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# Exploitation and Its Unintended Outcomes: An Axiomatic View of Marx's Surplus Value

Egmont Kakarot-Handtke\*

## Abstract

The present paper scrutinizes the logical foundation of Marx's dialectic analysis of the evolving money economy. The frame of reference is thereby given with the set of structural axioms. It turns out, first, that the commonplace notion of exploitation has to be replaced by crossover exploitation among capitalists and workers; second, that the concept of surplus value cannot explain the existence and magnitude of overall profits; finally, that the real shares of output are determined in the spheres of income and expenditure and not, as classical, Marxian and neoclassical economists unanimously maintain, in the sphere of production.

**JEL** B14, B41, E11, E25

**Keywords** new framework of concepts; structure-centric; axiom set; antagonism of profits and wages; crossover exploitation; surplus value; axiom of reals

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It is widely acknowledged that it is impossible to separate the scientific content of *Capital* from its political intention (Mandel, 1990, p. 16). There is no political hindrance, though, to identify its logical foundation. If it can be demonstrated that the basic propositions are contradictory or insufficient any further question about scientific and political content falls flat. For this procedure one has Marx's invitation: 'I welcome every opinion based on scientific criticism' (1990a, p. 93).

The discussion of fundamental assumptions opens the way to the real question. Marx's objective was to discover the 'laws of motion' of the market system. This, in a broad sense, coincides with the objective of standard economics.

It is good to have [the technically best study of equilibria], but perhaps the time has now come to see whether it can serve in an analysis of how economies behave. The most intellectually exciting question of our subject remains: is it true that the pursuit of private interest produces not chaos but coherence, and if so, how is it done? (Hahn, 1984, p. 102)

Marx relied on the method of materialistic dialectic. In fact he insisted:

... that he was the first person to have applied this method to the study of economic problems. ... Marx specified this use of the dialectical method as the *differentia specifica* of *Capital*, which distinguished it from all other economic analyses. (Mandel, 1990, p. 17)

Each theory, and Marx's theory is no exception, rests on a small set of foundational assumptions.

It is no accident that Marx starts *Capital* Volume I with an analysis neither of the 'capitalist mode of production', nor of capital, nor of wage-labour, nor even of the relations between wage-labour and capital. For it is impossible to analyse any of these basic concepts or categories ... scientifically, totally and adequately without a previous analysis of value, exchange-value and surplus-value. (Mandel, 1990, p. 13)

All conclusions about the functioning and development of the economy are logically prefigured in these assumptions.

Just as surplus-value and capital emerge *logically* from an analysis from value and exchange-value, so too does the capitalist mode of production emerge *historically* from the growth of commodity production ... (Mandel, 1990, p. 13-14), original emphasis

Standard economics, too, takes the theory of value as core (Debreu, 1959). The crucial difference is that Marx relies on the dialectical method for further elaborating his theory, while standard economics relies on the axiomatic method (Stigum, 1991, p. 4). The common denominator is the concept of value, yet valuation is apparently subjective. Marx, though, based his theoretical edifice on the labour theory of value

and maintained that *both* the development of the economy and the behavior of individuals is objectively determined by the production conditions (Graziani and Vale, 1997, p. 21).

The standard theory of value rests on an explicit set of *behavioral* axioms (Arrow and Hahn, 1991, p. v). This formal transparency is preferable to Marx's verbal presentation, but in the last instance this is not decisive. The main thesis of the present paper is that human behavior does not yield to the axiomatic method, yet the axiomatization of the money economy's fundamental structure is feasible. The crucial point is not axiomatization *per se* but the real world content of axioms. The following inquiry applies the *objective* structural axiom set to Marx's concept of surplus value which he regarded as his main theoretical discovery (Mandel, 1990, p. 51).

The case for structural axiomatization has been made at length elsewhere (e.g. 2011e, 2011d), thus we can take off without going deeper into methodology. The minimalistic formal frame that constitutes the pure consumption economy is set up in Section 1. Thereby the premature specification of behavioral assumptions is forestalled. Then, in Sections 2 to 5 the structural interrelation of profits and wages is formally established. This clarifies the origination of profit, the relation between profit and the distribution of output, and why myopic agents misinterpret the relation between profits and wages. In Section 6 commonplace exploitation is replaced by the concept of crossover exploitation. In Section 7 the surplus value is consistently derived from the structural axiom set. Thereby it turns out that Marx's concept is redundant and that, by consequence, his theory does not contain a valid explanation of profits. Section 8 offers a summary.

## 1 Axioms

The first three structural axioms relate to income, production, and expenditures in a period of arbitrary length. For the remainder of this inquiry the period length is conveniently assumed to be the calendar year. Simplicity demands that we have at first one world economy, one firm, and one product.

