

HARMONISING TRANSFORMATION WITH REPRODUCTION.

More observations and proofs.

This article follows on from the previous article. It examines Three Cases, the first where one Department is the average for the economy, the second where the size of capitals and the rate of exploitation differs, and finally the effect of raising the composition of capital. 'Discovery renders the invisible obvious.' This is what Table 17 reveals. It shows that it was always obvious that the transformation of values into prices required a two-step process involving both profits and capital.

Case 1.

Once again we have 3 industries or Departments. In this case the outstanding difference is that Department 2 is now the average industry for the economy. Following Marx's observation, we note that it cannot enter into the distribution process. Thus the only distribution found will be between Department 1 & 3. Once again we will find an anomaly of 13 resulting from the redistribution of profit of 30 to Department 1 found in Table 2 because its share of the total surplus value produced is 44% and not the assumed 50% in order to equalise the rate of profit when 30 was transferred. Theoretically, 13 should have been transferred from Dept 2 and only 17 from Department 3 to be proportionate. However, were that to have occurred the rate of profit would not have equalised at 50%.

The interesting fact of course is that in the final table, Table 5, when that 13 is added back we now achieve equal rates of profit around 29%. While total value equals total prices, the rate of profit has fallen from 50% measured by value to 29% measured by prices. In this case, the rate of exploitation is no longer 100% but 67%. The proof of concept is unaffected by this. Capital has increased by 60 while profits have fallen by 60 due to the 30 plus 30 transfers of surplus value.

Table 1. (valued by labour time)

| Dept. | constant | variable | surplus v | output | rates | difference |
|--------|----------|------------|-----------|--------|-----------------------------|---------------|
| (a) | (b) | (c) | (d) | (e) | (f) | (g) |
| 1 | 100 | 40 | 40 | 180 | 29% | +30.0% (+30) |
| 2 | 60 | 60 | 60 | 180 | 50% | 0% (0) |
| 3 | 20 | 80 | 80 | 180 | 80% | -24.0% (-30) |
| Input> | 180 + | 180 = 360C | 180 | 540 | 50.0% (average rate) | *Rounding off |

We note the rate of profit differs between the Departments due to their unique compositions. This requires a redistribution of surplus value between the Departments which does not include Department 2 because its composition is average for the economy and its weight is average as well. Thus 30 is moved from Dept 3 to Dept 1 achieving a uniform rate of profit of 50%. (*as per Chapter 9 of Volume 3.)

Table 2.

| Dept. | constant | variable | surplus v | Rate of p | rates | Commodity price* |
|--------|----------|----------|-----------|--------------------|--------------|------------------------|
| (a) | (b) | (c) | (d) | (f) | (f) | |
| 1 | 100 | 40 | 40 | 40 + 30 = 70 | 50% | 140 + 70 = 210 |
| 2 | 60 | 60 | 60 | 60 = 0 | 50% | 120 + 60 = 180 |
| 3 | 20 | 80 | 80 | 80 - 30 = 50 | 50% | 100 + 50 = 150 |
| Input> | 180 | 180 | 180 | =180 profit | 50.0% | 360 + 180 = 540 |

The second tranche of redistribution which is always equal to the first. occurs when capitals need to be priced and profits adjusted to ensure that a uniform rate of profit is maintained on the repriced capital. The social product is 540 while the capital component is 360. Thus capital is 2/3 of the total meaning 20 of the 30 will be used to reprice capital and 10, comprising the remaining 1/3, will be used to adjust profits.

Table 3.

| | Total C | Adjustment | Repriced capital | original profit | adjustment | Adjusted profit |
|---|------------|------------|------------------|-----------------|------------|-----------------|
| 1 | 140 | + 20 | = 160 | 70 | +10 | 80 (50%) |
| 2 | 120 | 0 | =120 | 60 | 0 | 60(50%) |
| 3 | 100 | -20 | = 80 | 50 | -10 | 40(50%) |
| | 360 | 0 | 360 | 180 | 0 | 50% |

Now that the capital has been priced and the profits adjusted the “price of output” can be calculated. We reach the stage where inputs and outputs are fully priced. If we assume the following quantities are being produced in each Department, 180, 360 & 720, the unit prices can be calculated, which of course provides individual prices of production. When these circulate they provide the cost prices and profit margins for each Department, because they are at the same time, the sums of money changing hands against these products. The bold prices in column (e) are the unit prices. Each means of production has appreciated by 33% while each luxury good has depreciated by 33%.

