His critics charge that Marx's thesis is not only improbable but impossible.

This study is an attempt at arbitration of this dispute, inspired by recent quantitative reinterpretations of Marx's critique of political economy. In the interest of providing a detailed review of the theoretical and empirical literature surrounding this issue, I specifically address the debate about the "transformation" of values into prices. Resolving this issue not only removes some a priori objections to Marx's value theory, it also provides a coherent interpretation of Marx's falling profit rate thesis. It appears, then, that the alleged refutations of Marx have themselves been refuted.

In addition to investigating the *logical* validity of Marx's argument, I attempt to ascertain whether and to what extent his argument is supported *empirically*. I therefore conduct a multivariate time-series regression analysis of various profit rates in the United States. I test several partially competing hypotheses concerning the most important determinants of the profit rate. Most importantly, I operationalize Marx's concept of value by calculating an aggregate ratio of total price to total labor hours. I find that accelerating value accumulation correlates with a falling rate of profit, which is entirely consistent with Marx's thesis.

Sociology, knowingly or not, has always been the study of *modern* society. Because of this, I suggest that there are certain core processes at work that are necessary for its reconstitution and which therefore retain a spatial and temporal contiguity. My aim in this study is to help reclaim for sociology the investigation of one of modern society's most fundamental processes: the accumulation of value.

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## I. Introduction

This study is about profit as a sociologically useful and relevant concept: what it is, where it comes from, and how it varies over time. It is an investigation into the most influential attempt to understand profit to date: Marx's value theoretic approach. According to this theory, profit generation is the primary motivating force of modern capitalist economies. Profit generation is a juggernaut whose momentum carries us along for the ride. Profit is also, according to Marx, inherently exploitative. Profit generation thus entails at once our immiseration and our alienation by social forces that we create but do not control.

The first part of this study analyzes Marx's value-theoretic account of profit generation in capitalist societies, providing a brief account of his value theory and the so-called "transformation problem" that encompasses the relation between value and price. The solution to this hitherto intractable problem is accomplished, I argue, by a group of contemporary Marxian scholars who dispense with the sacrosanct assumption of static equilibrium. This solution, in turn, has stirred new controversy over the internal consistency and accuracy of Marx's famous law of the tendency for the rate of profit to fall. I review this debate, and endeavor to formally demonstrate that Marx's conclusions are indeed consistent with his premises.

The second part of this study investigates the historical trend of various nominal profit rates in the United States for the past half century. Using a multivariate time series regression strategy, my goal is to identify the relative importance of several proposed



determinants of the profit rate. One of my findings is that the data do not support the argument that employment levels play a role in the ability of labor to collectively bargain for a higher wage. In addition, I employ the first time series regression analysis to date utilizing an independent variable that operationalizes the Marxian concept of the “monetary expression of labor time,” an aggregate ratio of total price to total labor hours that enables the conversion of monetary magnitudes into value terms.

My primary finding is that accelerating *value* accumulation results in a falling rate of profit. This is entirely consistent with Marx’s falling profit rate thesis. I also find support for the “realization failure” hypothesis: wages tend to grow slower than the economy as a whole. Both of these hypotheses have traditionally provided the basis for a theory of capitalist crisis. In addition, I find no evidence supporting the hypothesis that falling profit rate trends are due to intensified international competition. These findings suggest that the antinomy in academic debates between proponents of the realization failure and falling profit rate thesis is illusory: they are but two descriptions of a single, more complex process. Social scientists must avoid the temptation to hypostatize value and to reify economic data more generally.

## II. Marx's Value Theory of Labor

Marx begins *Capital* with an analysis of the commodity, which has both a use-value and an exchange-value. In societies based upon the capitalist mode of production, Marx maintains that commodities are no longer primarily objects of utility or consumption, but exchange-values, or goods and services created and provided for the explicit purpose of making a profit. Because exchange-value is a social relation, Marx insists that the commodity is not a natural thing, but a social construct, expressing in elementary form the wealth of modern societies (1990: 126). The accumulation of wealth, in other words, appears as the abstract accumulation of value, which in turn presupposes that labor too, “in so far as it finds its expression in value” possesses both a use-value and an exchange-value. Marx credits himself with the discovery of this twofold nature of labor in modern societies, and bases his theory of exploitation upon their quantitative divergence.

For Marx, labor does not possess value, but creates value. It adds new value in the production process. Capitalists, however, do not pay for labor, but rather, pay for a *generic* capacity to perform labor. Marx refers to this abstract capacity as labor-power. Labor-power has an exchange-value. It also has a use-value to the capitalist, which is concrete labor itself. Because commodified labor does not merely produce use-values, but “use-values for others” (1990: 131), it inaugurates a new principle of social organization in which “relations of personal dependence” no longer “form the given

social foundation” and in which “labour and its products . . . assume a fantastic form different from their reality” (1990: 170).

A surplus arises when the value of a worker’s labor-power is less than the value that labor produces during production. This difference is called surplus-value, and it is also the time spent working in excess of the amount of work required to reproduce one’s livelihood. Surplus-value is thus surplus-labor time and is the exclusive source of profit in capitalist society, according to Marx.

Capitalists try to increase surplus-value in one of two ways. One way of increasing surplus-value is to lengthen the working day without a corresponding increase in labor compensation. Marx refers to this as the production of *absolute* surplus-value. Historically, this kind of surplus extraction prevails during the early stages of capitalism, when production for use initially becomes production for profit under capitalist ownership. The production process itself remains relatively unchanged. Marx refers to this early stage of capitalist production as the *formal* subsumption of labor. Another method of increasing surplus value is to decrease the necessary labor time needed to reproduce labor-power. This occurs by cheapening the value of the labor-power commodity itself by increasing productivity. Marx refers to this as the production of *relative* surplus value. Historically, this corresponds to the *real* subsumption of labor that begins when capitalists constantly revolutionize the means of production. The production of relative surplus value thus necessarily entails the mechanization of production. Although the production of relative surplus value is a defining feature of fully developed, mature capitalism, the extraction of absolute surplus-value is still extant. An increase in

working hours in the US, for instance, over the past few decades is well documented (Schor 1992).

Marx argues that “what exclusively determines the magnitude of the value of any article is therefore the amount of labour socially necessary, or the labour-time socially necessary for its production” (1990: 129). He goes on to define socially necessary labor time as “the labour-time required to produce any use-value under conditions of production normal for a given society and with the average degree of skill and intensity of labour prevalent in that society” (1990: 129). This is one way of saying that less efficient producers do not generate more value simply by expending more labor time.

Marx distinguishes value, which is determined by labor-time, from both use-value and exchange-value. The magnitude of use-value corresponds to the physical quantity of commodities, or material wealth, whereas exchange-value is a commodity’s price, or the value it receives on the market. Marx’s law of value asserts that *value* is determined by the expenditure of socially necessary labor time. Nowhere does Marx argue that labor is the only source of *material wealth*.<sup>1</sup> Commentators frequently confuse the two.<sup>2</sup> In fact, he argues in *Capital* that use-values are the “combinations of two elements, the material provided by nature, and labour” (1990: 133). Consequently, there is always a “material substratum” that is “furnished by nature” (133). And again in the *Critique of the Gotha Program* he states emphatically that, “Labour is *not the source* of all wealth. *Nature* is

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<sup>1</sup> By material wealth I mean use-values. These are not necessarily physical objects, however. Marx stresses that a use-value satisfies a need. Whether this need “arise[s] . . . from the stomach, or the imagination, makes no difference” (1990: 125).

<sup>2</sup> John Roemer, for instance, argues that “labour power as a commodity is not unique in its magical property of producing more surplus value than it embodies. Indeed, in an economy capable of producing surplus, any commodity has this magical property” (1989: 100).

just as much the source of use values (and it is surely of such that material wealth consists!)” (1978: 525).

Marx’s labor theory of value<sup>3</sup> should not therefore be implicitly understood as an ahistorical labor theory of wealth. Instead, Marx’s theory is an attempt to answer the question: “Why is labor represented by the value of its product and labor-time by the magnitude of that value?” (1990: 80). For this reason, Raya Dunayevskaya (1988: 138) argues that Marx’s labor theory of value should instead be called a “value theory of labor” because “the process of production has mastery over man, instead of the opposite” (1976: 174-75). Value, or wealth in the abstract, is for Marx “an automatic subject” (1990: 255) and the “sole driving force” (1990: 254) that animates the circuit of capital, whereby money is transformed into commodities and back into money again, or M-C-M’. It is for this reason that Ollman (1979) writes that abstract labor not only creates value, value as a condition creates abstract labor. Marx’s project is an attempt to understand how the logic of capital becomes a “self-moving substance” (1990: 256) that acts over and against the individuals that collectively produce it. In other words, his critique of political economy is fundamentally a critique of alienation understood as a process of fetishization.<sup>4</sup>

Marx writes that exchange-value is the “necessary mode of expression, or form of appearance” that value necessarily takes in modern societies. Value, which is determined by labor time, is the essence of exchange-value. Essence, however, does not mean

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<sup>3</sup> Marx never uses this phrase. Instead, he called it “the law of value”, or the “determination of value by labor-time.”

<sup>4</sup> John Holloway (2002) distinguishes between two understandings of the fetish: hard fetishism and fetishization-as-process (29). The former understands fetishism as an “established fact” whereas the later understands it as a “continuous struggle” (29).

ineffable or mysterious. As Derek Sayer points out, by essential relations, Marx simply means those “conditions of existence of the phenomenal forms” that explain “why phenomena should take such forms” (1979: 9). They are the preconditions for the manifest forms. By saying that value is the essence of exchange-value, Marx is in effect stating that the precondition of the monetary commensuration of commodities, as it exists in its historical specificity, is the social commensuration of human activity in the form of socially necessary, abstract labor. Consequently, abstract labor does not refer to an arbitrary subjective mental classification, but rather, to an objective historical process of commensuration. He states that, “although an abstraction this is a historical abstraction which could only be adopted on the basis of a particular economic development of society” (1941: 106).<sup>5</sup>

Marx refers to this new, self-mediating principle of social organization as the law of value. This law describes the “historical abstraction” that establishes new dependencies upon quasi-objective, impersonal social structures. A society governed by the law of value is one in which,

“all the different kinds of private labor are continually being reduced to the quantitative proportions in which society requires them. The reason for this reduction is that in the midst of the accidental and ever-fluctuating exchange relations between products, the labour-time socially necessary to produce them asserts itself as a regulative law of nature” (1990: 168).

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<sup>5</sup> This is the crucial difference between Marx and his early critics such as Eugen von Bohm-Bawerk who proposed instead that abstract utility was the common substance found in all commodities. The idea that all commodities possess utility is accurate in the sense that they all possess a use-value, but it is an ahistorical concept that does not grasp the preconditions of production for exchange.

## Interpreting Marx Quantitatively

Mathematical formalizations of Marx's theory are in fact implicit interpretations of his theory that presuppose certain concepts that Marx may or may not have shared. The primary justification for the exclusion of Marxian value theory from economics and sociology<sup>6</sup>, is based upon a specific quantitative interpretation of Marxian value theory that failed to make sense of Marx's work, and therefore dismissed it as internally inconsistent. I will show, in this section of the paper, that subsequent scholarship has refuted these allegations.

Marx's project is not *primarily* quantitative, since he was most concerned with bringing about qualitative social transformation, but it is true that Marx's value theory posits several determinate quantitative relationships. For Marx, all new value is created solely by living labor. Workers, however, receive only a portion of the value they produce, which is equivalent to the value of labor-power. Marx refers to the money advanced by capitalists to acquire labor-power as *variable capital*. He refers to the money advanced to acquire machines and other non-labor inputs as *constant capital*. The difference between the value of the output and the value of inputs (variable and constant capital) is called *surplus-value*. Surplus-value is also the difference between the value

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<sup>6</sup> The perhaps best exemplified by the *American Journal of Sociology* symposium on exploitation in 2000, where Aage B. Sorenson rejected Marx's value theory as an adequate basis because "it was abandoned long ago" (1524) and also because "the hidden source of the exploitation makes it impossible to use empirically" (1529). He proposes instead that a concept of exploitation be based upon the (equally unobservable) neoclassical concept of rent, which occurs whenever prices depart from their imaginary equilibrium magnitude. What is most interesting, however, about this symposium is that all participants, including the noted Marxian economist Erik Olin Wright, agreed, without providing explicit reasons, that Marx's labor theory of value is fundamentally flawed, outdated, and in need of replacement.

produced by living labor and the value of labor-power, and the difference between necessary and surplus labor-time.

The value of outputs equals the sum of these inputs:

1)  $C + V + S = \text{Value of outputs}$

2)  $L = V + S$

In equation 2, L refers to living labor, V to variable capital, and S to surplus-value. C is constant capital, which, according to Marx, transfers its pre-existing value, but does not generate any new value. Marx refers to the ratio of C to V as the *organic composition of capital*.<sup>7</sup> In modern terms, it is the capital to labor ratio. As the organic composition of capital rises, the relative portion of available surplus falls. The rate of exploitation is given by the ratio  $S/V$ , and the Marxian rate of profit is the amount of surplus extracted over total investments (both constant and variable capital):

3)  $R_v = S/(C+V)$

In keeping with Marx's famous circuit of capital  $M-C-M'$ , the rate of profit can also be thought of as  $M/M'$ , the ratio of the original money advanced to the money received (Sweezy 1970: 141).

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<sup>7</sup> The organic composition can also be thought of as  $c/(c+v)$ , the ratio of constant capital to total capital (Sweezy 1970: 66).



Marx concluded that, at the aggregate level, the *value rate of profit* given in equation 3 strictly determined the aggregate *price rate of profit*, given in equation 4.

$$4) R_p = P / (C + V)$$

K here refers to the sum total of capital stocks and investments, which include money advanced to acquire labor. For Marx, this means that profits ultimately depend upon the extraction of surplus value from living labor. Marx writes that, “the average rate of profit is nothing other than total surplus value related to and calculated on this total capital” (1991: 104). In addition to the aggregate equality of the value and price rates of profit, Marx calculated two additional aggregate equalities: total profit equals total surplus-value, and total *price of production*<sup>8</sup> equals total value.