Total income of the household sector  $Y$  in period  $t$  is the sum of wage income, i.e. the product of wage rate  $W$  and working hours  $L$ , and distributed profit, i.e. the product of dividend  $D$  and the number of shares  $N$ .

$$Y = WL + DN \quad |t \quad (1)$$

Output of the business sector  $O$  is the product of productivity  $R$  and working hours.

$$O = RL \quad |t \quad (2)$$

Consumption expenditures  $C$  of the household sector is the product of price  $P$  and quantity bought  $X$ .

$$C = PX \quad |t \quad (3)$$

The economic principle, known as Occam's razor in methodology, demands that the number of basic propositions is minimized.

The attempt is made to collect all the assumptions, which are needed, but no more, to form the apex of the system. They are usually called the 'axioms' (or 'postulates', or primitive 'propositions'; no claim of truth is implied in the term 'axiom' as here used). (Popper, 1980, p. 71)

It is a misunderstanding either to accept or to reject axioms as 'universal truths' (Davidson, 1998, p. 67), Dow (2003, p. 552). A set of axioms is either agreed upon as a *tentative* formal starting point or rejected out of hand. The *relative* merits of different sets of axioms can only be assessed by testing whether the conclusions drawn from them have a counterpart in reality.

The ground of confidence in any concrete deductive science is not the *à priori* reasoning itself, but the accordance between its results and those of observation *à posteriori*. (Mill, 2006, p. 896-897)

Our minimalist starting point represents the pure consumption economy, i.e. no investment expenditures, no foreign trade, and no government. The economic meaning is rather obvious for the set of structural axioms. What deserves mention is that total income in (1) is the sum of wage income and *distributed profit* and not of wage income and profit. Profit and distributed profit are quite different things that have to be thoroughly kept apart.

The full logical and factual implications of the structural axiom set – and, for that matter, of any other set of foundational propositions as well – are far from obvious (Klant, 1984, p. 10). They have to be consistently unfolded. Thereby it turns out that some implications are counter-intuitive, that is, from the standpoint of parochial realism. This holds, as we shall presently see, for profits. Yet, as Marx put it:

... all science would be superfluous if the form of appearance of things directly coincided with their essence ... (Marx, 1990b, p. 956)

## 2 Profit

The business sector's financial profit  $Q_{fi}$  in period  $t$  is defined with (4) as the difference between the sales revenues – for the economy as a whole identical with consumption expenditures  $C$  – and costs – here identical with wage income  $Y_W$ :<sup>1</sup>

<sup>1</sup> Profits from changes in the value of financial and non-financial assets are neglected here. One member of the latter class is the stock of products which may change with regard to quantity and valuation price if the product market is *not* cleared in successive periods (for details see 2011c). This case is excluded in the following by the condition  $\rho_X = 1$ .

$$Q_{fi} \equiv C - Y_W \equiv PX - WL \quad \leftarrow \quad Y_W \equiv WL \quad |t. \quad (4)$$

For the business sector as a whole to make a profit consumption expenditures  $C$  have in the simplest case to be *greater* than wage income  $Y_W$ . So that profit comes into existence in the *pure consumption economy* the *household* sector must run a deficit at least in one period. This in turn makes the inclusion of the financial sector mandatory. An economic theory that does not include at least one bank that supports the concomitant credit expansion cannot capture the essential features of the market economy (for details see 2011a, p. 4). Marx's money-commodity theory is not ideally suited for this purpose (Bellofiore and Realfonzo, 2003, p. 206), (Fleetwood, 2000, p. 174).

It needs hardly emphasis that in the investment economy the process of profit generation appears more complex. This does not affect the nature of profit but simply removes the *formal* necessity that the households have to incur a deficit to get the economy going.<sup>2</sup> This is then done by the investing business sector. It is not advisable, though, to tackle the intricacies of the investment economy before the pure consumption economy is *fully* understood. The very first step of an analysis is to reduce complexity, or else, as Keynes put it, 'we shall be lost in the wood.'

### 3 Appearances of profit

From (4) and (1) follows for the relation of profit and distributed profit:

$$Q_{fi} \equiv C - Y + Y_D \quad \leftarrow \quad Y_D \equiv DN \quad |t. \quad (5)$$

The determinants of profit look essentially different depending on the perspective. For the firm price, quantity, wage rate, and employment in (4) are all important; under the broader perspective of (5) these variables play no role at all. Since (4) and (5) are formally equivalent *both* perspectives are not only valid, but indeed indispensable for a comprehensive analysis.