Table 4.

| Dept | Repriced capital | Adjusted profit | Price of output | Average unit price |
|---------|------------------|-----------------|-----------------|-----------------------------------|
| (a) | (b) | (c) | (d) | € |
| 1 | 160 | 80 | 240 | $\$240/180 = \1.33 each (+133%) |
| 2 | 120 | 60 | 180 | $\$180/360 = 50$ cents (0%) |
| 3 | 80 | 40 | 120 | $\$120/720 = 16.6$ cents (-67%) |
| Inputs> | 360 | 180 | 540 | |

When applied to each Department, inputs equal outputs once the adjustment of 13 is taken into account. The new rate of profit averages 29% down from 50%. Clearly, arithmetic does not substitute for competition, but ultimately the prices of 240 + 180 + 120 will prevail. Thus while it is correct to begin with the redistribution of surplus value of +30 and -30 in Table 2, in line with Chapter 9, to equalize profits, this distribution is not proportionate. Nonetheless, it does yield a difference of 60 equal to the total redistribution of value. (Please note proof of concept only applies to examples where Departments are of equal size embodying uniform rates of exploitation.)

Table 5.

| Dept | c + | v | = C | + p | = Prices of Production | Rate of profit |
|---------------|------------|------------|-------------|-------------|--------------------------------|---------------------------------|
| (a) | (b) | (c) | (d) | (e) | (f) | (g) |
| 1 | 133 | 40 | 173 (-13) | 54 | 227 (+13) = 240 | 30%* [54/(173 +13)] |
| 2 | 80 | 60 | 140 | 40 | 180 | 29% [40/140] |
| 3 | 27 | 80 | 107 (+13) | 27 | 134 (-13) = 121 | 29% [27/(107 - 13)] |
| inputs | 240 | 180 | 420 | 121 | 541 (rounding up error) | 29%* rounding off errors |
| | | | + 60 | - 60 | +13 - 13 = 0 | |

Capital has appreciated by 60 while profits have diminished by 60, equal to 30 + 30. However in all cases, nothing physically has changed. Unit consumption has not changed. Workers' wages and the prices of the articles they buy are unchanged. Workers continue to buy the same number of consumer items as before. In the case of the capitalists, their unproductive consumption is unaltered because luxury goods have fallen in price. What is so interesting again is not only how inputs approximate outputs ensuring reproduction, but how the rate of profit itself once more equalises once we account for the adjustments.

Case 2. Capitals differ in size and rates of exploitation.

Hypothesis and assumptions not only have to be proved right, but more importantly they must resist being proved wrong. In Case 1 above, I tried every each way to disprove Marx's assumption that an industry which has a composition of capital which is average for the economy, cannot be included in the redistribution of surplus value, because prices are equal to values within this industry or Department. Every time Department 2 was included reproduction broke down and or the average rate of profit unravelled.

In Case 2 we will examine a more complicated example, one in which capitals now differ in size with their rates of exploitation or surplus value now diverging as well. The total social output is 560 per period and capital represents 390 or 70% of the total. The rate of surplus value in Dept 1 is 83%, in Dept 2 it is 140% and in Dept 3 it is 71%. This diversity when added to varying compositions of capital results in rates of profit which diverge as shown in column (f) below. Column (g) provides the amounts needed to average out the rate of profit amounting to 22.

Table 6.

| Dept. | constant | variable | surplus v | output | Rate of profit | Difference in s.v. |
|--------|----------|------------|-----------|--------|------------------------|--------------------|
| (a) | (b) | (c) | (d) | (e) | (f) | (g) |
| 1 | 100 | 60 | 50 | 210 | 31% | +20 |
| 2 | 60 | 50 | 70 | 180 | 64% | -22 |
| 3 | 50 | 70 | 50 | 170 | 42% | +2 |
| Input> | 210 + | 180 = 390C | + 170 | = 560 | 43.6% (average) | 0 |

In Table 7 the difference is applied resulting in a uniform rate of profit of 43.6%. The commodity price in (g) is taken from Chapter 9 as mentioned previously.