Marx’s aggregate equalities account for the fact that profit rates tend to equalize across sectors of the economy with varying organic compositions. An industry that employs more labor does not necessarily receive higher profits. Assume two industries with equal rates of surplus value (S/V), equal amounts of advanced capital (C+V), and different organic compositions. If industry A has 90 units of constant capital and 10 units of variable capital, and the rate of surplus extraction is 50 percent, then the total value produced is  $90 + 10 + 5 = 105$ . Industry B, however, has 50 units of constant capital and 50 units of variable capital. Again, assuming an equal rate of surplus extraction at 50 percent, the total value produced is  $50 + 50 + 25 = 125$ . It would therefore seem that industry

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<sup>8</sup> Price of production for Marx is simply the cost of inputs, which he calls cost-price, plus the average rate of profit.

B would be more profitable. In the real world, however, profit rates tend to equalize. Assuming a general or average profit rate of 20 percent, the value received by each industry would equal the total capital advanced, 100, plus the 20 percent mark-up, or 120 units of value. Industry B would therefore receive less value than it produces, whereas industry A would receive more value than it produces. Differences in the organic composition of capital therefore “prevent goods from exchanging in proportion to their values, even in equilibrium” (Sowell 1985: 122). Marx argues that the values of *individual* commodities will, in general, not equal their prices, stating that:

The possibility, therefore, of a quantitative incongruity between price and magnitude of value, i.e. the possibility that the price may diverge from the magnitude of value, is inherent in the price-form itself. This is not a defect, but, on the contrary, it makes this form the adequate one for a mode of production whose laws can only assert themselves as blindly operating averages between constant irregularities (1990: 198).

The market is therefore the mechanism by which the redistribution of pre-existing value takes place.

The conventionally defined rate of profit is:

$$5) R = p/K$$

$p$  is annual profits received in a given year, and  $K$  is total capital stock. It is the same as Marx’s price rate of profit,  $P/(C+V)$ . The profit rate can be further decomposed into:

$$6) p/K = (p/Y) (Y/K)$$

Y is equal to total annual output, or income.  $p/Y$  is known as the *profit share*. One minus the profit share can be thought of as labor's share of income.  $Y/K$  is the *output-capital ratio*. Its inverse has been used as an empirical proxy for the organic composition of capital, as defined by  $C/L$  because total net output, Y, is the product of living labor, L. It is also sometimes referred to as the maximum profit rate<sup>9</sup> since Y would equal profits if wages were zero (assuming maximum capacity is being utilized). To test capacity utilization effects, the output-capital ratio itself can be decomposed:

$$7) R = (p/Y) (Y/Z) (Z/K)$$

Here  $p/Y$  is the profit share,  $Y/Z$  is the rate of capacity utilization, and  $Z/K$  is the capacity capital ratio. The latter variable, the capacity capital ratio, can be further decomposed into:

$$8) Z/K = (Z_r/K_r)(P_y/P_k)$$

$Z_r$  and  $K_r$  are capacity and capital values in "real" or constant dollars. A current dollar is equal to a constant dollar multiplied by the price index for particular year.  $P_y$  and  $P_k$  therefore refer to the separate price indices for output and fixed capital assets.

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<sup>9</sup> The Russian mathematician George von Charasoff first pointed out in 1910 that any increase in the organic composition of capital reduces the maximum possible profit rate, since if wages are zero, the rate of profit is  $s/c$ , "the inverse of the ratio of dead to living labor" (Howard and King 1992: 131).

## The Value Price Transformation

The preceding quantitative exposition is generally accepted without reservation. Real disagreements, however, arise over the question of how the values of constant and variable capital are actually determined. According to the traditional interpretation that prevailed for nearly a century, the values of inputs are determined simultaneously with the values of outputs, so that they are necessarily equal. In addition, prices and values constitute separate systems. According to the traditional view, however, Marx's value theory is "internally inconsistent" and therefore *necessarily* false.<sup>10</sup>

The most influential alleged proof of internal inconsistency is that of Ladislaus von Bortkiewicz (1952), who between 1906 and 1907 wrote four essays asserting that a society in which the law of value prevailed would not be able to reproduce itself. It is noteworthy that Bortkiewicz considered himself a Marxian economist. Paul Sweezy later popularized his argument in 1942 with the publication of *A Theory of Capitalist Development*. The crux of the argument is straightforward. Assume that Department I produces machines, or constant capital inputs, for all other sectors of the economy. Assume that Department II produces the means of subsistence, or consumer goods, for workers in all industries. Finally, Department III produces luxury goods for capitalists to consume. Department I is, unsurprisingly, more capital intensive than the other two. To

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<sup>10</sup> The importance of the question of internal inconsistency is asserted forcefully by Kliman: "Internally inconsistent theories may be appealing, intuitively plausible and even obvious, and consistent with all available empirical evidence- but they cannot be right. It is necessary to reject them or correct them. Thus the alleged proofs of inconsistency trump all other considerations, disqualifying Marx's theory at the starting gate. . . . The reclamation of *Capital* from the myth of inconsistency is therefore an absolutely necessary and vital precondition to any efforts to reclaim it in more ambitious ways" (2007: 3).

simplify matters, assume also that one hour of socially necessary labor-time represents \$1, which represents one physical quantity of output.

For Bortkiewicz, the values of inputs are “transformed” by Marx into output prices. In order for the system to reproduce itself, the value of outputs must equal the value of inputs. I demonstrate his reasoning in Table 1 using an adapted version of an example given by Paul Sweezy (1970: 113). Bortkiewicz assumes an average profit rate of 33% across all sectors. The output prices, which Marx refers to as prices of production, for individual industries are therefore given by the equation  $C+V+.33(C+V)$ . This is the price of inputs plus the average profit rate markup.

The problem for Bortkiewicz is that the values of the inputs to production do not equal the prices of the outputs. For instance, workers are paid 200 yet the price of what they consume is only 166. Sweezy writes that this result “could be justified only if we were to make the assumption that workers accumulate capital to the extent of  $33 \frac{1}{3}$  out of their incomes” (1970: 115). Moreover, the equality of total price and total value at 800 is a mere accident of the numbers, and does not hold generally. Sweezy therefore reasons that, “only one conclusion is possible, namely, that the Marxian method of transformation is logically unsatisfactory” (1970: 115). From here, he calculates, using simultaneous equations, what the prices *would have to be* in a hypothetical equilibrium economy.

This mathematical formalization assumes that output prices must equal input prices. Because of this, it is a *simultaneous interpretation*. It also assumes that values must be transformed into prices. Values and prices thus constitute separate accounting systems and the problem is therefore to translate or map one system onto the other. It is

therefore also a *dual-system interpretation*. These two assumptions are usually justified by invoking the concept of equilibrium, which, according to a standard economics textbook, refers to a “constellation of selected interrelated variables so adjusted to one another that no inherent tendency to change prevails in the model which they constitute” (Fritz 1958: 9). Yet, describing a situation in which there is “no inherent tendency to change” is quite at odds with Marx’s project to “lay bare the economic law of motion of modern society” (1990: 10). Those who interpret Marx as an equilibrium theorist emphasize capitalism’s ability to reconstitute itself, conflating non-equilibrium with social collapse. As I will demonstrate below, however, non-equilibrium models can also account for society’s reproduction. In fact, simple reproduction or stasis is merely a special case of motion. Marx’s value theoretic approach can account for both.

In the past few decades, Marxian scholars have challenged the interpretive validity of both simultaneous valuation and dual-system determination. Proponents of the so-called New Interpretation (NI), single-system interpretations (SSI), and temporal single-system interpretations (TSSI) all arose concurrently in the 1980s (Kliman 2007: 52). The NI (Dumenil 1980; Foley 1982) challenges Bortkiewicz’s dual system interpretation of the value of labor-power, but not the dual-system interpretation of constant capital. SSI’s (Wolff, Roberts, and Callari 1982; Lee 1993; Moseley 1993) question the dual-system interpretation of both constant and variable capital, and because of this, they are able to preserve all three of Marx’s aggregate equalities. SSI’s do not, however, derive Marx’s conclusion about falling profit rates.

TSSI’s were first proposed by those working on the transformation problem (Perez 1980; Carchedi 1984) and subsequently used to defend (Ernst 1982) Marx’s Law

of the Tendential Fall in the Rate of Profit (LTFRP). It first became collectively and self-consciously articulated, however, with the publication of *Marx and Non-Equilibrium Economics* in 1996, a collection of essays edited by Alan Freeman and Guglielmo Carchedi. I will devote most of my attention to the TSSI because it is the only quantitative interpretation of Marx's value theory that has successfully deduced all of Marx's conclusions from his premises. The TSSI successfully preserves all three aggregate equalities, and also successfully defends the consistency of Marx's falling profit rate thesis. Because of this, the TSSI meets hermeneutical standards of textual interpretation, specifically, George Stigler's (1965) principle of scientific exegesis which states that, in short, an interpretation that is able to make sense of the text is the correct interpretation. The TSSI does just that.

Along with SSI's, the TSSI maintains that the values of constant and variable capital are determined by the amount of money needed to acquire them. Value and price are not separate systems that have to be mapped onto one another, but are instead, mutually constituted. Unlike other SSI's, however, the TSSI maintains that the prices of inputs do not equal the prices of outputs. The prices of outputs, in other words, are the prices of inputs at the beginning of a *subsequent cycle of production*. Instead of relying on simultaneous equations that posit that goods are sold at the prices at which they were previously purchased, the TSSI employs a sequential model of determination. This alone is sufficient to refute the allegation of internal inconsistency. My TSS solution<sup>11</sup> to Table 1 is provided in Table 2. The only difference is that Table 2 includes two production periods rather than one.

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<sup>11</sup> The refutation is my own, but the method behind the refutation is explained by Kliman (2007: chapter 9).

It is first important to remember that both years 1 and 2 represent the same physical quantity of goods. Only their values have changed. In addition, I assume that workers work for the same duration and intensity in each time period. The amount of new value added in production is therefore set by the amount of living labor performed, and is equal to 400 in both time periods. This is provided by the equation  $L=S+V$ . The sum total of S and V in Period 1 is 400. I therefore maintain this sum in Period 2 for consistency.

Because the price of the original 400 units of constant capital has risen to 433 at the end of period 1, the total cost of these 400 units equals 433 at the beginning of period 2. Each individual unit of constant capital therefore costs  $433/400$ , or 1.08. Likewise, the individual unit cost of consumer goods is  $166/200$ , or .83. Consumer goods are therefore cheaper than before, while the means of production are more expensive.

Because this model assumes simple reproduction, the same physical quantity of constant and variable capital is purchased as before in each industry. The prices paid by each industry for constant capital is therefore equal to the per-unit price of constant capital times the physical quantity of constant capital. The per-unit price is simply the ratio of the price at the end of period 1 to the total value at the beginning of period 1. For example, because each unit of constant capital costs 1.08 at the end of period 1, Industry I spends a total of  $1.08*250=270$  on constant capital at the beginning of period 2.

Likewise, because each unit of variable capital costs .83 at the end of period 1, Industry I spends a total of  $.83*75=62.25$  on variable capital at the beginning of period 2, and so on.

The same amount of *new* value, however, is generated in period 2 because the same amount of labor is employed. Because consumer goods are cheaper, however, less



money is needed to hire labor-power. The difference between the total amount of value produced and variable capital is, as always, surplus-value. The rate of surplus-value,  $S/V$ , has consequently risen from 100 percent to 140 percent. In addition, the total value of the economy has risen from 800 to 832 because of the value transferred to constant capital from the previous production cycle. Simple reproduction has occurred, thus refuting Bortkiewicz's allegation of internal inconsistency.

Notice, however, that the rate of profit, given by the equation  $S/(C+V)$ , has actually risen from 33 percent to roughly 39 percent. This is a result of the stipulation that the prices of inputs equaled their values in the beginning of period 1. When this production process is extended to subsequent cycles in a process called iteration, the profit rate actually falls, so long as the magnitude of living labor remains constant.

Table 2 also demonstrates that the prices of outputs diverge from their original input values, and that these prices then subsequently determine the values of the outputs. The order of determination between prices and values is sequential and cyclical:

9) Input prices<sub>1</sub> → Output values<sub>1</sub> → Input prices<sub>2</sub> → Output values<sub>2</sub>. . .

In other words, the value of inputs is given by their price. Because total price equals, for Marx, total value in labor hours, any fraction of this total monetary value equals a proportional fraction of total value. TSSI authors therefore employ a conversion factor between price and value magnitudes, and call it the Monetary Expression of Labor Time (MELT). The MELT is simply the ratio of the total money price (=value) of output to the

total labor-time value of the output.<sup>12</sup> Consequently, any price can be converted into a labor-value at any given time, and vice versa. Yet, price and value are also distinct, because the output value is determined *before* it goes to market.<sup>13</sup> Its value is thus determined by the value represented by the money spent on constant capital inputs plus the value added by living labor. Once a commodity is sold on the market, however, it will almost always sell above or below its value. The market price system circulates these values, but does not alter the total aggregate magnitude of value, which only grows when production once again ensues.

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<sup>12</sup> This particular way of explaining the MELT was provided to me by Andrew Kliman in personal correspondence. Incidentally, the MELT can be used to give precise meaning to a Marxian concept of exploitation. Surplus-value is simply the difference between the hours a worker works and the value of the wage-bill. For example, if the MELT is \$50/hour and the weekly wage is \$500, a worker receives the equivalent of 10 hours of labor. If this worker works 40 hours per week, then the worker expends 30 hours of surplus-labor. The rate of exploitation would consequently be 30/10, or 300 percent.

<sup>13</sup> Marx writes, “the value of a commodity is expressed in its price before it enters circulation, and it is therefore a pre-condition of circulation, not its result” (1990: 260).

### III. Marx's Value Theoretic Explanation of Crises

#### **The Temporal Single-System defense of Marx's falling rate of profit thesis**

Karl Marx famously posited his “law of the tendential fall in the rate of profit” (LTFRP) in volume 3 of *Capital*. In his notebooks, collectively entitled the *Grundrisse*, he calls this law “in every respect the most important law of modern political economy” (1973: 748). The idea of a falling rate of profit, however, was not new. Classical political economists such as Smith, Ricardo, Malthus, and Mill had all predicted that capitalism would eventually slow down and lapse into a “stationary state with a zero rate of accumulation” (Harvey 1999: 177). With the exception of Smith, however, classical political economists had located the cause of the decline in factors external to capitalism. Ricardo, for instance, argued that declining productivity was the inevitable result of population growth because increasingly less fertile agricultural land would have to be utilized. This would raise the costs of food, which in turn would raise wages and squeeze profits. Marx was scathing in his critique of this idea, saying that Ricardo “flees from economics to seek refuge in organic chemistry” (1973: 754). Marx differs from his classical predecessors because he identifies the falling rate of profit as an endogenous *self*-destructive tendency of capitalist economies.