Profit is not connected to a factor input. So far, we have labor input as the sole factor of production and wage income as the corresponding factor remuneration. Since the factor capital is nonexistent in the pure consumption economy, profit cannot be assigned to it in functional terms. And since profit cannot be counted as factor income there is no place for it in the theory of income distribution. The income definition: total income  $\equiv$  wage income + profit, e.g. (Kaldor, 1956, p. 95) or (Keynes, 1973, p. 23), is commonsensical, but theoretically indefensible.

The individual firm is blind to the structural relationship given by (5). On the firm's level profit is therefore subjectively interpreted as a reward for innovation

<sup>2</sup> When the purchase of long lived consumption goods, e.g. houses, is correctly subsumed under consumption expenditures there arises no practical problem with regard to collateral for the banking industry and a sound credit expansion may – in principle – proceed for an indefinite time in the pure consumption economy.

or superior management skills or higher efficiency or toughness on wages or for risk taking or capitalizing on market imperfections or as the result of monopolistic practices. There is a lot of empirical plausibility in this subjective interpretations. Seen under the broader perspective, though, business does not ‘make’ profit, it redistributes profit. The case is perfectly clear when there is only one firm. It is a matter of indifference whether the firm’s management thinks that it needs profit to cover risks or to finance growth or whether it realizes the profit maximum or not. If the consumption expenditures  $C$  are equal to income  $Y$  and distributed profit  $Y_D$  is zero in (5), profit will invariably be zero. The existence and magnitude of total profit is neither explicable by the subjectivist marginal principle nor by the labour theory of value (for details see 2011d, pp. 7-10), and it is beyond common sense as well.

The barter-economic notion of surplus stands in no relation to profit as determined by (4). Neither is the neoclassical equilibrium condition, profit rate = marginal productivity of capital, applicable in the pure consumption economy, because we have profit but no capital. And, since profit and capital must not be treated like Siamese Twins, as they have by the classics and Marx in particular, the tendency of the profit rate to fall is also in need of a thorough revision.

In the general case, profit or loss depends on consumer spending and profit distribution. If in the limiting case distributed profit is zero, then we have three logical alternatives:  $C < Y$ ,  $C = Y$  or  $C > Y$ . The first alternative entails a loss for the business sector as a whole; the second means zero profit, and only the third leads to profit which in turn is the indispensable condition for a reproducible economy. Hence the real question is how the market economy creates the conditions from *within* that are necessary for its further self-reproduction.

The profit definition has another important implication. There is no *real* residual that corresponds to the *nominal* residual profit. Real ( $O, X$ ) and nominal ( $Y, C$ ) flows are to some degree independent. Profit belongs entirely to the nominal sphere, in a real model it cannot exist (for details see 2011f).

Distributed profit, in contrast, can have a real counterpart. If the product market is cleared the whole output is shared between wage earners and the receivers of distributed profit according to their respective expenditure ratios (for the details see 2011a, pp. 11-12).

Under the condition  $C = Y$  profit  $Q_{fi}$  must, as a corollary of (5), be equal to distributed profit  $Y_D$ . The fundamental difference between the two variables is not an issue in this *limiting* case. The equality of profit and distributed profit is an implicit feature of equilibrium models. These have no counterpart in reality.

#### 4 The overall profit ratio

Definitions are supplemented by connecting variables on the right-hand side of the identity sign that have already been introduced by the axioms. To the definitions in

(4) and (5) three structural ratios are added now. With (6) the expenditure ratio  $\rho_E$ , the sales ratio  $\rho_X$ , and the distributed profit ratio  $\rho_D$  is defined:

$$\rho_E \equiv \frac{C}{Y} \quad \rho_X \equiv \frac{X}{O} \quad \rho_D \equiv \frac{Y_D}{Y_W} \quad |t. \quad (6)$$

Definitions add no new content to the set of axioms but determine the logical context of concepts. New variables are introduced with new axioms.

From (5), the first axiom (1), and the definitions (6) one gets for total profits:

$$Q_{fi} \equiv \left( \rho_E - \frac{1}{1 + \rho_D} \right) Y \quad |t. \quad (7)$$

To get rid of all absolute magnitudes, the profit ratio  $\rho_Q$  is defined with (8) and this gives a succinct summary of the *structural* interrelations of the profit ratio, the expenditure ratio, and the distributed profit ratio for the business sector as a whole:

$$\rho_Q \equiv \frac{Q_{fi}}{Y_W} \Rightarrow \rho_Q \equiv \rho_E (1 + \rho_D) - 1 \quad |t. \quad (8)$$

The overall profit ratio  $\rho_Q$  is positive if the expenditure ratio  $\rho_E$  is  $> 1$  or the distributed profit ratio  $\rho_D$  is  $> 0$ , or both. Neither the organic composition of capital, for example, nor the degree of monopolization on both the product and the labor market plays any role. And if the wage rate  $W$ , which is a component of the distributed profit ratio  $\rho_D$  in (6), and the dividend  $D$  always move in lockstep, then neither of them affects the overall profit ratio of the pure consumption economy.

