Andrew Kliman, Feb. 9, 2017

Notes on Moseley's "Logic" vs. the Real Deal

In his discussions of the effect of technical change in luxury-producing sectors on the rate of profit, Fred Moseley has been assuming an equalized rate of profit and he's been assuming that there is a single basic (non-luxury) sector. I'll also assume these things here, and I'll assume (only for the sake of simplicity, since the results can be easily generalized) that there's a single luxury-producing sector and that there is no fixed capital.

Note that the *revised* version of Moseley's argument explicitly defines technical change as a change in physical input-output coefficients.

Let us call the basic sector Sector 1 and the luxury-producing sector Sector 2. The analysis will employ the following variables:

a_1	amount of Good 1 needed to produce a unit of Good 1
a_2	amount of Good 1 needed to produce a unit of Good 2
b	real wage rate; i.e., amount *of Good 1* that workers buy with their money wages, per unit of living labor performed
C	constant capital (economy-wide aggregate)
ℓ_1	amount of living labor needed to produce a unit of Good 1
ℓ_2	amount of living labor needed to produce a unit of Good 2
m	the MELT, i.e., the amount of money equivalent to a unit of labor-time
p_1^{in}	per-unit input price of Good 1
p_1^{out}	per-unit output price of Good 1
p_2^{in}	per-unit input price of Good 2
p_2^{out}	per-unit output price of Good 2
r	(uniform) rate of profit
S	surplus-value (economy-wide aggregate)
V	variable capital (economy-wide aggregate)
x_1	physical output of Good 1
x_2	physical output of Good 2

Now for the analysis. I shall begin with a crucial point about left-hand-side and right-hand-side variables:

Crucial Point about Left-hand-side and Right-hand-side Variables

None of the equations that follow state, or imply, that the left-hand side variables are *determined* by, or defined in terms, of the right-hand-side variables. The analysis that follows does not assume anything about what determines what. It has no need for such an assumption. The equations that have monetary aggregates on the left-hand sides merely state that it is possible to *express* these monetary aggregates in terms of per unit prices, technical and real wage coefficients, the MELT, and output levels on the right-hand-sides.

In the same manner, I can correctly *express* the tax rate I pay as

tax rate = (total tax)/(income),

without implying that the tax rate is *determined* by the total tax and the income. It may well be that, instead, it is the total tax that is the "determined" variable here—determined by the tax rate and the income. That makes no difference because, if it is true that

total tax = (tax rate)(income),

then it must also be true that

tax rate = (total tax)/(income),

since the final equation can be derived from the one above it simply by dividing through by income and then switching the left- and right-hand sides of the equation.

Therefore, Moseley cannot validly object that the analysis below violates the manner in which he theorizes the determination of the rate of profit, the determination of variable capital, the determination of the real wage rate, or the determination of anything else. To repeat: the analysis makes no assumption about what determines what. Moseley is free to put any right-hand-side variable on the left-hand side, and vice-versa, as long as he scrupulously adheres to the laws of algebra.

The rate of profit is

$$r = \frac{S}{C+V} = \frac{S/V}{C/V+1} \tag{1}$$

Given the assumptions stated in the first paragraph of this note, we can express *C, V,* and *S* as follows:

$$C = p_1^{in}(a_1x_1 + a_2x_2) \tag{2}$$

$$V = p_1^{in}b(\ell_1x_1 + \ell_2x_2) \tag{3}$$

$$S = m(\ell_1x_1 + \ell_2x_2) - p_1^{in}b(\ell_1x_1 + \ell_2x_2) \tag{4}$$

so that

$$\frac{S}{V} = \frac{m(\ell_1x_1 + \ell_2x_2) - p_1^{in}b(\ell_1x_1 + \ell_2x_2)}{p_1^{in}b(\ell_1x_1 + \ell_2x_2)} \tag{5}$$