Marx's LTFRP states that a rising organic composition of capital, all other things equal, will result in a falling profit rate. Marx reasoned as follows: since all new value,

including surplus-value, is created solely by living labor, the less living labor contributes to the production process, the less surplus there is available for extraction by capitalists. Because of capitalism's inherent drive to revolutionize the means of production, human labor is increasingly replaced by machines, which results in a rising organic composition of capital, which in turn depresses the rate of profit. Marx's argument can be summarized using simple algebra (Howard and King 1992: 128)

1)  $K=C/V$

2)  $E=S/V$

3)  $R=S/(C+V)$

The organic composition of capital is  $K$ ;  $E$  is the rate of exploitation; and  $R$  is the (value) rate of profit. Dividing both the numerator and denominator of  $S/(C+V)$  by  $V$  yields the following:

4)  $R=E/(K+1)$

Equation 4 states that the profit rate will rise with an increase in the rate of exploitation, and will fall with a rise in the organic composition of capital. All that is necessary for the profit to fall, however, is for the organic composition of capital to rise at a faster rate than exploitation.

There is some dispute over the meaning of Marx's LTFRP. As Harvey notes, Marx himself identified several counteracting influences to the law, including: “ (1) a rising rate of exploitation; (2) falling costs of constant capital (which checks the rise in

value composition); (3) depression of wages below the value of labor-power; and (4) an increase in the industrial reserve army (which preserves certain sectors from the ravages of technological progress by lessening the incentive to replace labour power by machines)” (1999: 178). Are these counteracting influences, then, able to stabilize the average profit rate, or does the LTFRP predict that it falls permanently? Furthermore, what is the relationship between his LTFRP and capitalist crises? Finally, if there is a connection between the two, does the LTFRP predict the collapse of capitalism, or recurrent crises that it can overcome?

These questions are disputed in the literature. Howard and King (1992), for instance, argue that Marx predicts that, “the rate of profit must eventually decline” despite these counteracting influences. They argue that he relates the falling rate of profit to cyclical crises of increasing severity, but does not clearly specify the causal link between the two. Likewise, David Harvey (1999: 179) argues that Marx at least gives the impression that the *tendential* law predicts an empirical *trend* when he makes statements about capitalism’s inevitable collapse. Still other authors (Geert 1991; Kliman 2007) argue that Marx does not predict that the rate of profit will fall inexorably: “his LTFRP in fact predicts recurrent economic crises that restore profitability- largely by means of the cheapening of the means of production- rather than a falling trend in the rate of profit” (Kliman 2007: 44).

In addition, it would be difficult to discern any trends because available economic data do not correspond to Marxian categories. Harvey (1999) points out that, for instance, that surplus-value, the numerator of Marx’s value rate of profit, is distributed not only as profits, but as rents, interest, taxes, and so on. Nor does this law take into account the

importance of turnover times in the determination of the profit rate.<sup>14</sup> Other authors (Moseley 1985, 1992; Shaikh and Tonak 1994) argue that surplus is also distributed in the form of compensation to *unproductive labor*, or capitalistically employed labor that consumes rather than produces use-values.<sup>15</sup> Examples of non-productive labor include military personnel, security guards, lawyers, bankers, and advertisers. Presumably, then, a Marxian profit rate would have to include the compensation paid to employees engaged in non-productive activities as part of its numerator. Because surplus-value is not exclusively distributed as profits, surplus-value can rise while profits fall, and vice-versa.

Marx acknowledges that the profit rate might fall for other reasons, the most important factor being the rise in real wages brought about by class struggle. His LTFRP, however, predicts that the rate of profit will fall even when these other important factors remain constant. Still, the LTFRP is an entirely abstract law that assumes, among other things, a society with two classes<sup>16</sup> and an entirely closed capitalist economy. The law, therefore, does not take into account military conquest, or other extra-economic influences that might affect the rate of profit. For this reason authors such as Robert Albritton (1999) and Michael Lebowitz (2003) stress that *Capital* should not be read as a

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<sup>14</sup> Harvey argues that, “without a common measure of turnover time, there can be no equalization of profit rates because there would be no standard against which to determine whether the profit rate was higher or lower than average, or even rising or falling” (1999: 187). He proposes that the credit system and the interest rate are necessary to provide the common standard of “socially necessary turnover time” (187).

<sup>15</sup> The distinction does not rely on whether a certain kind of labor is *necessary* or not. Non-productive labor may be necessary in that it produces socially necessary *outcomes*, but it does not produce *output*. Moreover, non-productive workers are exploited like other workers. Moseley (1985, 1992) argues that a falling productive labor to non-productive labor ratio is a primary cause of the falling rate of profit in the United States. David Harvie in his aptly entitled (2005) essay “All Labour Produces Value For Capital and We All Struggle Against Value”, vehemently opposes this distinction, arguing that all abstract labor produces value.

<sup>16</sup> Marx, however, frequently discusses other classes, such as the landowners, the peasants, the petty-bourgeoisie, and even the lumpen-proletariat. He thought, however, that capitalism increasingly split society into the two antagonistic classes mentioned above.

blueprint for history, but as an account of the abstract logic of self-expanding value. Albritton thus argues that Marx makes no empirical predictions whatsoever with his LTFRP, and that it expresses merely the abstract end of capitalism. This is the fate that capitalism would meet if it were to unfold according to its own logic without outside interference. Because society is never completely dominated by this logic, however, this self-destruction does not materialize (1999). Marx's *Capital* is not intended to describe a totality in the Hegelian sense because at least one of its preconditions is not determined by the system itself, and it is therefore not entirely closed. Because the value of labor-power always "contains a historical and moral element" (1990: 275), it is not determined entirely by the market. Lebowitz (2003) argues that because the value of labor-power is determined in the process of class struggle, an extrinsic and antagonistic logic necessarily resists the reifying power of capital (Lebowitz 2003).<sup>17</sup>

Albritton's argument that the LTFRP only expresses an abstract necessity implicitly relies on the assumption that the profit rate would in fact fall if capitalism were left to its own devices. Critics, however, have argued forcefully that there is no reason to assume that this is the case. Marx argues that the tendency of the rate of profit to fall arises from a rising organic composition of capital, all other factors being equal, and he identifies this rising organic composition of capital with rising productivity. Furthermore, rising productivity is the result of the pursuit of relative surplus value and is therefore endogenous to Marx's model of capitalism. Capitalists, however, do not introduce new technologies unless by doing so they can raise their profit rates. Increased productivity

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<sup>17</sup> It is unclear, though, which social logics would save capitalism from itself. Certainly it would not be the logic of wage-labor.

should raise the profit rate because more outputs can be generated per unit of input. In short, labor-saving technical improvements must, according to Marx's critics, necessarily raise the general rate of profit.

The argument that cost-reducing innovations increase the profit rate has a long history.<sup>18</sup> In 1899 both the Italian Benedetto Croce and the Ukrainian Mikhail Tugan-Baranovsky argued that rising productivity entailed a reduction in the value of constant capital, thus offsetting the tendency for the organic composition to rise. Karl Kautsky charged Tugan of committing a "fallacy of composition" by assuming that the results of individual actions could not lead to opposite aggregate effects, but he neglected to address squarely the issue of whether rising productivity raises or lowers the profit rate. Later, Ladislaus von Bortkiewicz attempted to rigorously prove their assertions.

In general, Marx's critics went unanswered. Advocates simply presumed the logical coherence of Marx's LTFRP, while others, such as Kautsky, Rosa Luxembour, and Rudolf Hilferding, preferred to explain economic crises in terms of underconsumption, rather than as the result of a rising organic composition of capital. Later, Natalie Moszkowska (1929), Japanese economist Kei Shibata (1934), and neoclassical economist Paul Samuelson (1957) developed more rigorously the original insights of Croce and Tugan. Their efforts culminated in the Okishio Theorem (1961), according to which, it is not only implausible, but *impossible* for the rate of profit to fall given technical progress and a constant real wage. Okishio's model was later extended by Roemer (1981) to include fixed capital.

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<sup>18</sup> Much of the material for next three paragraphs is taken from Howard and King (1992: chapter 7).



Despite these *a priori* logical objections, some recalcitrant Marxian theorists made the LTFRP a central element of their crisis theories. The first to make this connection explicitly was Erich Preiser, who rejected interpretations of Marx as an underconsumptionist. Henryk Grossman later echoed this position, arguing that Marx's materialist conception of history required that capitalist breakdowns be located in the sphere of production. He argued in addition that Marx's law predicted capitalism's inevitable collapse. Ernst Mandel's *Late Capitalism* (1975), an empirical work, seemed to take Marx's law for granted, while other authors, such as David Yaffe (1973) of the "capital-logic" school explicitly defended Marx's LTFRP, without, unfortunately, defending its logical coherence. Only recently, have TSSI scholars provided logical refutations of the Okishio Theorem, thus demonstrating the internal coherence of Marx's argument.

In order to explain the principle of Okishio's Theorem, I will use Natalie Moszkoswka's example of the limiting case, "where capitalists are indifferent between old and new techniques because the net saving in labor value is zero" (Howard and King 1992: 133). Howard and King (1992) and Alan Freeman (2000) discuss her example at length. I include the original numbers used by these authors, but also extend the model to include a third year.

Moszkoswka assumes a single-sector economy where the only thing that is produced is corn. Workers are only paid one-half of their working day, so the rate of exploitation is 100 percent. Workers therefore consume only half of the net output. Assume for simplicity that 1 labor hour produces one unit of corn, which is worth \$1.

The physically determined profit rate is the ratio of *net* corn output to total corn input, or more precisely,

$$5) P = (\text{Corn output} - \text{Corn inputs} - \text{Corn wages}) / (\text{Corn inputs} + \text{Corn Wages})$$

A scenario of rising physical productivity is depicted in Table 3. For clarification, and keeping with Moszkowska's model, I have indicated the total amount of living labor performed in each year, which remains constant at 340.

Table 3 demonstrates that a rise in productivity does not cause the (physical) rate of profit to fall. Instead, it remains constant at 50 percent. The output of year 2 could have been achieved with the old technology by increasing both corn and labor by 50 percent, yielding:

$$6) 255 \text{ corn} + 510 \text{ labor} \rightarrow 765 \text{ corn}^{19}$$

Howard and King therefore note that,

it is evident that the process uses 85 more tons of corn, with a value of 85, and 170 fewer workers; with the value of labour-power equal to one-half, this represents a savings of 85 units of labour value in the payments of direct labour. Thus the extra labour embodied in the new means of production is exactly equal to the saving in paid labour which the new technique allows, when the labour values of the original technique are used to make the comparison" (1992: 134).

In year 2 constant capital inputs double, or rise by 100 percent, yet corn output rises by 150 percent. Importantly, if productivity had increased beyond this, the rate of profit

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<sup>19</sup> The arrow symbolizes production. It is commonly used in the literature. I do not use an equal size because the sum of 255 and 510 does not equal 765. This is at the heart of the TSSI objection to use-value valuation.

would have actually risen. Something similar happens in year 3. Constant capital input rises, but the output rises even more. In year 1 the organic composition of capital is 1. In year 2 it's 2, and in year 3 it's 3. Because the profit rate has not fallen, Marx's LTFRP is ostensibly refuted.

Notice, however, that in each year the value of corn is strictly determined by the physical quantity of corn. This presumes that the input prices equal the output prices for each period. It therefore flatly contradicts Marx's premise that, "the same labour, therefore, performed for the same length of time, always yields the same amount of value, *independently of any variations in productivity*" (1990: 137, emphasis added). The output of year 1 is 510, which is then advanced to acquire 510 units of input (340 units of constant capital and 170 variable capital). The output of year 2, however, exceeds the sum of the seed corn input and the living labor performed. Because the amount of living labor performed remains constant at 340, the value of the output, if it is to be determined by labor time, must be  $340+340=680$ . The 765 units of corn should therefore have a value of 680, so that each unit of corn equals not \$1, but about 89 cents. Likewise, in year 2 the total amount of value equals 850 (510 units of constant capital plus the 340 units of new value added by living labor). The 1020 units of output should therefore equal 850, and the per-unit value of corn should have fallen to around 83 cents. Table 4 demonstrates in a simplified manner the refutations of the Okishio Theorem developed by proponents of the TSSI (Freeman and Carchedi 1996; Freeman 1999; 2000; Kliman 1996,

1999, 2007; Kliman and Freeman 2000; Ramos-Martinez 2004). Table 4 defends Marx by illustrating that labor-saving technologies *can* cause the general rate of profit to fall.<sup>20</sup>

Another way of arriving at physicalist conclusions, while giving the impression that labor is determined by labor-time, is to employ *replacement cost valuation*. According to replacement cost valuation, inputs are retroactively valued according to their prevailing price at the end of the production cycle, rather than the price at which they were actually purchased. In Table 5 I employ simultaneous, or replacement cost, valuation to arrive at results identical to Table 3. To derive the per-unit cost of corn, I divide the net value added by living labor, which is 340 for each year, by the net product. The net product equals the corn output minus the corn input and corn wages. Once I have this per-unit price, I retroactively determine the input prices.

Unlike Table 3, Table 5 presumes correctly that input unit prices decline with rising productivity. Corn falls from \$2 in year 1 to \$1 in year 3. The profit rate rises, however, because part of the original capital advanced is retroactively devalued. At the end of year 1, there are 510 units of corn each worth \$2. All of this is reinvested, or ploughed back into the soil at the beginning of year 2. The capitalist therefore *must* spend  $510 * \$2$ , or \$1020 to do this. But because of retroactive valuation, each unit of corn *appears* to be worth only \$1.33, so that the capitalist spends only  $510 * \$1.33$ , or \$678. The problem with this, however, is that the capitalist *already* spent the \$1020. The fact that the corn costs less, *after* the \$1020 is spent does not change the fact that the capitalist spent the \$1020. The fallacy of replacement cost valuation is better evinced

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<sup>20</sup> The model I use presumes a falling *general* rate of profit. Individual innovators will raise their profits, at least temporarily, before their technology becomes widespread and the average profit rate falls.

when we assume that the capitalist advances *borrowed* money. A capitalist who borrows \$1 million does not cease to owe the bank simply because the value of what she purchased with that money is no longer worth anything. More importantly, Marx does not assume that input prices equal output prices. Detractors of Marx therefore do not derive their conclusions from Marx's premises, but from their own. The charge of *internal* inconsistency is therefore refuted.