## 5 Profits and wages

For two firms profits in each period  $t$  are derived from (4) as:

$$\begin{aligned} Q_{fiA} &\equiv P_A X_A - W_A L_A \\ Q_{fiB} &\equiv P_B X_B - W_B L_B \end{aligned} \quad |t. \quad (9)$$

In order to get the *direct* relation between profit and the wage rate, all intermediate variables are now eliminated. To restrict the analysis to the simplest case two conditions are applied first: the market price  $P$  and the productivity  $R$  are equal for both firms (for the effects of productivity differentials see 2011e, pp. 10-12):

$$P_A = P_B = P \quad R_A = R_B = R \quad |t. \quad (10)$$

The uniform market price follows from the axioms and definitions as:

$$P = \frac{\rho_E}{\rho_X} (1 + \rho_D) \frac{W}{R} \quad |t. \quad (11)$$

The price depends on the expenditure ratio  $\rho_E$ , the sales ratio  $\rho_X$ , the distributed profit ratio  $\rho_D$ , and unit wage costs  $\frac{W}{R}$ . When the wage rates are not equal in both firms, the average wage rate  $W$  is given by:



$$W \equiv W_A \frac{L_A}{L} + W_B \frac{L_B}{L} \quad |t. \quad (12)$$

For the elementary case of two firms with equal employment  $L_h = \frac{L}{2}$  this gives, in conjunction with the introduction of the wage ratio  $\rho_W$ :

$$W \equiv W_B \frac{\rho_W + 1}{2} \quad (13)$$

$$\text{if } L_A = L_B = L_h \text{ and } \rho_W \equiv \frac{W_A}{W_B} \quad |t.$$

Under the conditions of market clearing, i.e.  $\rho_X = 1$ , the market clearing price  $P^*$  follows then from (11) as:

$$P^* = \rho_E (1 + \rho_D) \frac{W_B}{R} \frac{\rho_W + 1}{2} \quad \text{if } \rho_X = 1 \quad |t. \quad (14)$$

To simplify matters further, profit distribution is here completely taken out of the picture (it is dealt with at length in 2011a, pp. 8-10):

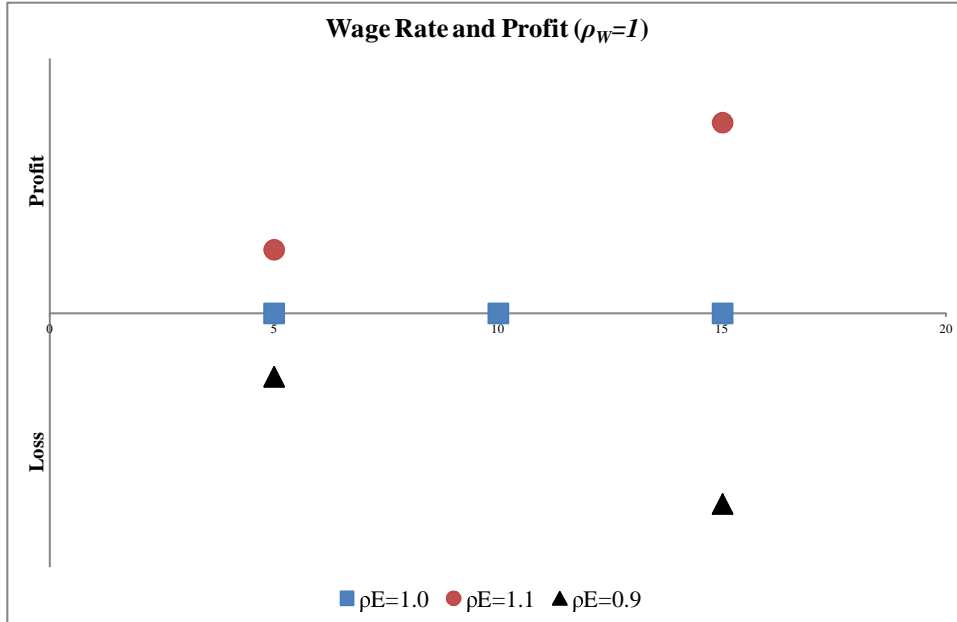
$$P^* = \rho_E \frac{W_B}{R} \frac{\rho_W + 1}{2} \quad \text{if } \rho_X = 1; \rho_D = 0 \quad |t. \quad (15)$$