Table 7.

| Dept. | constant | variable | surplus v | Adjusted profit | rates | Commodity price* |
|--------|----------|------------|-----------|-------------------|--------------|-------------------------|
| (a) | (b) | (c) | (d) | (e) | (f) | (g) |
| 1 | 100 | 60 = 160C | 50 | 50 + 20 = 70 | 43.6% | 160 + 70 = 230 |
| 2 | 60 | 50 = 110C | 70 | 70 - 22 = 48 | 43.6% | 110 + 48 = 158 |
| 3 | 50 | 70 = 120C | 50 | 50 + 2 = 52 | 43.6% | 120 + 52 = 172 |
| Input> | 210 + | 180 = 390C | 170 | 170 profit | 43.6% | 390C + 170 = 560 |

Table 8 reflects the 2nd redistribution needed to price each capital which is equal in magnitude to the first. Now it takes 15 (70%) to reprice capital leaving 7 to adjust profits. (Explanatory Note 1.)

Table 8.

| | Total C | Adjustment | Repriced capital | original profit | adjustment | Adjusted profit |
|---|------------|------------|------------------|-----------------|------------|-------------------------------|
| 1 | 160 | + 15 | = 175 | 70 | +7 | 77 (44%) |
| 2 | 110 | -7 | = 103 | 48 | -3 | 45 (44%) |
| 3 | 120 | -8 | = 112 | 52 | - 4* | 48(43%)* |
| | 390 | 0 | 390 | 170 | 0 | 43.6% (* rounding off) |

The repriced capital now categorised as cost price plus the adjusted profit yields the aggregate prices of production for each Department. If we assume that the physical output corresponds to the value of each product, we may assume that 210 items are produced in Dept 1, 180 in Dept 2 and finally 170 in Department 3. This adds up to 560 in value and 560 for the number of items. By dividing the price of output by the quantity of items we obtain the average price of production per item in each Department.

Table 9.

| Dept | Cost Price | + Adjusted profit | Price of output | Average unit price |
|---------|--------------|-------------------|-----------------|--|
| (a) | (b) | (c) | (d) | (e) |
| 1 | = \$175 | \$77 | \$252 | \$252/210 = \$1.20 each (+125%) |
| 2 | = £103 | \$45 | \$148 | \$148/180 = 82 cents (-18%) |
| 3 | = \$112 | \$48 | \$160 | \$160/170 = 94 cents (-6%) |
| Inputs> | \$390 | \$170 | \$560 | |

These unit prices then become the circulating prices which enter into the productive consumption of Dept 1 & 2 and the unproductive consumption of Dept 3.

Table 10.

| Dept | c | v | = C | + p | = New Output | Rate of profit |
|---------------|--------------|--------------|---------------|--------------|--------------------------------------|---------------------|
| (a) | (b) | (c) | (d) | (e) | (f) | (g) |
| 1 | \$120 | \$49 | \$169 | \$72 | \$241 (-11) | 40% [72/(169 + 11)] |
| 2 | \$72 | £41 | \$113 | \$42 | \$155 (+7) | 40% [42/(113 - 7)] |
| 3 | \$60 | \$58 | \$118 | \$45 | \$163 (+4) | 40% [45/(118 - 4)] |
| inputs | \$252 | \$148 | \$400* | \$159 | \$559* (* rounding off error) | 40% average |
| | | | | | -11 +(7 + 4) = 0 | |

We notice that the plusses and minuses in (f) cancel each other out and we note further in Table 11 below that the physical productive consumption in Depts 1 and 2 measured in price do not differ from the consumption measured by value. The red columns refer to Table 10 and the blue to Table 6. When we examine Case 3 further on (Table 17), we will note that reproduction does indeed break down when we skip step 2 which is the repricing of capital. This is what the critics of Chapter 9 were pointing to.

The difference of 11 is due to the redistributing of surplus value in step 1 needed to equalise profit rates. If profit was redistributed in proportion to the quantity of surplus value in each Department, the difference would be different and closer together. (Explanatory Note 2.) It must be also noted that competition will trap prices in the range set by the table. In the case of Department 1, they cannot fluctuate beyond the upper limit of \$252 or the lower limit of \$241.

Table 11.

| Dept | c | c | v | v | = C | =C | Profit | Profit |
|------|------|------|------|------|------|------|-----------|-----------|
| (a) | (b) | | (c) | | (d) | | (e) | |
| 1 | 48% | 48% | 33% | 33% | 42% | 41% | 29% | 45% (+29) |
| 2 | 29% | 29% | 28% | 28% | 28% | 28% | 41% (-27) | 26% |
| 3 | 23% | 23% | 39% | 39% | 30% | 31% | 29% (-2) | 28% |
| | 100% | 100% | 100% | 100% | 100% | 100% | 99% | 99% |

Case 3. Increasing the composition of capital.