The LTFRP is difficult if not impossible to prove because alternative accounts of the same phenomena exist. The theory, in other words, is irreducible to the data. This explains, in part, the emphasis placed on logical, deductive argument by participants in this debate. John Roemer, for instance, argues that no amount of evidence can save Marx's LTFRP since such evidence "cannot provide refutation of a theory" (1979: 380). Kliman shares this view, stating that, "no facts or data analysis can vindicate the LTFRP" (2007: 115).<sup>21</sup>

Kliman, however, does argue that Marx's falling rate of profit hypothesis is not only possible, but in fact plausible. He argues that the Okishio Theorem does not take into account the "disinflationary or deflationary impacts of rising productivity" (2007: 115). To bolster Marx's argument that rising productivity can depress the general rate of profit, Kliman quotes Alan Greenspan, who states that, "Indeed, the increased availability of labor-displacing equipment and software, at declining prices and improving delivery times, is arguably at the root of the loss of business pricing power in recent years"

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<sup>21</sup> Kliman advises that "researchers who wish to test his theory empirically should . . . focus their attention, not on the observed trend of the profit rate, but on ascertaining whether, and to what degree, the recurrent crises of capitalism are traceable to recurrent declines in capital values, and a tendency for prices to fall, as a result of increasing productivity" (2007: 31).

(quoted in Kliman 2007: 127). Kliman's interprets Marx's LTFRP as a theory of cyclically falling prices and devaluation.

In the examples above inflation is assumed to be constant. In the real world, however, prices are systematically rising. Might this offset the LTFRP? Kliman answers no, because inflation affects input and output prices equally. Changes in the rate of inflation, however, *can* affect the profit rate. Kliman demonstrates that a rising rate of inflation causes “causes sales revenue to increase by a greater percentage than costs increase” raising the nominal rate of profit, whereas a falling rate of inflation increases sales revenue “by a smaller percentage than costs, causing the nominal rate of profit to fall” (2007: 129). What matters, then, is whether the *rate of inflation* falls or rises, *not* whether prices are rising or falling. Disinflation, or a falling rate of inflation then, is sufficient for the profit rate to fall. Furthermore, the rate of inflation can be decomposed into the growth rate of the MELT (monetary expression of labor time) plus the growth rate of values. If the MELT therefore rises by 6% and values fall by 1%, the rate of inflation is 5%. Kliman writes that, “if faster productivity growth now causes values to decline by 4% per year, the rate of inflation falls to about 2% . . . both the nominal and the real rates of profit will fall” (2007: 130). It is also, however, possible that an accelerating MELT growth rate may cancel out the affects of a growing inflation rate, thereby canceling out the tendency for the profit rate to fall. In my regression models below, I test for this very possibility.

## Two additional causes of crisis: Class Struggle and Realization Failure

Marx is not *primarily* interested in the LTFRP as a theory of cyclical fluctuations in profitability. He is not even primarily interested in discovering economic laws, but rather, in discovering how they appear as laws in the first place. An important and traumatic phenomenon of the liberal, market-centered phase of capitalism in which he lived was that of recurrent economic crises.<sup>22</sup> Marx maintained that these crises displayed regular and identifiable patterns and could therefore be understood in terms of his law of value. The meaning and significance to which he endowed the LTFRP, then, derives from his law of value, and his attempt to explain crises, and his hope that they would bring about capitalism's demise.

Marx, however, does not predicate his discussions of crises exclusively on the LTFRP. Sweezy argues that it is impossible to know how much emphasis Marx ever placed on the LTFRP as an element of his explanation of crises (1970: 148). Indeed, Marx discusses at least two other potential interruptions to capitalist accumulation: class struggle and realization failure, or underconsumption. In the following passage, Marx advocates the former theory while seemingly repudiating the latter:

It is a pure tautology to say that crises are caused by the scarcity of solvent consumers, or of a paying consumption. The capitalist system does not know any other modes of consumption but a paying one . . . . If any commodities are unsaleable, it means that no solvent purchasers have been found for them, in other words, consumers . . . . But if one were to attempt to clothe this tautology with a profounder justification by saying that the working class receive too small a portion of their own product, and the evil would be remedied by giving them a larger share of it, or raising their wages, we should reply that crises are precisely always preceded by a period in which wages rise generally and the working class actually get a larger share of the annual product intended for consumption. From the point of view of the advocates of 'simple' (!) common sense, such a period should rather remove a crisis. It seems, then, that the capitalist production comprises certain conditions which are independent of good or bad will and permit the working class to

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<sup>22</sup> I do not mean to deny the importance of contemporary crises.

enjoy that relative prosperity only momentarily, and at that always as a harbinger of a coming crisis. (1933: 475-6, quoted in Sweezy 1970: 151).

He does not explain here precisely the mechanism by which a rising labor's share of income will result in a falling profit rate, but the negative correlation is implied in his definition of surplus-value and variable capital. Marx portrays workers as caught in a kind of quicksand or boa constrictor's grip, whereby any attempt to advance their position invariably brings them closer to peril.

This passage is also frequently invoked to dismiss interpretations of Marx as an underconsumptionist, and to deny, on the basis of Marx's word, the possibility of underconsumption itself. Sweezy, however, is adamant that, "there could be nothing more absurd . . . [than to claim that] Marx regarded the magnitude of consumption as of no consequence in the causation of crises" (1970: 151). Sweezy thinks instead that Marx simply failed to fully develop the theory. He cites as evidence this passage in *Capital III*:

The last cause of all real crises always remains the poverty and restricted consumption of the masses as compared to the tendency of capitalist production to develop the productive forces in such a way that only the absolute power of consumption of the entire society would be their limit. (Marx 1933: 568, quoted in Sweezy 1970: 177).

Marxian economists Conrad Schmidt, Karl Kautsky, Louis B. Boudin, Rudolf Hilderding, and Rosa Luxembourgh all emphasized realization failure in their crisis theories. Sweezy (1942) and Baran (1957) also elaborated an RF theory of crisis, Sweezy in terms of under-consumption, and Baran in terms of under-investment.

Sweezy describes a crisis of over-production/underconsumption as one that results from a decline in the ratio of the rate of growth of consumption to the rate of growth of the means of production (1970: 183). According to Sweezy, the production of



consumer goods may lag behind the production of the means of production (factories, fixed capital, etc.) thereby generating a crisis of over-production/under-consumption. Another way of thinking about this is that over-production occurs when profits (which are primarily reinvested into the means of production) grow at a faster rate than do wages.

Realization failure theories, however, have been widely criticized for mistaking cause and effect. Raya Dunayeskaya (1989), for example, argues that the inability to sell is a consequence and not a cause of falling profitability. Kliman (2003: 122) likewise argues that the growth of output that is productively invested is not “constrained by human consumption.” Critics of the RF theory often count themselves as ardent defenders of Marx’s LTFRP. The two theories, however, are not mutually exclusive.

One of the earliest critics of under-consumption was Tugan-Baranowsky (Sweezy 1970: 158). Tugan argued that a crisis of over-production was not only improbable, but impossible. He insisted that capitalist crises resulted from *disproportionate* production among the various branches of industry. His argument, however, was not so much a proof of the impossibility of overproduction, as it was a proof of the logical possibility that overproduction might not lead to a crisis. Using simultaneous equations, he demonstrated that a single worker could replace the entire working class, and so long as proportionality existed among all branches of production, capitalism would continue to operate smoothly and would not enter into any crisis or stagnation. Tugan-Baranowsky’s argument was universally rejected. No one denied that a crisis of disproportionality was possible, they simply rejected Tugan’s claim that an RF

crisis was impossible.<sup>23</sup> Critics insisted that, ultimately, production was for human consumption. Yet, this seems to contradict Marx's formula for the self-expansion of capital, M-C-M', and his explicit statements that production in capitalism is for production's sake, and not for human consumption.

How can this be reconciled? Sweezy gives an interesting answer. He notes that the inversion of the circuit of capital in capitalism, commodity-money-commodity (C-M-C), or production for use rather than profit, does not become irrelevant, since the vast majority of the population has to sell its labor-power for money in order to purchase consumer goods. The circuit of capital, M-C-M', does not describe the logic of wage-labor. He therefore argues that the production of use-value for the sake of consumption, and the production of value for the sake of production, constitute the real "fundamental contradiction of capitalist society from which all other contradictions are ultimately derived" (1970: 172).

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<sup>23</sup> Sweezy, for instance, considers an underconsumption crisis to be a special case of a disproportionality, arising from the disproportionate development of the means of production relative to consumer demand (1970: 183).

## **IV. Contemporary Debates on Falling Profitability and Crisis Theory**

Among contemporary scholars, much attention has been given to what Brenner (2006) calls “the long downturn.” This refers to the dramatic decline in both growth rates and profit rates in all industrialized nations beginning around the 1960s. Many contemporary critical Left economists (e.g. Brenner 2006; Dumenil and Levy 2004) have interpreted the ascendancy of neo-liberalism and the demise of the capital-labor accord as class projects in response to the long downturn. One result, or perhaps symptom, of the collapse of the capital-labor accord has been a dramatic decline in the collective capacity of labor to act in a unified manner in its own economic interests. Union membership, especially in the private sector, has declined dramatically in the past two decades, and the strike, at least in the United States, has become entirely ineffective (Rosenfeld 2006). In addition, Brenner reports that, excluding the United States, the average rate of unemployment remains as high as the average unemployment rate during the Great Depression. Meanwhile, the US recovery has occurred against a backdrop of stagnating growth and a repression of wages “without precedent during the last century” (Brenner 2006: 2). Yet, despite neo-liberal policies aimed at containing wage growth, a full recovery from the long downturn has not occurred

One of the most popular explanations for the downturn is what Brenner calls the “contradictions of Keynesianism” thesis (2006: 16), according to which, the very policies that restored effective demand and established the conditions for the postwar boom by empowering labor vis-à-vis capital were ultimately self-undermining, leading to

reduced profitability and stagnation. The premise of this argument is that declining productivity growth by itself cannot cause a fall in profitability unless wage growth fails to decline in tandem. This thesis explains falling profitability as a result of declining growth, rather than vice-versa. The cause of the initial decline in growth, however, is contested.

Brenner argues that labor strength is insufficient to explain the origins and duration of the crisis. He points out that victories by labor are localized, whereas pressures on profitability have been system-wide, affecting all OECD nations. Local labor victories cannot therefore account for the “spatially generalized” and “temporally-extended” decline in profitability (Brenner 2006: 24).

Brenner proposes that the re-industrialization of Japan and Western Europe after World War II intensified international competition and resulted in a systemic reduction in profitability. He thus emphasizes the “horizontal” effects of unplanned competition rather than the “vertical” struggle between capital and labor (2006: 25). Competition acts to reduce profitability because more efficient producers put downward pressure on prices. This in turn reduces the profit rate of those firms operating with less efficient machinery or production techniques, while increasing the profit rate of the more efficient firms. In the perfectly competitive world modeled by equilibrium theory, the less efficient producers simply disappear. In the real world, however, this does not occur. Less efficient producers remain in business so long as they are able to retain an average rate of profit on their *circulating* capital, that is, so long as they retain an average *profit margin*. This is because “their fixed capital is ‘sunk’, that is, already paid for . . . . They can thus regard it as, in practical terms, costless and its further use as free” (2006: 29).

They must, however, reduce prices, and because of this, their rate of profit declines. This reduces overall profitability in the market with respect to the profit rate that prevailed prior to the introduction of the more efficient competitor. Importantly, Brenner claims that, because production is anarchic and unplanned, this process is not self-adjusting and not transitional.

This thesis has received much criticism. Dumenil and Levy (2002a) argue that declining profitability has nothing to do with competition. Moreover, Brenner argues that the long downturn originated in the manufacturing sector. Dumenil and Levy note that the decline in profit rates actually occurred simultaneously in all sectors of the economy, with the exception of those that they call “highly capital intensive.” Analyzing the NIPA data for the Business sector, both corporate and non-corporate, they find that the fall in profitability has resulted from both a decline in both the output-capital ratio and the profit share. They argue that the decline in the output-capital ratio resulted from a decline in real productivity, as well as from a relative increase in the prices of fixed capital to output.

Dumenil and Levy use descriptive statistics. Because Brenner also argues that his explanation will manifest itself in declining capital-output ratios and profit shares (2006: 32), the data do not adjudicate the dispute. Brenner could easily permute his explanation to incorporate non-manufacturing sectors. Elsewhere, Dumenil and Levy (1993) explain long term growth cycles in terms of technical progress and the downturn in terms of a slowdown of technical progress, a hypothesis which assumes that profit rates are determined by physical rather than value magnitudes.

Freeman (2005) has criticized Brenner’s unquestioned acceptance of the Okishio Theorem, emphasizing the role that a rising organic composition of capital has played in

declining profit rates. He argues further that because Brenner's analysis is incompatible with simultaneous valuation and equilibrium methods, it is susceptible to dismissal by mainstream economics, so long as he does not explicitly repudiate the use of simultaneous equations in modeling actual economic behavior. He argues that falling profitability has been dominated by a falling output-capital ratio caused by the accelerating obsolescence of existing capital stocks. He interprets this in terms of Marx's rising organic composition of capital. In a bivariate regression model where the independent variable is the profit share, he finds that the r-squared for the years 1929 to 1965 is only .008. He thus argues that, "99.2 percent of the variation in the profit rate is unexplained by the profit share" (2005: 8). His data are suspect, however, because he makes no use of regression diagnostics. It is also not clear why he does not employ a multivariate analysis, or a second bivariate analysis where the output-capital ratio is the independent variable. This would help to determine whether the output-capital ratio does indeed explain the remainder of the variation in the profit rate.