The market clearing price now depends only on the expenditure ratio, on unit wage costs in firm  $B$ , and on the relation of wage rates  $\rho_W$  in both firms. Inserting (15) in (9) gives finally the respective profits in dependence of the respective wage rates:

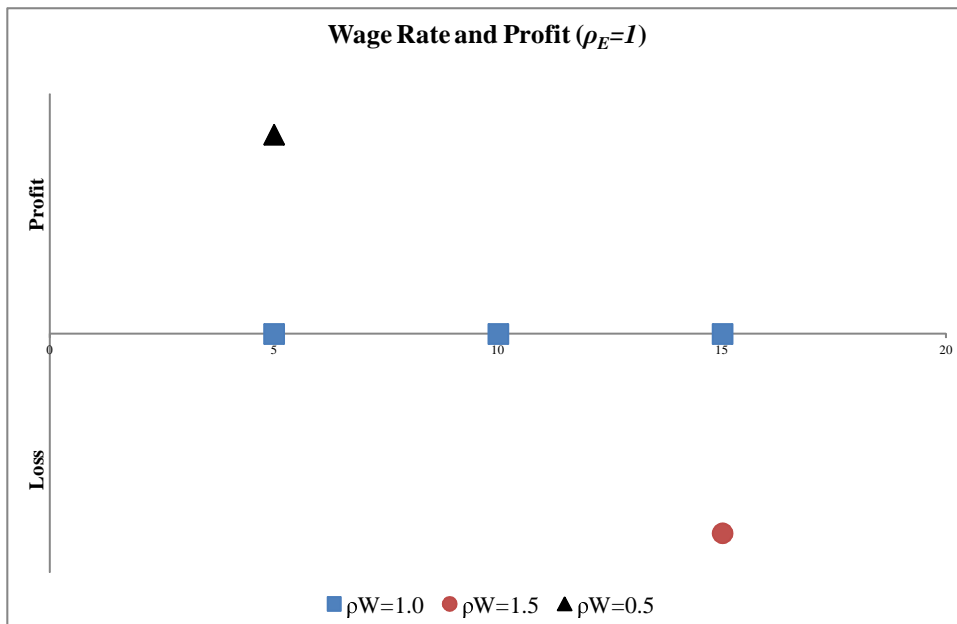
$$\begin{aligned} Q_{fiA} &\equiv W_A L_h \left( \frac{\rho_E}{\rho_W} \frac{\rho_W + 1}{2} - 1 \right) \\ Q_{fiB} &\equiv W_B L_h \left( \rho_E \frac{\rho_W + 1}{2} - 1 \right) \end{aligned} \quad |t. \quad (16)$$

If  $\rho_E = 1$  and  $\rho_W = 1$  the profit of each firm is zero. The profit of each firm depends *positively* on the own wage rate if the overall expenditure ratio is  $\rho_E > 1$  and  $\rho_W = 1$ . In this case profits rise and fall with the rise and fall of the wage rates of both firms. If  $\rho_E = 1$  the profit of firm  $A$  depends *negatively* on an increase of the own wage rate, i.e.  $\rho_W > 1$ , and *positively* on a wage increase in firm  $B$ , i.e.  $\rho_W < 1$ . Mutatis mutandis for firm  $B$ . In Figure 1 the different effects are visualized.

The profit of firm  $A$  remains zero if both ratios are unity and the wage rate  $W_A$  rises from 10 to 15 money units in Figure 1a. The profit *rises* with the firm's own wage rate  $W_A$  if the expenditure ratio of the households is greater than unity (1.1) and the other firm's wage rate moves in step, i.e.  $\rho_W = 1$ . That is, wages come back in some proportion via the product market and this proportion depends on the actual expenditure ratio. Hence a wage increase in firm  $A$  does not *necessarily* lead to a profit decrease. This happens only if the expenditure ratio is below unity (0.9 in Figure 1a). When we regard an expenditure ratio of unity as the normal case, then it



(a) The relation between wage rate changes ( $W_A$  and  $W_B$  from 10 to 15 and from 10 to 5 money units) and profit changes in firm A dependent on the expenditure ratio



(b) The relation between wage rate changes ( $W_A$  from 10 to 15 and from 10 to 5 money units) and profits of firm A with  $W_B$  constant

**Figure 1**

is immaterial whether the wage rate in firm  $A$  rises or falls as long as the other firm moves in step.