$$\frac{C}{V} + 1 = \frac{p_1^{in}(a_1x_1 + a_2x_2) + p_1^{in}b(\ell_1x_1 + \ell_2x_2)}{p_1^{in}b(\ell_1x_1 + \ell_2x_2)} \tag{6}$$

and, plugging (5) and (6) into (1), we can express the rate of profit as

$$r = \frac{\dfrac{m(\ell_1x_1 + \ell_2x_2) - p_1^{in}b(\ell_1x_1 + \ell_2x_2)}{p_1^{in}b(\ell_1x_1 + \ell_2x_2)}}{\dfrac{p_1^{in}(a_1x_1 + a_2x_2) + p_1^{in}b(\ell_1x_1 + \ell_2x_2)}{p_1^{in}b(\ell_1x_1 + \ell_2x_2)}} = \frac{m(\ell_1x_1 + \ell_2x_2) - p_1^{in}b(\ell_1x_1 + \ell_2x_2)}{p_1^{in}(a_1x_1 + a_2x_2) + p_1^{in}b(\ell_1x_1 + \ell_2x_2)} \tag{7}$$

Now note that, in Marx's theory total price equals total value,

$$p_1^{out}x_1 + p_2^{out}x_2 = p_1^{in}(a_1x_1 + a_2x_2) + m(\ell_1x_1 + \ell_2x_2) \tag{8}$$

And note that we have some information about the output prices, since the rate of profit in Sector 1 is

$$r = \frac{p_1^{out}x_1}{p_1^{in}a_1x_1 + p_1^{in}b\ell_1x_1} - 1 \tag{9}$$

and the rate of profit in Sector 2 is

$$r = \frac{p_2^{out}x_2}{p_1^{in}a_2x_2 + p_1^{in}b\ell_2x_2} - 1 \tag{10}$$

After equating the right-hand sides of (9) and (10), and some additional manipulations, we can express Sector 2's output price in terms of Sector 1's output price and the technical and real wage coefficients:

$$p_2^{out} = \left(\frac{a_2 + b\ell_2}{a_1 + b\ell_1} \right) p_1^{out} \tag{11}$$

Substituting (11) into (8), we obtain

$$p_1^{out}(x_1 + \left[\frac{a_2 + b\ell_2}{a_1 + b\ell_1} \right] x_2) = p_1^{in}(a_1 x_1 + a_2 x_2) + m(\ell_1 x_1 + \ell_2 x_2) \tag{12}$$

so that

$$m(\ell_1 x_1 + \ell_2 x_2) = p_1^{out}(x_1 + \left[\frac{a_2 + b\ell_2}{a_1 + b\ell_1} \right] x_2) - p_1^{in}(a_1 x_1 + a_2 x_2) \tag{13}$$

Using the right-hand side of (13), instead of the left-hand side, in (7), we obtain

$$\begin{aligned} r &= \frac{p_1^{out}(x_1 + \left[\frac{a_2 + b\ell_2}{a_1 + b\ell_1} \right] x_2) - p_1^{in}(a_1 x_1 + a_2 x_2) - p_1^{in} b(\ell_1 x_1 + \ell_2 x_2)}{p_1^{in}(a_1 x_1 + a_2 x_2) + p_1^{in} b(\ell_1 x_1 + \ell_2 x_2)} \\ &= \frac{p_1^{out}(a_1 + b\ell_1)x_1 + p_1^{out}(a_2 + b\ell_2)x_2 - p_1^{in}\{(a_1 x_1 + a_2 x_2) + b(\ell_1 x_1 + \ell_2 x_2)\}(a_1 + b\ell_1)}{p_1^{in}\{(a_1 x_1 + a_2 x_2) + b(\ell_1 x_1 + \ell_2 x_2)\}(a_1 + b\ell_1)} \\ &= \frac{p_1^{out}\{(a_1 x_1 + a_2 x_2) + b(\ell_1 x_1 + \ell_2 x_2)\} - p_1^{in}\{(a_1 x_1 + a_2 x_2) + b(\ell_1 x_1 + \ell_2 x_2)\}(a_1 + b\ell_1)}{p_1^{in}\{(a_1 x_1 + a_2 x_2) + b(\ell_1 x_1 + \ell_2 x_2)\}(a_1 + b\ell_1)} \\ &= \frac{p_1^{out} - p_1^{in}(a_1 + b\ell_1)}{p_1^{in}(a_1 + b\ell_1)} \end{aligned} \tag{14}$$