Whereas Freeman and Dumenil and Levy decompose the profit rate, at least initially, into two factors (profit share and output capital ratio), Weiskopf (1979) decomposes the profit rate into three factors, each of which he argues is predicted as the primary variable by three different Marxian crisis theories. He identifies these theories as the rising strength of labor (RSL) thesis, the realization failure (RF) thesis, and the rising organic composition of capital (ROC) thesis. Weiskopf associates RSL with a rise in labor's share of income, RF with a fall in the rate of capacity utilization, and ROC with a fall in the capacity-capital ratio.

Weiskopff argues that the RSL thesis identifies unemployment as the most important independent variable in the determination of the real wage. A rise in the real wage, in turn, reduces the profit share, thus reducing the profit rate. The order of determination is as follows: unemployment falls, real wages increase, labor's share of income rises, and the profit rate falls.

He next identifies realization failure with a fall in the capacity-utilization rate. Capacity utilization refers to the rate at which industries are utilizing their existing factories. If factories are producing at maximum capacity, the capacity utilization rate would be 100 percent. A realization failure then, entails, not the technical impossibility of producing more goods, but the inability to utilize this technical capacity.

A fall in the capacity-capital ratio, on the other hand, refers to a decline in the maximum possible production capacity of firms relative to their fixed assets.<sup>24</sup> This is intended to indicate a rising organic composition (ROC) of capital. An increase in the organic composition of capital may result from either a rise in the real capital-labor ratio, where labor is expressed in hours and capital in constant dollars, or from an increase in the relative prices of capital goods to wage goods, independent of their physical magnitudes.

Analyzing the non-financial corporate business (NFCB) sector for the United States between 1949 and 1979, Weisskopf finds that the decline in profitability arises “almost entirely” from a “rise in the true share of wages, which indicates a rise in the

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<sup>24</sup> Fixed assets are used by Weisskopf to refer to the denominator of the profit rate, K. Other aspects of K that are included by other authors include inventories, financial capital, and the assets set aside for compensation.

strength of labor” (1979: 370). This contravenes the analyses of Brenner, Freeman, and Dumenil and Levy.

Hahnel and Sherman (1982), on the other hand, employ a multivariate time-series regression strategy, and find some support for RSL, overhead labor, and RF. Like Weisskopf, however, they are primarily interested in the cyclical behavior of profit rates, rather than in their long-term trends.

Raffalovich, Leicht, and Wallace (1992) focus exclusively on labor’s share of income, or the wage share, rather than the rate of profit. Their models, however, improve upon previous research and their findings are relevant to Marxian theories of declining profitability and crises insofar as the wage share remains an important determinant. Their primary finding is that the data support the realization failure (RF) thesis. Unemployment is negatively associated with the wage share ( $W/Y$ ), meaning that increasing employment results in a greater portion of income going to labor. This may seem to favor the RSL thesis, but they find no significant relationship between unemployment and compensation. The RSL thesis is therefore not supported. The negative relationship between unemployment and wage share in fact occurs because additional workers absorb more of the national income, not because these workers, on average, get paid any more.

In addition, they test for the so-called *overhead labor effect*, which proposes that capacity utilization varies inversely with compensation. As capacity utilization falls, workers are laid off. The workers, who cannot be easily fired, however, usually earn higher wages. As a result, “less profit is made per worker” and labor’s share of income



rises (Hahnel and Sherman 1982: 55).<sup>25</sup> Raffalovich, Leicht, and Wallace (1992), however, find no relationship between capacity utilization and average compensation.

They summarize their findings by stating:

. . . . only the “wage lag” hypothesis survives unscathed. Contrary to the predictions of the “rising strength of labor” hypothesis, increasing unemployment does not reduce labor’s share of income by reducing the average rate of pay- it reduces labor’s share by reducing the quantity of labor employed. Contrary to predictions of the “overhead labor” hypothesis, increasing capacity utilization does not reduce labor’s income share by reducing the average rate of pay- it reduces labor’s share by increasing output more rapidly than total compensation. Consistent with prior research and the “wage lag” hypothesis, labor productivity- but not compensation- increases with increasing rates of capacity utilization. Output therefore increases faster (and decreases more slowly) than the total compensation of labor. (1992: 254).

Raffalovich, Leicht, and Wallace do not relate their findings to Marxian crisis theory, but the consequences of a slower rise in the rate of labor compensation relative to “growth”, i.e. profits, would be identical to that of Sweezy’s declining ratio of consumption growth to capital stock growth. In terms of Marx’s theory of exploitation, it provides strong evidence that rising wages are indeed compatible with rising exploitation since wages grow at a slower rate than national income.

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<sup>25</sup> Neither Hahnel and Sherman (1982) nor Raffalovich et al. (1992) make an argument as to why capacity utilization is the primary independent variable here rather than employment.

## IV. Description of Data and Methods

To determine empirical profit trends for the United States I estimate several rates of profit using data from the National Income and Product Accounts (NIPA) and Fixed Asset Tables available from the Bureau of Economic Analysis (BEA).<sup>26</sup> The trends for these profit rates are depicted graphically in Figure 1.

NFCB refers to the Non-Financial Corporate Business Sector. The numerator of the profit rate, annual profit, is calculated directly from NIPA accounts, net of inventory value adjustment (IVA) and capital consumption adjustments (CCadj).<sup>27</sup> The capital stock is calculated from the fixed assets of the NFCB sector. Manufacturing profits are likewise calculated by dividing annual manufacturing profits by total manufacturing fixed assets.

The business profit rate is calculated by dividing the profits of the Business sector, which includes all private entities organized for profit, by the price of non-residential fixed capital assets. Profits are derived by deducting employee compensation from the total output of the business sector. Because the NIPA includes in the total output of the Business sector the output of both self-employed persons and government enterprises, it is necessary to calculate the compensation of each in the compensation estimate. Fixed assets do not include inventories or, unfortunately, the fixed assets of government

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<sup>26</sup> See appendix for full details of these estimates.

<sup>27</sup> In including IVA in my analysis, I follow Weisskopf's (1979) method. A debate between Munley (1981) and Weisskopf (1981) has taken place over the correct interpretation of the IVA.

enterprises, which are not listed separately from general government assets in the fixed assets tables.

Finally, the domestic profit rate is calculated by deducting from the entire net domestic product (NDP) total compensation of employees, and dividing this profit estimate by the value of total fixed assets. The domestic profit rate least resembles the others because it includes non-capitalist sectors of the economy including the income and fixed assets of government and residential sectors. All prices are in current dollars.<sup>28</sup> In Figure 1, all profit rates exhibit similar trends. Henceforth, I will limit discussion primarily to the NFCB and manufacturing sector due to data availability.

For my regression models I use labor's share of income ( $W/Y$ ) rather than profit share ( $p/Y$ ). This eliminates some potential problems of auto-correlation. It is also more important to this study. In addition, I regress not levels, but changes in these variables. Analyzing movements rather than levels eliminates most problems with auto-correlation (Hahnel and Sherman 1982), which is particularly troublesome for time-series analysis. It must therefore be remembered that, whereas in a typical regression model, the dependent variable ( $Y$ ) is regressed on several independent variables ( $X$ 's), the regression models I employ instead regress changes ( $Y_{t2}-Y_{t1}$ ) of the dependent variables on changes in the independent variables ( $X_{t2}-X_{t1}$ ). All models presented below meet Gauss-Markov assumptions and are tested for autocorrelation using the Breusch-Godfrey test, at the  $p<.05$  level.

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<sup>28</sup> Current cost estimates reflect "the value . . . expressed in the prices that would have been paid for those assets if they had been purchased at the end of [that year]" (BEA 2003).

## Decompositions of the Profit Rate

Figure 1 shows that profit rates in the United States have fallen dramatically since the 1940s. In addition, the percentage of income distributed to employees, in the form of compensation and benefits, has grown steadily, but fell slightly during the 1990s. The profit share has generally moved in the opposite direction. It is useful also to look at these trends graphically. Figures 2 and 3 depict both the profit share and wage share for the NFCB sector. In addition, some descriptive statistics of the rate of profit and its decompositions in the manufacturing and NFCB sectors are provided in Tables 6 and 7.

The manufacturing and NFCB sectors show similar trends.<sup>29</sup> One interesting observation is that the profit rate in the manufacturing sector rises despite a fall in capital productivity from the 1980s to the 1990s. The output capital ratio ( $Y/K$ ) measures how many dollars of output can be generated for every \$1 of input, with input referring to capital stocks. It is therefore a measure of the productivity of capital in price terms. This is interesting because it necessarily means that the rise in the rate of profit occurred at the expense of labor's share of total income. Furthermore, the fall in the output capital ratio is the result of a falling capacity capital ratio ( $Z/K$ ). In Marxian terms, this signifies a rising organic composition of capital. These data demonstrate that during the 1990s the rising organic composition of capital was offset by the intensification of surplus value extraction.

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<sup>29</sup> I do not include the capacity utilization and capacity capital ratios for the NFCB sector because capacity utilization data (which is necessary to calculate the variable  $Z$ ) is only available for the manufacturing sector.

I next supplement these descriptive statistics by utilizing a multivariate time-series regression analysis of the rate of profit for the United States in the manufacturing sector. Importantly, I test for the effects of the rate of inflation and the growth rate of the MELT on profit rate trends. To my knowledge, this study is the first multivariate time-series regression analysis to employ these important variables.

To calculate the rate of inflation, I use the average annual rate of change available from the Bureau of Labor Statistics.<sup>30</sup> To calculate the MELT, I use a simple algorithm developed by Kliman (2007). Because the TSSI distinguishes between the price of inputs and outputs, each year has two MELTs, which are calculated by equation 1.

$$1) M_{t+1} = \$P_{t+1} / [(\$C_t / M_t) + L_{t,t+1}]$$

M refers to the MELT; \$P refers to the price of gross output; \$C refers to the price of intermediate inputs; and L refers to labor hours added in the interim. The subscript  $t+1$  refers to outputs and the subscript  $t$  refers to inputs. This distinction is relative, however, because the outputs of one period are the inputs of a subsequent period, and so on. Gross output and intermediate input estimates for the manufacturing sector are provided by the BEA.<sup>31</sup>

A problem arises, however, because the initial MELT is not given. There are a number of ways to handle this. It can be calculated with data on changes in the price

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<sup>30</sup> Available at <ftp://ftp.bls.gov/pub/special.requests/cpi/cpi.ai.txt>.

<sup>31</sup> Available at [http://bea.gov/bea/uguide.htm#\\_1\\_15](http://bea.gov/bea/uguide.htm#_1_15). Estimates from 1947-997 are defined according to the Standard Industrial Classification (SIC) system, whereas data after 1997 are defined according to the 1997 North American Industrial Classification System (NAICS). Some discrepancies are therefore, unfortunately, unavoidable.

level and changes in productivity, where productivity refers to the ratio of physical outputs to total labor hours (both living and past). The best estimate of physical productivity is therefore the multifactor productivity estimates available from the BLS, but because these data are not available prior to 1987, I do not use this estimate.<sup>32</sup> Fortunately, it is not necessary to be exact in the calculation of the initial MELT because equation 1 necessitates that the discrepancy between the real  $M_t$  and the estimated  $M_t$  rapidly vanishes after a few cycles. In fact, to test this, I plugged in as my initial estimate of the MELT \$1 and then \$1,000,000 for 1977. Both estimates yielded a MELT of \$48.78/hour by 2005. It is still better, however, to estimate an initial input MELT rather than plugging in a random number. I therefore assume that the initial input MELT is equal to the initial output MELT. Assume that  $M_t = M_{t+1}$ . Dividing the left hand side of equation 1 by the denominator of the right hand side,  $[(\$C_t/M_t)+L_{t,t+1}]$ , multiplying and rearranging terms, yields equation 2:

$$2) M_t = M_{t+1} = (\$P_{t+1} - \$C_t) / L$$

This is a simultaneist version of the MELT. I use it initially, but then do not assume that subsequent input and output MELTs remain equal. Finally, to get the growth rate of the MELT, I calculate the percent change from the input MELT to the output MELT, according to equation 3:

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<sup>32</sup> By definition  $M = pQ/L$  where  $p$  is a price level,  $Q$  is a quantity of physical output, and  $L$  is labor hours (both past and living labor).  $Q/L$  is an index of productivity. Substituting  $R$  for  $Q/L$  yields,  $M = pR$ .  $M_{t+1}/M_t = [p_{t+1}/p_t] \times [R_{t+1}/R_t]$ .  $p_{t+1}/p_t = (1 + \% \text{ change in price level})$ , and  $R_{t+1}/R_t = (1 + \% \text{ change in productivity})$ .  $M_{t+1}$  therefore equals  $[p_{t+1}/p_t] \times [R_{t+1}/R_t] \times M_t$ . Substituting this for the left side of equation 1, eventually yields the formula  $M = [(\$P/pR) - \$C]/L$ .

$$3) \text{ Percent Change} = (M_{t+1} - M_t) / M_t$$

I regress changes in the manufacturing profit rate on the wage share, capacity utilization and capacity capital ratios. This is consistent with Weisskopf's methodology. I also include the lagged dependent variable as a control. The model therefore does not assume that profit rate changes are independent of its prior history, and can therefore be interpreted as a model of system inertia (Raffalovich 1992). In addition, I utilize robust regression techniques to avoid problems of heteroskedasticity. My results are depicted in Table 8.

In model 1, data for all variables are provided from 1950 to 2005. Data used to calculate the MELT, however, are not available prior to 1977, and because I am using annual changes in the growth rate of the MELT, the initial year for all other models is 1978. The results for models 1 and 2 are not surprising. Changes in the wage share are negatively correlated with changes in the profit rate. As more of the total national income is distributed as compensation, profit rates fall. This variable therefore captures the distributional struggle between capital and labor. Capacity utilization is positively associated with profits, which makes sense because factories and equipment are more fully utilized during economic upturns. Finally, the capacity capital ratio, the inverse of Marx's organic composition of capital, is positively correlated with changes in the profit rate. As capital productivity rises, so does the profit rate. These relationships remain approximately the same in models 3 and 4.