If the expenditure ratio is unity and firm  $A$  moves ahead with a wage increase, i.e.  $\rho_W > 1$ , then its profit falls as shown in Figure 1b. If the firm moves ahead with a wage cut, i.e.  $\rho_W < 1$ , then its profit increases. Conversely, the profit in firm  $A$  rises and falls directly with the wage rate in firm  $B$ .

It is parochial realism to maintain that the overall relation between profit and wage rate is negative. What is true for a small firm and an isolated change becomes false when generalized. Recall that we have given each firm a share of 50 percent ( $L_h = \frac{L}{2}$ ) of the economy. Hence each firm experiences the repercussions of its own and the other firms actions and this makes nonsense of *ceteris paribus* and isolated profit maximization. These repercussions may become very small for the  $i^{\text{th}}$  firm, depending on  $\frac{L^i}{L}$ , but they *never* become zero. While it is commonsensical to neglect minor repercussions in practice, it is inadmissible to omit them in theory, because exactly these small repercussions prohibit generalization.

With an expenditure ratio of unity and equal wage rates in both firms  $\rho_W = 1$  the profit is zero in each firm. If firm  $A$  now reduces the wage rate by half, then  $\rho_W = \frac{1}{2}$  and profit  $Q_{fiA}$  in (16) rises as Figure 1b shows. With the wage cut total wage income falls. If the expenditure ratio is unity consumption expenditures reduce by the same amount and therefore the market clearing price (15) falls. At this new price firm  $B$  now incurs a loss with unaltered wage costs. Since overall profits are zero because of  $\rho_E = 1$ , this loss is equal to the profit of firm  $A$ . For the business sector as a whole there is no effect on profit.

The respective profit ratios, which are defined in analogy to the overall ratio (8), follow from (16) as:

$$\begin{aligned} \rho_{QA} \equiv \frac{Q_{fiA}}{W_A L_h} &\Rightarrow \rho_{QA} \equiv \frac{\rho_E}{\rho_W} \frac{\rho_W + 1}{2} - 1 \\ \rho_{QB} \equiv \frac{Q_{fiB}}{W_B L_h} &\Rightarrow \rho_{QB} \equiv \rho_E \frac{\rho_W + 1}{2} - 1 \end{aligned} \quad |t. \quad (17)$$

After the wage cut the profit ratio of firm  $A$  is 0.50 and that of firm  $B$  is -0.25. The initial profit ratio was zero for both firms. In order to restore these initial conditions firm  $B$  has no other option but to lower its own wage rate and to bring  $\rho_W$  back to unity.

## 6 Crossover exploitation

A *general* wage cut lowers the market clearing price and leaves the absolute amount of profits in both firms at zero if the expenditure ratio is unity and if the wage ratio is unity, according to (16). It has no effect on the profit ratio as (17) makes clear. For any given expenditure ratio the profit ratio of both firms depends on the wage ratio

$\rho_w$ . From this follows that a general wage cut can have *no* effect on employment if the decision to hire more workers depends on the individual firm's profit ratio.

The case is entirely different when wage rate changes are not uniform. From the perspective of Political Economy the facts are deceptively clear for participants and outside observers alike: firm *A* slashes the wage rate and thereby raises profits according to (16) and Figure 1b. This fits the time-honored stereotype of wages and profits as antagonists:

Further, Ricardo discussed at considerable length the tension between the workers and the capitalists, in that he claimed consistently that the rate of wages and the rate of profit varied inversely. His proposition at the beginning of his chapter "On Profits" that "profits would be high or low in proportion as wages were low or high" . . . came back repeatedly to prominence. (Vickers, 1995, p. 62), see also (Nadal, 2004, pp. 193-197)

This, though, is parochial realism and Marx, among many others, borrowed it unwarily from Ricardo. The complete picture reveals that firm *A* is better off to the disadvantage of firm *B* and the workers of firm *B* are better off to the disadvantage of the workers of firm *A* because at a lower market clearing price they absorb a bigger share of output with their unaltered income. The situation of the business sector *as a whole* is unchanged and the same is true for the household sector. If there is exploitation it happens *within* the sectors. A partial wage rate change leads only to a redistribution of profits between the capitalists and of output between the workers.

Profit has no effect on the distribution of output, only profit distribution and the spending out of distributed profit has (for details see 2011a, pp. 11-12). As long as nothing is spent out of distributed profits the workers get the whole product. Neither the length of the working day nor the wage rate plays any role, except for the redistribution of profit within the business sector and of output within the household sector.

From the structural axiom set follows that profits (7) are determined by the expenditure ratio and the distributed profit ratio. The real shares of output are determined in the spheres of income and expenditure and *not*, as classical, Marxian and neoclassical economists in conspicuous unanimity maintain, in the sphere of production. All these approaches are based upon the 'axiom of reals' (Minsky, 1984, p. 454) and therefore share a common error.