Now, if per-unit input prices equal per-unit output prices, then $p_1^{out} = p_1^{in}$. Plugging this into the last term in (14), we find that

$$r=\frac{p_1^{in}-p_1^{in}(a_1+b\ell_1)}{p_1^{in}(a_1+b\ell_1)}=\frac{1-(a_1+b\ell_1)}{(a_1+b\ell_1)} \tag{15}$$

Thus, if

(i) per-unit input prices have to equal per-unit output prices both before and after a technical change, and
(ii) there is no change in the technical coefficients of production in the non-luxury-producing Sector 1 (a_1,ℓ_1), and
(iii) there is no change in the real wage rate (b),

then

(iv) *the uniform rate of profit* after *the technical change in the luxury-producing sector (Sector 2) must be exactly equal to the uniform rate of profit* before *the technical change.*

This conclusion has been derived from an analysis of the rate of profit that has made *no assumption* about what determines what. Therefore, Moseley *cannot* validly object that the analysis has violated the manner in which he theorizes the determination of the rate of profit, the determination of variable capital, the determination of the real wage rate, or the determination of anything else.

Therefore, his "Logic" cannot get out of the starting gate. It begins by assuming that the technical change in Sector 2 will cause his rate of profit to fall. He then argues that the fall in the rate of profit will lead to a reduction in the price of Good 1, and therefore to a fall in *V,* etc. Yet we now know that his rate of profit *will not* fall. Consequently, subsequent changes induced by the fall in the rate of profit--the reduction in the price of Good 1, the fall in *V,* etc.—*cannot* occur.

If per-unit input and output prices need not be equal, everything is different. Sector 1's per-unit output price is

$$p_1^{out}=p_1^{in}(a_1+b\ell_1)(1+r) \tag{16}$$

Using the right-hand-side of (7), we find that

$$p_1^{out}=p_1^{in}(a_1+b\ell_1)\left[\frac{p_1^{in}(a_1x_1+a_2x_2)+m(\ell_1x_1+\ell_2x_2)}{p_1^{in}(a_1x_1+a_2x_2+b[\ell_1x_1+\ell_2x_2])}\right] \tag{17}$$

and plugging this into the last expression in (14), we get

$$r = \frac{p_1^{in}(a_1 + b\ell_1)\left[\dfrac{p_1^{in}(a_1x_1 + a_2x_2) + m(\ell_1x_1 + \ell_2x_2)}{p_1^{in}(a_1x_1 + a_2x_2 + b[\ell_1x_1 + \ell_2x_2])}\right] - p_1^{in}(a_1 + b\ell_1)}{p_1^{in}(a_1 + b\ell_1)}$$

$$= \frac{p_1^{in}(a_1x_1 + a_2x_2) + m(\ell_1x_1 + \ell_2x_2)}{p_1^{in}(a_1x_1 + a_2x_2 + b[\ell_1x_1 + \ell_2x_2])} - 1 \tag{18}$$

So, if there is a change in the technical coefficients of production in the luxury-producing Sector 2 (a_2, ℓ_2), then the uniform rate of profit after the technical change will be *unequal* to the uniform rate of profit before the technical change. That is the case even if there is no change in the technical coefficients of production in the non-luxury-producing Sector 1 (a_1, ℓ_1), or in the real wage rate (b), or in the other right-hand-side variables.