In model 3 and 4, however, the rate of inflation is correlated with the profit rate in the opposite direction as Kliman predicts. According to Kliman, a rising rate of inflation should be correlated with a *rising* nominal rate of profit, and a rising MELT growth rate should be correlated with a *rising* rate of profit.<sup>33</sup> Models 3 and 4 support the latter but fail to confirm the former. Kliman's analysis assumes that if prices rise continuously, then outputs are more expensive than inputs. The input-output model, however, assumes discrete, not continuous change, and production is not so neatly demarcated into before-and-after snapshots. Even if it were, it would not be likely that different industries would coordinate their production cycles so that they all purchased and sold inputs at the same time. Furthermore, the data on MELT and inflation growth rates are annual averages. Although it might be possible to suggest that inputs would be less expensive than outputs for one production cycle, thus raising the profit rate, one cannot conclude that the average of the inputs to all production cycles are less expensive than the average of the outputs to all production cycles. My analysis so far only suggests, however, that the rate of inflation and the growth rate of the MELT should have no effect on the profit rate. Instead, they are highly significant.

There is another reason, though, why the rate of inflation should be positively, not negatively correlated with the rate of profit. The rate of inflation is taken from the consumer price index. It does not therefore measure directly the rate of inflation of inputs to the production process, i.e. intermediate goods and raw materials, nor does it measure price changes in capital stocks, the denominator of the profit rate. It therefore

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<sup>33</sup> In results not shown here, I test for interaction effects between inflation rate and MELT growth rate. Results are not significant.



seems that it should affect only the prices of outputs that are sold as consumer goods on the market. Rising consumer good prices, therefore, should indicate a rising rate of profit, all other things being equal.

The data, however, are clearly suggestive that increases in the rate of inflation entail an increase in the expenditures of manufacturing businesses, and that this is not offset by the increased prices of the goods they attempt to sell. The wage share ( $W/Y$ ) variable holds constant the distribution of income between profits and compensation, but does not hold constant the proportion of compensation that consumers actually spend. It is plausible that as the price of consumer goods rises, demand diminishes relative to the supply. This is consistent with the TSSI model, since variable capital is itself an input to production, not an output. Because wages tend to rise at a slower rate than income, wage-labor would not be able to purchase output sold. This means in Marxian terms that the value of labor-power diminishes relative to the value of the commodities it produces. The fact that the wage share controls for the distribution of income does not negate this, since income does not include capital stocks or wealth, which, although not measured directly by the consumer price index, should rise concurrently with it, or perhaps rise at an even faster rate. In addition, capital stocks do not include the actual output, which would not be counted as capital stocks. In other words, as the rate of inflation increases, purchasing power diminishes, and the value of what capitalists receive in income relative to the value of the commodities they produce and already possess diminishes as well. The nominal profit rate thus falls.

The MELT, on the other hand, appears to behave in the way that Kliman predicts. Furthermore, the rate of inflation and the MELT are controls for each other. Because the

rate of inflation is mathematically identical to the MELT growth rate plus the growth rate of value, the MELT indicates the effect of the rate of income change in value terms.  $A=B+C$ , where A is the rate of inflation and B is the growth rate of the MELT and C is the growth rate of value. This relation entails that when A is held constant and B rises, C must fall, and when B is held constant and A rises, C must rise. Thus, a rise in the growth rate of the MELT, when controlling for the rate of inflation, means that the growth rate of value has diminished. Model 4 indicates that a falling value growth rate is correlated with a rise in the nominal rate of profit. In addition, a rise in the rate of inflation, when controlling for the growth rate of the MELT, implies a growing rate of value. Model 4 indicates that an accelerating growth rate of value is correlated with a fall in the nominal rate of profit. All of this is consistent with Marx's LTFRP. The findings in Table 8 are also, however, entirely consistent with a realization failure process. The faster value accumulates relative to its prior history, the more the nominal profit rate declines. Marx's LTFRP explains this as the diminishing contribution of living labor to production, whereas the RF thesis explains it in terms of an imbalance between the accumulation of capital and the compensation to employees. Both are supported here.

## **Determinations of Labor's Share of Income**

Next, I test the rising strength of labor (RSL) thesis, and then attempt to determine the most important predictors of changes in labor's share of income. The RSL theory predicts that the wage share and profit rate are negatively correlated. This has already been demonstrated above. Specifically, it predicts that wages will vary inversely with unemployment. As unemployment falls, labor becomes stronger and workers can successfully negotiate for higher wages. This relationship is tested in Table 9, for the manufacturing sector. The per capita wage is measured in current dollars and is equal to total compensation in the manufacturing sector divided by total employment. Compensation includes wages, salaries, and benefits. Employee data are taken from the manufacturing sector. Because the dependent variable, per capita compensation, is curvilinear, I use the differences of its natural log. I also control for inflation since I am using compensation figures in nominal, rather than real, dollars. Note, however, that I am not controlling for the rate of inflation, but rather, keeping the absolute level of inflation constant.

Little relation is detected between unemployment and per capita compensation. There is no correlation for model 1. In addition, there is auto-correlation for model 1 at the  $p < .01$  level. This does not pose a problem, however, because auto-correlation can only inflate estimation results. In model 2, there is only a marginal correlation, and it is in the opposite direction as predicted by the RSL thesis. Rising unemployment is associated with a rise in compensation, not a fall. Thus, the evidence here does not support the idea that labor in the United States, during the latter half of the 20<sup>th</sup> century,

has been more successful at collectively bargaining for higher wages during periods of high employment.

In Table 10, I regress changes in labor's share of income on changes in unemployment, per capita compensation, growth, and capacity utilization. All data are for the manufacturing sector. As before, I use the natural log of compensation and growth. Growth is calculated as the annual differences in total income for the manufacturing sector, where total income is the sum of profits and compensation. I keep the absolute level of inflation constant, and also introduce the MELT as a variable. I do not regress changes in the wage share on the *growth rate* of the MELT, but rather, on its changes. I do not include the growth rate of the MELT because there is no theoretical reason to do so.<sup>34</sup> In order to compare the independent variables, I include the beta coefficients.

As expected rising unemployment is correlated with a fall in the wage share; rising per capita wages are correlated with a rise in the wage share, and growth correlates with a fall in labor's share of income. All of these results are consistent with the wage lag, or realization failure thesis and support the findings of Raffalovich, Leicht, and Wallace (1992). Because income grows faster than compensation, growth is correlated with a fall in the wage share. This is true when holding the average rate of compensation constant. Likewise, inflation is correlated with a fall in the wage share. In model 3, capacity utilization becomes a significant predictor of changes in the wage share, but

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<sup>34</sup> In results not shown here, I include the growth rate of the MELT and the rate of inflation as controls, instead of inflation and changes in the MELT. Together, rates of growth of inflation and the MELT are not significant. This indicates that an accelerating *rate* of value accumulation does not directly affect the *distributional* struggle over nominal *income*. This further supports Marx's LTFRP because the effects of a rising organic composition should be seen in the ratio of  $L/(C+V)$ , or in the output capital ratio, rather than in how  $L$  is distributed between profit and variable capital.

because average per capita pay is held constant, it cannot be due to an overhead labor effect.

The most interesting result is that when controlling for the MELT in model 4, unemployment becomes less significant, while both capacity utilization and inflation become non-significant compared to model 3. The MELT itself is highly significant and negatively correlated with the wage share. Basically, as labor time is represented by more money, a smaller proportion of that money is distributed to workers in the form of compensation. This might seem counter-intuitive, but the MELT is the expression not only of living labor, i.e. new value added, but of past labor also. Consequently, the amount of (embodied past) labor that \$1 can purchase diminishes, independently of what it can purchase in physical use-value terms. This to my knowledge is a new finding, and indicates that a rise in the MELT is not arbitrary but relates to wage share in a determinate way. To explain my results, it is helpful to consider two simple definitions of the MELT. Because gross output minus intermediate input is roughly equivalent to value added, and because new value added is attributable to living labor, Equation 3 can be reformulated as:

$$4) M=Y/L$$

Y is income, and L is living labor. The MELT is therefore a ratio of nominal (i.e. price) added value to living labor. An increase in M therefore entails a rise in Y/L, the ratio of value-added to living labor. But, Y is held constant by the growth variable. A rise in M therefore entails a decline in L relative to Y, or in other words, increasing nominal

productivity, and because inflation is also added as a control, this indicates the introduction of labor-saving technologies. The MELT, however, can also be written as:

$$5) M=pQ/L$$

The small  $p$  is a price index,  $Q$  is the physical quantity of goods produced, and  $L$  is labor hours, both living and past labor. Because inflation is held constant, a rise in  $M$  entails necessarily a rise in the ratio of  $Q/L$ . Because  $L$  includes both the hours added by living labor, and the past hours of labor embodied in machines, a rise in  $M$  indicates a rise in total productivity. Equations 4 and 5 are two different ways to arrive at the same idea. An increase in productivity lowers labor's share of income, all other factors held constant.

Because  $Y/L$  and  $Q/L$  closely resemble the output capital ratio,  $Y/K$ , I add  $Y/K$  as another control variable. In results not shown here this surprisingly is not significant and has no effect on the significance of the MELT as a predictor of changes in the wage share. How is this possible? The most likely explanation is that  $Y/K$  is not a direct measure of inputs and outputs.  $K$ , for instance is measured as the value of fixed assets. It does not therefore include the price spent on intermediate inputs and raw materials. In addition,  $Y$  is a measure of income, or money received. It is not therefore identical to the difference between outputs and inputs. For instance, companies may have vast inventories of unsold commodities, and it would not affect the wage share,  $W/Y$ , or the output capital ratio,  $Y/K$ , because it would neither be counted as income,  $Y$ , or be included in the capital stocks,  $K$ .

The most plausible explanation for Table 10 is again the realization failure (RF) theory. The model presented in Table 10, however, clearly introduces new dimensions of complexity that the abstract models of accumulation do not entirely take into account. A rising MELT is associated with a falling nominal wage share ( $W/Y$ ), even when growth  $Y$ , is held constant, per capita compensation is held constant, and unemployment is held constant. Controlling for growth is similar to assuming simple reproduction. The missing element seems to be the absolute amount of living labor added to the production process, and how much this labor is exploited. It is plausible that the MELT variable captures some intensification of surplus-value extraction that is neither captured by per capita compensation averages (in current dollars), nor by total growth of  $Y$ . Since the growth variable controls more or less for  $Y$ , the change must arise in  $W$ . In addition, it is important to remember that, strictly speaking,  $\$P-\$C$ , or the difference in price between intermediate inputs and gross outputs, is not equal to  $\$Y$ , which is only the difference between  $P$  and  $C$  *realized* on the market. Because  $Y$  is held constant, a rise in the MELT indicates that  $(P-C)/L$  rises which corresponds with a fall in total compensation  $W$ . Because inflation controls for the price of consumer goods, we can assume that  $P$  remains constant as well. A rise in  $M$  must therefore result from a fall in  $\$C$ , the price of intermediate inputs, which correlates with a fall in total compensation to labor. This is consistent with my analysis above: productivity growth leads to diminishing input costs, which has the seemingly paradoxical effect of depressing profit rates. Marx's LTFRP is one way of resolving this paradox.

## Empirical Test of the Realization Failure Hypothesis

To test Sweezy's hypothesis of a falling ratio of consumption growth to the growth of means of production, I present the ratios of the growth rate of wages to the growth rate of fixed assets<sup>35</sup>. Because they are curvilinear, I take the natural log of both. Data are taken from the Non-Financial Corporate Business Sector (NFCB). My results are presented in Table 11, along with a comparison of ten-year average Wage Shares (W/Y), Profit Shares (P/Y), and Profit Rates (P/K) for the NFCB sector.

Table 11 shows that the rate of growth of compensation relative to fixed capital assets declined dramatically during World War II and reached its subsequent lowest point during the 70s. It moves in tandem with the wage share, but noticeably diverges with the trend in the wage share in the 1970s and the 1990s. In the 1970s, the rate of growth of consumer goods relative to capital goods falls dramatically compared to the previous decade, whereas the wage share actually increases and the profit share falls. The rate of profit falls when compared to the 1960s, and at the same time, growth in capital stocks outpaces that of consumer goods.

The fall in the growth rate of compensation probably arises from a general slowdown in national economic growth. This explains the fact that wages constitute a greater portion of total (circulating) income during the 1970s. This provides evidence for an explanation of the long downturn in terms of a realization failure or wage lag. As Sweezy predicts, a decline in the ratio of the compensation growth to capital growth

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<sup>35</sup> This is calculated in STATA by running a robust regression where the independent variable is the natural log of employee compensation,. I then find the derivatives by running the "mfx" [marginal effects] estimator.



occurs alongside a fall in profit rates. At the same time, however, labor's share of income increases. This indicates that the fall in profit rates and profit shares was the result of declining growth rates. It is not the numerator of the wage share ( $W/Y$ ) that grows faster; rather it is probably the denominator that grows slower.

It is outside the scope of this study to identify the possible causes of the initial slow down which precipitated the seemingly contradictory slowdown in compensation growth relative to fixed capital growth and a concurrent rise in labor's share of income. It is impossible to determine with the data provided whether these disturbances were the result of exogenous shocks (such as oil prices) or endogenous ones. The reality is probably that both played a part, although the question of which trends are endogenous or exogenous is somewhat arbitrary since it depends on the model being used. I would only like to point out here some preliminary evidence in favor of the realization failure, or wage lag, hypothesis. One scenario consistent with the data is that a crisis of underconsumption, indicated by the falling growth rate of compensation, precipitated a fall in investment, and hence, of growth generally. Because growth rates fell, while at the same time wages remained relatively stable (in absolute terms), the wage share tended to rise. Again, this is only one plausible explanation rooted in the theories just explicated. Further research would need to be conducted to substantiate these claims, which would not be limited by, among other factors, focus on a single nation-state.

## Testing Brenner's hypothesis

I now test the causal mechanism put forth by Brenner. His argument is essentially an argument for accelerating obsolescence<sup>36</sup> brought about intensified international competition. Although he argues explicitly that his hypothesis regarding the long downturn will manifest itself in a declining profit share and increasing capital-output ratio, these findings are consistent with nearly every explanation. I therefore set out to test here the specific causal mechanism of international competition.