For the economy as a whole, the classical antagonism of wages and profits is an optical illusion. This, of course, has a bearing on the *political* notion of classes. There is *no* distributional conflict about output between profits and wages. When classes are defined according to these categories the actual conflict materializes *within* the classes in the form of competition. When, in the limiting case, there are two groups of workers and two groups of capitalists and the first group of capitalists exploits the first group of workers, then the exploiters objectively act in the interest of the second group of workers whatever their own subjective motives

may be. The second group of workers has no economic interest to overcome the wage discrimination of the first group, yet the second group of capitalists has indeed because of (17). In any event it is more to the facts to substitute the commonplace notion of exploitation by the notion of crossover exploitation within the business and the household sector.

The myopic agents, workers and capitalists alike, are blind to these interdependencies and therefore prone to the fallacy of composition. The generalization of partial effects has the compelling logic of the profit and loss account and the irrefutable empirical evidence of firm *A* on its side. Indeed, what could be more convincing? Wages down, profits up. It works. The *invisible* redistribution of profit and output is anonymously effected behind the agents' back by the market clearing price. Therefore all firms tend to act like firm *A*. If they are all successful the structural logic ensures that at the (temporary) end of the adaptation process the profit ratios are the same as at the beginning but the wage rate, the price and absolute profits are at a lower level. The market turns common sense on its head.

The workers on the other hand need not resort to class struggle if they want to bring profits down to zero. An effective alternative follows from (7):

$$Q_{fi} = 0 \Leftrightarrow \rho_E = \frac{1}{1 + \rho_D} \quad |t. \quad (18)$$

If the distributed profit ratio is greater than zero the expenditure ratio has to be below unity to satisfy the zero profit condition (18). That is, saving can wipe out overall profits in the pure consumption economy. The same holds for the investment economy (for details see 2011b, pp. 18-19). Vice versa, if the household sector or, for that matter, the public sector, runs a deficit, i.e.  $\rho_E > 1$ , profits are up. Ricardo had this interrelation before his eyes but could not see it because he was fixated on the *partial* wage–profit nexus.

Notwithstanding the immense expenditure [read deficits] of the English government during the last twenty years, there can be little doubt but that the increased production on the part of the people has more than compensated for it. The national capital has not merely been unimpaired, it has been greatly increased, and the annual revenue of the people, even after the payment of their taxes, is probably greater at the present time than at any former period of our history. (Ricardo, 1981, p. 151)

## 7 Surplus value

The real wage follows from (11) as:

$$\frac{W}{P} = \frac{R}{\rho_E (1 + \rho_D)} \quad \text{if } \rho_X = 1 \quad |t. \quad (19)$$

The real wage rises with productivity and falls with an increase of the expenditure ratio and/or the distributed profit ratio. Since there is no capital the real wage cannot have anything to do with the marginal productivity of capital. It has nothing to do with the marginal productivity of labor either. The real wage is a *structural* fact. Distribution is neither dependent on a production function with convenient formal properties nor on the behavioral hypothesis of profit maximization.

Misery due to a low real wage therefore has basically two structural axiomatic reasons: a low productivity or a high distributed profit ratio (if the product market is cleared and the household sector's budget is balanced). In the first case capitalists can hardly be blamed. Productivity depends on Nature and the historically given technology, but profit distribution is at their discretion. The distributed profit ratio is zero if all profits are retained. Retained profits facilitate investment and this in turn contributes to capital accumulation and subsequently to productivity increases. Once this process is set in motion the workers have both, the full consumption goods output in each period and a continuously rising real wage. This, of course, is the panglossian scenario. If, to the contrary, profits are fully distributed and distributed profits are fully spent the real wage falls below productivity. The gap depends on the relation of distributed profits to wage income. Whether this gap is large enough to make a *real* difference to the individual worker cannot be known *a priori*.