I model this by using changes in the trade to GDP ratio in current dollars. I use current dollars here rather than constant dollars because the latter tend to “exaggerate the openness ratio” (Hirst and Thompson 1999: 62). Trade-to-GDP ratios are not exact since they include the import contents of exports, and vice versa. They also do not include financial investments, direct or indirect. However, because Brenner hypothesizes that trade in manufacturing led to declining profitability, a measure of trade in actual goods and services is sufficient. I take the average of imports and exports and divide them by GDP to get this ratio. I analyze annual percent changes.

The trade-to-GDP ratio should, according to Brenner's hypothesis, affect the price ratio of output to capital, since more dollars of capital inputs are required to produce a dollar of output. The trade to GDP ratio should therefore have a positive relation to the capacity output ratio. In turn, the capacity output ratio should vary negatively with the

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<sup>36</sup> It may appear that de-valuing the denominator of the capital stock,  $K$ , would lead to a rise in the profit rate. As Freeman (2005) points out, however, all losses in the value of the  $K$  must be deducted from the numerator of the profit rate. For example, an investor who borrows \$1 million to purchase a factory cannot pay her lender back only half that amount, even if, the day after she purchases it, the factory is now only worth half that much. In this case, the investor has in effect lost \$500,000.

profit rate.<sup>37</sup> I have also analyzed exports and imports individually as ratios to the GDP, and the natural log of their differences. I also use the natural log of trade itself, rather than a ratio, in both current and constant dollars. I test a total of six independent variables: trade to GDP ratio; exports to GDP ratio; imports to GDP ratio; the natural log of annual changes in exports; the natural log of annual changes in imports; and the natural log of annual changes in trade. I regress three different dependent variables: annual changes in the profit rate; annual changes in the output capital ratio ( $Y/K$ ); and the annual changes in the capacity output ratio ( $Z/K$ ).

Although trade is a good proxy for international openness, it does not capture the efficiency of the competitors themselves. If Brenner's hypothesis is correct, however, a significant correlation should be detected between the profit rate, and more specifically, the capacity capital ratio ( $Z/K$ ), and trade. I am therefore testing a spurious relationship that *would* appear if his hypothesis is correct. I include in Figure 4, a graph of the trade to GDP ratio over time, compared to the profit rate for the NFCB sector. When controlling for economic growth, I find no significant relationship between the three dependent variables (capacity capital ratio, the output capital ratio, and the profit rate) and any of the six independent variables.

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<sup>37</sup> Brenner (2006: 34-7) refers to "over-capacity," which occurs when capacity utilization exceeds a certain level. There is debate among economists about where this level lies, and how it has changed over time. Testing for this specific effect is outside the scope of this paper.

## V. Discussion and Conclusions

I shall begin my concluding remarks by acknowledging the limitations of this study. My study only provides a brief snapshot of economic reality for the United States, and only for a few decades after the Second World War. Its results cannot therefore be generalized in time or in space. This relatively brief snapshot is, moreover, a highly filtered and narrow one. Its scope is specific and precise, yet because of this, its ramifications are also. My models, along with Marx's, assume away unequal exchange, coercion, and production outside of the market. Furthermore, my calculations of the MELT are for the manufacturing sector only, yet Marx's equality of total price and total value only pertains to an aggregate, closed economy, which, if it were to exist, would be global. In addition, the data on labor hours do not, and cannot, indicate whether these hours are all "socially necessary." My results are therefore at best tentative and in some places somewhat speculative. Furthermore, the independent variables of my regression analyses are not ontological entities interacting causally with the world. They are in fact only synthetic abstractions. They are at best indirect indicators of more fundamental social processes that depend, ultimately on the decisions made by real individual and collective actors.

The TSSI has demonstrated the consistency of Marx's conclusion that rising productivity can result in a falling rate of profit. My findings are also entirely consistent with this hypothesis. First, I find that accelerating value accumulation corresponds with a falling nominal rate of profit. This not only confirms Marx's law of the tendential fall in the rate of profit, it also supports the ontological validity of value as a self-moving

substance that has some bearing upon its phenomenal form of appearance, price. Second, I find that productivity growth itself, as a ratio of output to embodied labor time, exhibits strong correlations that are not captured by conventional profit rate variables. Furthermore, my findings indicate that productivity growth leads to diminishing costs, which correlates with a falling rate of profit. This is entirely inconsistent with simultaneous valuation, and indicates that a non-equilibrium, temporal approach to input-output modeling is warranted. Finally, I provide evidence for a variable imbalance between the growth rates of compensation and capital stock accumulation. This imbalance strongly supports the RF thesis. I argue, moreover, that the LTFRP and the RF theses are not incompatible, but are instead two descriptions of a single multi-dimensional process.

I am left wondering, however, what is the central question that these hypotheses address? Are these theories still relevant today, and if so, in what capacity? The arguments employed to defend or refute Marx's LTFRP are predicated on models of reality that have scarcely changed in over a 100 years. Has capitalism, in its post-liberal and now neo-liberal phases, evolved in any way that might enable it to develop new counteracting tendencies, and new strategies for managing its own internal contradictions? The input-output models cannot answer these questions, for they are not capable of deductively establishing the logical validity of their own premises<sup>38</sup>, nor can they determine their actual historical preconditions. The models of capital accumulation that I present in Tables 1-5 therefore seemingly apply to any society, even those in which labor is remunerated with corn, not money. In other words, the models pay no attention to the

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<sup>38</sup> This was established famously by Kurt Gödel's incompleteness theorems.

material, historical, organizational, and social media in which the law is ostensibly articulated.

In addition, it isn't clear from these models what the relationship is between the economic and non-economic spheres of society, or what philosophy of history, if any, is implied. Nor is there even a clear logical connection between these models and a theory of class struggle, with which they are most commonly identified. Indeed, I would argue that the primary relation that the law of value presupposes is one of interdependence, not antagonism. Profits are the mechanism by which social surplus is reinvested in capitalist societies. It is because of this, and not only because of capitalist class retaliation, that falling profit rates also harm workers. This seems to give the paradoxical result that workers are "damned if they do, and damned if they don't." Workers will suffer if wages are low, and they will suffer even more if profits are low. Consequently, the so-called "contradictions of Keynesianism" thesis is a misnomer, because the contradictions belong entirely to capitalism itself. Certainly these contradictions are not resolved by eliminating completely the remaining remnants of civil society. Labor and capital stand to each other in a relationship of reciprocal presupposition, and because of this, labor is confronted with a Sisyphean task, that can only be transcended along with the immanent categorial barriers to its own self-abolition.

The foundation of Marx's value theoretic approach is that value is determined by labor time. Yet it is unclear whether this is a logical premise, as the TSS scholars seem to understand it, or whether it is an historical precondition. Marx himself seems to waver on the issue. On the one hand, he sometimes indicates that value is determined by labor time because capitalist society is predicated on abstract labor. I myself interpreted it this

way in my introduction to Marx's value theory. Yet, this does not explain how or why a single precondition of capitalist society also became an exclusive *determination*, or why it isn't simply a tautology to define value in terms of labor time and then to say that the latter determines the former. On the other hand, Marx appears to suggest that the determination of value is merely a logical premise upon which he constructs his theoretical edifice. Marx thus regards "the necessity of proving the concept of value" as "nonsense" (1941: 73). Yet this acknowledgment deprives his value theory of labor of much of its emotive appeal and analytical force. TSSI scholars, for instance, rather than developing a theory to describe the world, have thus far developed an interpretation to defend a theory. But why is *this* theory more important than any other?<sup>39</sup>

This ambiguity extends to the epistemological status of his law of value. Because the law of value is a socially constructed law that is historically and spatially circumscribed, it is unclear in what sense it is a law. This problem also pertains to Marx's *law* of the tendency for the profit rate to fall. Sayer (1979: 135-141) argues that Marx employs neither induction nor deduction, but rather abduction, in which he first observes some phenomenon, then provides a plausible hypothesis regarding the cause of the phenomenon, and then makes other predictions that would occur if his hypothesis were true. This argument has later been developed in neo-realist terms by Richard Marsden who argues that, "the law of value refers to the powers of a real, but non-empirical, social substance which undergoes metamorphosis through various material

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<sup>39</sup> I do not wish to single out the TSSI for this criticism since it applies to all Marxian economics, and most Marxian social theory as well. Of course, Marxian economics can also be defended on the grounds of pluralism.

forms” (1998: 308). The law is non-empirical because it cannot be derived *immediately* from sensory impressions.

The labor theory of value, however, need not be understood in such deterministic and economic terms. In fact, I would argue that the emancipatory potential of Marx’s value theoretic approach is unnecessarily truncated when viewed primarily as a theory of class struggle rooted in the market. Postone (1993, 1995, 1999), for instance, has argued persuasively that Marx’s value theory is, at its core, a theory of modern social mediation. Class struggle is therefore epiphenomenal, and irreducible to the core social relations of capitalism. Postone interprets the law of value as an account of how the organization of labor-time becomes a self-mediating determinant of social life. He does not limit value theory’s applicability to liberal market-centered phases of capitalism. The determination of value by labor-time thus describes a temporal norm that retains the social necessity of the expenditure of abstract labor-time for the reconstitution of capitalist society, despite the diminishing importance of labor-time expenditure to the production of material wealth. The law of value, meanwhile, describes the inherent barrier to the qualitative transformation of work into free time, a transformation rendered objectively possible by the law itself. Understood in this sense, a society in which value is not determined by labor time is a society in which labor time ceases to be a determinant of social life, or in other words, when value becomes determined, not by labor per se, but by autonomous human action. Such emancipatory considerations are lacking in the falling rate of profit literature.

My findings are not easily assimilated into a narrative form, and do not provide any definite answers. This makes it difficult to discern the meaning and relevance of the



debate surrounding the profit rate, which in turn makes it difficult to derive from the research any normative orientations. I am aware that my own study is certainly subject to the same criticisms I raise above. It is therefore important to emphasize that this study is not intended as an authoritative declaration of an apodictic truth of the profit rate. The problem that TSSI scholars confronted was that a riddle, in the form of made up mathematical equations, became endowed with the force and power of a reality. On their own terms, the equations were indisputable. For nearly a century, this bred a narrowing of thought that did not recognize itself as such. It is against the ready-made reality of the world that I caution. Reality must instead be un-realized. My own study certainly is limited in the ways that I suggest the discourse as a whole is limited. By acknowledging these limitations, I hope that they do not become impediments to new thinking or future research.

By positing economic laws, Marxian economists participate unwittingly in a representation of the distance between the law and its social origins. They participate in what can only be described as a kind of quest for the certainty of an objectively ready-to-hand world. The quest for objective redemption entails, also, an immanent disavowal of the fact that, “sociology [along with economics!], unlike natural sciences, deals with a pre-interpreted world where the creation of and reproduction of meaning frames is a very condition of that which it seeks to analyze, namely human social conduct” (Giddens in Habermas 1984: 110). In short, by ignoring the process of fetishism that enables *autonomous* economic representations, we run the risk of reinforcing the *heteronomous* reality these representations enforce. It is my hope that that this study has contributed to an understanding of these representations, without, however, succumbing to them. .

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## **Appendix A: Data Sources for Profit Rate and Wage Share**

A. Domestic Profit Rate  $p/K$

1. Profit  $p$  equals income minus compensation ( $Y-W$ )
2.  $Y=NDP$  NIPA 1.7.5 NDP is net domestic product, which equals GDP minus the depreciation of capital
3.  $W=$ Compensation of employees NIPA 6.2 plus a calculated compensation for the self-employed (SE)
4. The wage for the SE equals the unit wage per employee multiplied by the number of full-time equivalent Self Employed
5. The number of Self Employed workers taken from NIPA 6.7
6. Unit wage for SE is total domestic compensation 6.2 divided by the total number of full-time equivalent employed 6.5 NIPA
7.  $K$  equals total fixed assets from line 2 of 1.1 FA tables. Includes private and government assets, residential and non-residential. Does not include inventories.

B. Business Profit Rate  $p/K$

1. Profit  $p$  equals  $Y-W$
2.  $W$  equals Business Compensation NIPA 6.2A-D, plus compensation for Government Enterprises (GE) NIPA 6.2A-D for state, federal and local governments, plus a calculated amount for the compensation for the Self Employed (SE)
3. SE equals a unit wage times the number of the self employed in the private sector NIPA 6.7
4. Unit wage equals total compensation of employees in the business sector 6.2A-D, divided by the total number of employees in the private sector NIPA 6.5
5.  $K$  equals non-residential fixed assets FA table 1.1. Does not include inventories or the assets of government enterprises.