Let us now, in contrast to Marx's dialectical characterization, define the surplus value consistently in structural axiomatic terms (cf. Georgescu-Roegen, 1960, pp. 226, 229). We start with the *surplus product* of one hour's work which is defined as difference between productivity and the real wage:

$$\sigma \equiv R - \frac{W}{P} \quad |t. \quad (20)$$

From the surplus product per hour we arrive at the total surplus product by multiplication with total working hours:

$$\sigma L \equiv RL - \frac{WL}{P} \equiv O - \frac{Y_W}{P} \quad |t. \quad (21)$$

To get the total *surplus value*  $s$  the total surplus product is valued with the market price  $P$  and this gives under the condition of market clearing  $\rho_X = 1$  in conjunction with (4):

$$s \equiv \sigma LP \equiv C - Y_W \equiv Q_{fi} \quad \text{if } \rho_X = 1 \quad |t. \quad (22)$$

In the structural axiomatic context total surplus value is by definition identical with financial profit. It is therefore misleading to say that 'surplus value takes the money form of profits' (Desai, 2008, p. 4). Both, profit and surplus value, are appearances of the actual configuration of the expenditure ratio and the distributed profit ratio. As joint appearances they are *uno actu* given *by definition*. The definition of surplus product as a certain part of the hourly output has no causal significance whatsoever. This entails that the transformation problem is an empty question. Surplus value is not produced on the shop floor and then transformed

into profits in the product market. As Marx put it in volume III: ‘Profit, as we are originally faced with it, is thus the *same thing* as surplus-value, ...’ (Marx, 1990b, p. 127, italics added).

The crucial theoretical difference is, first, that the real wage cannot be interpreted as some socially given minimum that is necessary for the reproduction of the working class. The real wage rises by and large with productivity and this explains why the capitalist mode of production does *not* lead to (absolute or relative) immiserization. Second, neither the surplus value nor profit is an indicator of commonplace exploitation.

When it is assumed as a theoretical *limiting* case that the wage earners always spend *more* than their income in each period and the receivers of fully distributed profits always *save* their income and consistently invest all their savings in the shares and bonds of the business sector then wages earners get the whole output and the receivers of distributed profits finally own the whole business sector. This follows logically from the structural axiom set and this is by and large what can be observed. The question of ownership, though, has nothing to do with profit *origination* in the money economy that concerns us here. The profit formula is exactly the same in an economy with cooperative ownership.

Marx himself considered the discovery of the concept of surplus-value, representing the sum total of profits, interests and rents of all parts of the bourgeois class, as his main theoretical discovery. (Mandel, 1990, p, 51)

From the structural axiomatic perspective the concept of surplus value is formally redundant. Just because it is by definition identical with financial profit it cannot explain it. Profit is explained by (7). With surplus value we have, in fact, discovered nothing about reality, but about the logical implications of our foundational concepts. It is good to know that profit and surplus value is formally the same thing, hence we can drop the latter without any fear of scientific loss.<sup>3</sup>

Marx’s theory of exploitation, distribution and insoluble inner contradiction remains, the dialectical method notwithstanding – or just because of it – on the descriptive surface. However, as Marx, the sociologist and historian, well knew, in the social realm appearance is no less real than essence (Mandel, 1990, p. 20).

That in their appearances things are often presented in an inverted way is something fairly familiar in every science, apart from political economy. (Marx, 1990a, p. 677)

## 8 Summary

Behavioral assumptions, rational or otherwise, are not solid enough to be eligible as first principles of theoretical economics. Hence all endeavors to lay the formal

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<sup>3</sup> “... the surplus value proposition ... belongs to feudalism, not to capitalism.” (Georgescu-Roegen, 1966, p. 361)

foundation on a new site and at a deeper level actually need no further vindication. The present paper suggests three non-behavioral axioms as groundwork for the formal reconstruction of the evolving money economy and applies these to Marx's approach. The main results of the structural axiomatic inquiry are:

- Overall profit is determined by the expenditure ratio and the distributed profit ratio.
- Profit is not connected to a factor input.
- The real shares of output are determined in the spheres of income and expenditure and not, as classical, Marxian and neoclassical economists maintain, in the sphere of production.
- The real wage is a structural fact. It has nothing to do with the marginal productivity of labor or capital.
- When the economy consists at the outset of two firms, the profit of each firm depends *positively* on the the overall expenditure ratio and *negatively* on the relation of the own wage rate to the wage rate of the other firm. Hence each firm experiences the repercussions of its own actions and is directly affected by those of its competitor. *Ceteris paribus* is therefore not admissible.
- If firm *A* slashes the wage rate its profit increases. The complete picture, though, reveals that firm *A* is better off to the disadvantage of firm *B* and the workers of firm *B* are better off to the disadvantage of the workers of firm *A*. The situation of the business sector *as a whole* is unchanged and the same is true for the household sector. If there is exploitation it happens *within* the sectors.
- For the economy as a whole the classical antagonism of wages and profits is an optical illusion. The commonsense notion of exploitation has to be replaced by the notion of crossover exploitation within the business and the household sector.
- In the structural axiomatic context total surplus value is by definition identical with financial profit. Both, profit and surplus value, are appearances of the actual configuration of the expenditure ratio and the distributed profit ratio. Therefore, surplus value cannot explain profit.



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