C. Manufacturing Profit Rate  $p/K$

1. Profit  $p$  equals Manufacturing profits NIPA 6.16A-D
2.  $K$  equals Manufacturing fixed assets FA table 3.1ES.

D. Non-Financial Corporate Business Sector (NFCB) and Manufacturing Wage Share

1. Profit  $p$  equals NFC profits 1.14 NIPA line 27, with inventory valuation adjustment (IVA) and capital consumption adjustment. Also available from line 4 in 6.16 NIPA.
2.  $K$  is from line 28 of FA table 4.1, fixed assets for NFCB sector.
3.  $Y$  (NFCB) is from NIPA 1.14
4.  $W$  (NFCB) is from NIPA 1.14
5.  $Z$  equals  $Y/(cu/100)$

6. Cu is capacity utilization for the manufacturing industry. Years 1949-1958 Taken from Appendix A. Raffalovich et al (1992). Years 1959-2006 is taken directly from the Federal Reserve website.
7. Unemployment (U) is taken from 1929 to 1992 is taken from Dumenil and Levy (1994). It is identical to the data from the Federal Reserve except it has two decimal points rather than one. After 1992 I use the Federal Reserve data available on its website.
8. Real compensation per capita (Crp) equals real Compensation (Cr) divided by employment in thousands of workers, taken from the manufacturing sector NIPA 6.5.
9. Per capita wage equals compensation in current dollars for the Manufacturing Sector NIPA 6.2A-D, divided by the number of employees in the Manufacturing Sector, 6.5A-D.
10. Py equals the 'price per unit of output' for the NFCB, NIPA 1.15.
11. Pk equals the price index for non-residential private fixed investments, NIPA 5.3.5.
12. Trade equals the average of imports and exports taken from NIPA 1.1.5
13. GDP is taken from NIPA 1.1.5

## **Appendix B: Tables and Figures**

**Table 1. Marx's Price Calculation as Interpreted by Sweezy.**

Department	C	V	S (100%)	Price
I	250	75	75	433 1/3
II	50	75	75	166 2/3
III	100	50	50	200
Totals	400	200	200	800

**Table 2. A TSSI Refutation of Internal Inconsistency.**

Year	Department	C	V	S (100%)	Price
1	I	250	75	75	433 1/3
	II	50	75	75	166 2/3
	III	100	50	50	200
	Totals	400	200	200	800

Year	Department	C	V	S (140%)	Price
2	I	270	62.25	87.75	462
	II	54	62.25	87.75	161
	III	108	41.5	58.5	208
	Totals	432	166	234	832

**Table 3. Physically determined rate of profit.**

Year	Corn inputs (C)	Corn Wages (V) →  L=340	Physical Corn output	Physical Rate of Profit
1	170	170  L=340	510	510-340=170.  170/340=50%
2	340	170  L=340	765	765-510=255.  255/510=50%
3	510	170  L=340	1020	1020-680=340.  340/680=50%

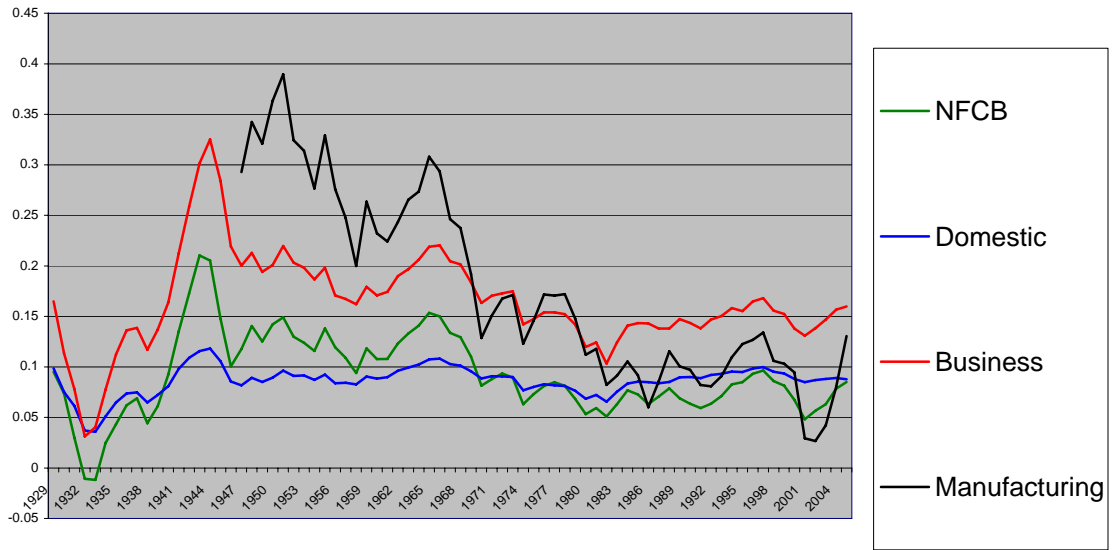
**Table 4. A TSSI Defense of Marx's LTFRP.**

Year	Corn inputs (C)	Corn Wages (V) →  L=340	Corn output	Total Value Output	Per unit value of corn	Profit Rate
1	170	170  L=340	510	510	510/510=1	510-340=170.  170/340=50%
2	340	170  L=340	765	680	680/765=.89	680-510=170.  170/510=33.33%
3	510	170  L=340	1020	850	850/1020=.83	850-680=170.  170/680=25%

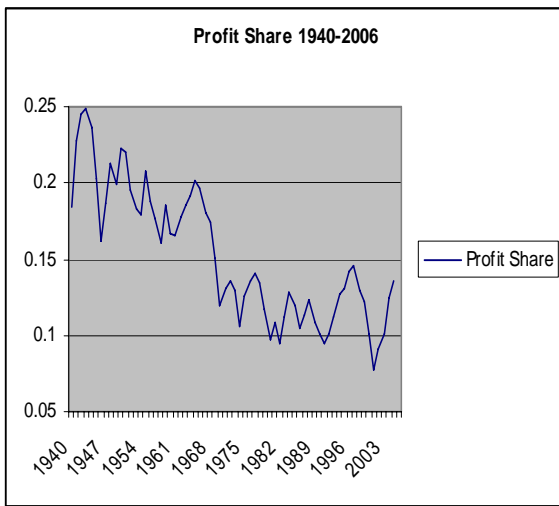
**Table 5. Replacement Cost Valuation Profit Rate.**

Year	Corn inputs (C)	Corn Wages (V)	Physical Corn output	Per Unit Cost of Corn Net Value/Net Product	Replacement Cost Profit Rate
1	170	170	510	510-340=170 (NP) 340/170=2	$(2*170)/(2*340)= 50\%$
2	340	170	765	765-510=255 (NP) 340/255=1.33	$(1.33*255)/(1.33*510)$ =50%
3	510	170	1020	1020-680=340 (NP) 340/340=1	340/680=50%

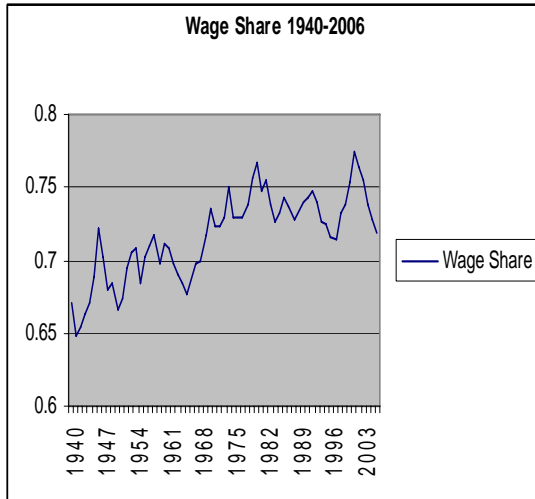




**Figure 1. Comparison of Profit Rates: 1926-2006.**



**Figure 2. Profit Share of the NFCB sector: 1940-2006**



**Figure 3. Wage Share of the NFCB sector: 1940-2006.**

**Table 6. Descriptive Statistics for Manufacturing Sector. Ten Year Averages.**

Manufacturing Sector	Profit Rate	Wage Share	Output Capital Ratio	Capacity Utilization Ratio	Capacity Capital Ratio
1950-59	29.83	76.81	129.81	87.92	145.39
1960-69	25.15	79.56	122.59	84.94	144.56
1970-79	15.49	82.71	89.98	81.52	110.51
1980-89	9.61	86.45	70.68	78.42	90.26
1990-99	10.53	84.56	68.07	81.29	83.74
1996-2005	8.73	86.21	61.05	78.40	77.63

**Table 7. Descriptive Statistics for Non-Financial Corporate Business Sector. Ten Year Averages.**

NFCB	Profit Rate	Wage Share	Output-Capital Ratio	Profit Share
1930-39	3.85	72.79	39.36	8.67
1940-49	14.48	67.84	67.86	21.05
1950-59	12.39	69.60	64.45	19.18
1960-69	12.89	69.68	71.89	17.89
1970-79	8.03	73.47	62.96	12.75
1980-89	6.57	74.06	58.98	11.10
1990-99	7.82	73.21	64.73	12.04
1996-2005	7.55	74.14	64.48	11.68

**Table 8. Predictors of profit rate changes in the manufacturing sector in the United States.**

	(1) 1950-2005	(2) 1978-2005	(3) 1978-2005	(4) 1978-2005
Profit rate (t-1)	-.09* (.04)	-.01 (.01)	-.01 (.01)	-.00 (.01)
Wage Share (W/Y)	-.70*** (.07)	-.68*** (.01)	-.67*** (.02)	-.67*** (.01)
Capacity Utilization (Y/Z)	.33*** (.04)	.14*** (.01)	.14*** (.02)	.13*** (.01)
Capacity Capital ratio (Z/K)	.17*** (.04)	.12*** (.01)	.15*** (.02)	.17*** (.01)
% change inflation	--	--	-.00** (.00)	-.00*** (.00)
% change MELT	--	--	--	.00* (.00)
R-squared (adjusted)	.90	.98	.98	.98
N	55	28	28	28

Robust regression coefficients shown. Standard errors in parentheses.  
 \*\*\*p<.001; \*\*p<.01; \*p<.05; †p<.1

**Table 9. Effect of Unemployment on per capita compensation in the manufacturing sector.**

	(1) 1950-2005 n=56	(2) 1978-2005 n=28
Unemployment	.00 (.00) [.06]	.01† (.01) [.30]
Inflation Level (not differences)	-.00* (.00) [-.31]	-.00** (.00) [-.52]
R-squared (adjusted)	.06	.31

Regression coefficients shown. Standard errors in parentheses and beta coefficients in brackets.

\*\*p<.01; \*p<.05; †p<.1

**Table 10. .Effects of Unemployment, Real Wage, Growth, and Capacity Utilization on the Wage Share in the United States.**

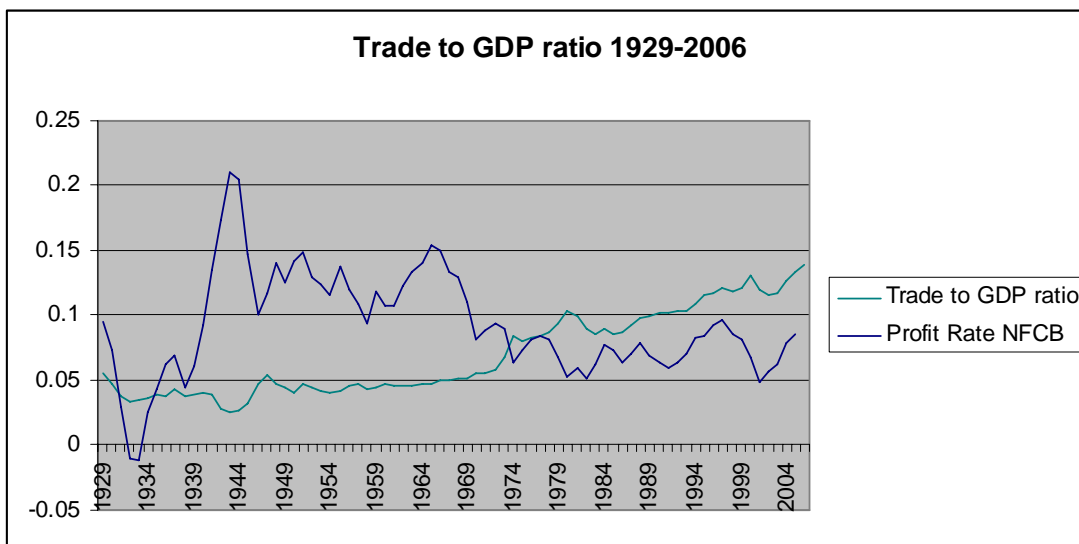
Manufacturing Sector	(1) 1949- 2005	(2) 1949- 1977	(3) 1978- 2005	(4) 1978- 2005
Unemployment	-.023*** (.003) [-.871]	-.025*** (.004) [1.35]	-.025*** (.005) [-.663]	-.01* (.01) [-.33]
Per capita wage (ln)	.746*** (.087) [.676]	.584** (.165) [.564]	.720*** (.13) [.612]	.55*** (.12) [.47]
Growth (ln) (P+W)	-.644*** (.049) [-1.593]	-.708*** (.107) [-2.03]	-.560*** (.060) [-1.21]	-.52*** (.06) [-1.14]
Capacity Utilization	-.001 (.001) [-.098]	.000 (.001) [.015]	-.004* (.002) [-.331]	-.00 (.00) [-.05]
Inflation (absolute levels, not differences)	-.000*** (.000) [-.356]	.000 (.000) [.090]	-.000* (.000) [-.205]	-.00 (.00) [-.00]
MELT ( $M_{t+1}-M_t$ )	--	--	--	-.02*** (.00) [-.36]
R-squared (adjusted)	.84	.75	.91	.94
N	56	28	28	28

Regression coefficients shown. Standard errors in parentheses and beta coefficients in brackets.

\*\*\*p<.001; \*\*p<.01; \*p<.05; †p<.1

**Table 11. Ratios of the Rate of Growth of Employee Compensation (dy) to the Rate of Growth of net Fixed Capital Stocks (dx).**

NFCB sector	dy/dx	Wage Share	Profit Share	Profit Rate
1930-39	2.884	72.79	8.67	3.85
1940-49	.730	67.84	21.05	14.48
1950-59	.911 (n=9)	69.60	19.18	12.39
1960-69	1.218	69.68	17.89	12.89
1970-79	.849	73.47	12.75	8.03
1980-89	1.404	74.06	11.10	6.57
1990-99	1.106	73.21	12.04	7.82
1996-2005	.929	74.14	11.68	7.55



**Figure 4. Trade to GDP ratio 1929-2006.**

## Vita

John Bradford was born in Monroe, Louisiana on February 26, 1980. During high school he was an avid policy debater and competed on the national circuit. He also began reading Marx during this time, and published several editorials for his local newspaper, where he advocated the decriminalization of cannabis, and the abolition of the winner-take-all election system in favor of proportional representation. He continued debating at Cornell University, where he enrolled in the School of Industrial and Labor Relations. Due in part to his mother's declining health, he left Cornell after three semesters and enrolled at Louisiana State University. At LSU he studied philosophy, religion, and political science. He developed a particular interest in Foucault, and the historical-libidinal materialism of Deleuze and Guatarri. After three semesters, he studied for a year at Maastricht University in the Netherlands. At Maastricht, he developed a strong interest in global political economy, actor network theory, and the Frankfurt School. After returning to LSU and completing his B.A., John began teaching English in Seoul, South Korea. After a few months, he and his partner discovered they were going to have a son. They then fled their company-owned flat in the middle of the night and hid with their ferret in local motels for several days in order to avoid paying reparations for violation of contract. His partner was able to return to Louisiana promptly, but John remained in South Korea for another month, working illegally in order to make extra money. After returning, he worked as a substitute teacher and as a telemarketer in Louisiana for a year until being offered a graduate assistantship at the University of Tennessee.

Today, John resides in Knoxville, TN, and is working on his PhD. He returns to Louisiana often to see his son, Eli Amadae Bradford. Aside from academics and family, John received a US paragliding license while in Ecuador. In Knoxville, he spends much of his free time playing capoeira.