In this sample, all that has changed is that constant capital has been increased by 100 from 210 to 320 in Department 1 (highlighted in yellow). This has raised the composition of capital there from 117% to 172%. We will be examining whether this increases the disparities found in Table 10 amounting to 2%, and further, its effect on the rate of profit. For reference Table 6 from Case 2 is reproduced below, followed by Table 12, which includes the additional 100 in constant capital.

Table 6.

| Dept. | constant | variable | surplus v | output | Rate of profit | Difference in s.v. |
|--------|----------|------------|-----------|--------|-----------------|--------------------|
| (a) | (b) | (c) | (d) | (e) | (f) | (g) |
| 1 | 100 | 60 | 50 | 210 | 31% | +20 |
| 2 | 60 | 50 | 70 | 180 | 64% | -22 |
| 3 | 50 | 70 | 50 | 170 | 42% | +2 |
| Input> | 210 + | 180 = 390C | + 170 | = 560 | 43.6% (average) | 0 |

Table 12. (An increase of 100c)

| Dept. | constant | variable | surplus v | output | Rate of profit | Difference in s.v. |
|--------|----------|------------|-----------|--------|-----------------|--------------------|
| (a) | (b) | (c) | (d) | (e) | (f) | (g) |
| 1 | 200 | 60 | 50 | 310 | 19% | +40 |
| 2 | 60 | 50 | 70 | 180 | 64% | -32 |
| 3 | 50 | 70 | 50 | 170 | 42% | -8 |
| Input> | 310 + | 180 = 490C | + 170 | = 660 | 34.7% (average) | 0 |

Immediately we notice that the average rate of profit has fallen from 43.6% to 34.7%.

The sequencing of Tables 13, 14 and 15 is similar to Case 2, so commentary is omitted.

Table 13.

| Dept. | constant | variable | surplus v | Adjusted profit | rates | Commodity price* |
|--------|----------|------------|-----------|-----------------|-------|------------------|
| (a) | (b) | (c) | (d) | (e) | (f) | (g) |
| 1 | 200 | 60 = 260C | 50 | 50 + 40 = 90 | 34.6% | 260 + 90 = 350 |
| 2 | 60 | 50 = 110C | 70 | 70 - 32 = 38 | 34.5% | 110 + 38 = 148 |
| 3 | 50 | 70 = 120C | 50 | 50 - 8 = 42 | 35% | 120 + 42 = 162 |
| Input> | 310 + | 180 = 490C | 170 | 170 profit | 34.7% | 490C + 170 = 660 |

Table 14.

| | Total C | Adjustment | Repriced capital | original profit | adjustment | Adjusted profit |
|---|------------|------------|------------------|-----------------|------------|-------------------------------|
| 1 | 260 | +30 | = 290 | 90 | 10 | 100 (34.5%) |
| 2 | 110 | 14 | = 96 | 38 | -5 | 33 (34.4%) |
| 3 | 120 | 16 | = 104 | 42 | - 5* | 37(35.5%)* |
| | 490 | 0 | 490 | 170 | 0 | 34.7% (* rounding off) |

In Table 14 above the same sum of value and surplus value originally amounting to 40 is used to reprice capital as well as adjusting the resulting profit. In this case capital has grown to 74% of the social product (490/660) requiring 30 to be directed towards repricing capital and 10 to adjusting profits.

Table 15.

| Dept | Cost Price | + Adjusted profit | Price of output | Average unit price |
|---------|--------------|-------------------|-----------------|--|
| (a) | (b) | (c) | (d) | (e) |
| 1 | = \$290 | \$100 | \$390 | \$390/310 = \$1.26 each (+125%) |
| 2 | = \$96 | \$33 | \$129 | \$129/180 = 72 cents (-18%) |
| 3 | = \$104 | 37 | \$141 | \$141/170 = 83 cents (-6%) |
| Inputs> | \$490 | \$170 | \$660 | |

Table 16

| Dept | c | v | = C | + p | = New Output | Rate of profit |
|---------------|--------------|--------------|--------------|--------------|--------------------------------------|-----------------------|
| (a) | (b) | (c) | (d) | (e) | (f) | (g) |
| 1 | \$252 | \$43 | \$295 | \$83 | \$378 (-13) | 27% [83/(295 + 13)] |
| 2 | \$76 | \$36 | \$112 | \$27 | \$139 (+10)) | 26.5% [27/(112 - 10)] |
| 3 | \$63 | \$50 | \$113 | \$31 | \$144 (+3) | 28% [31/(113 - 3)] |
| inputs | \$391 | \$129 | \$520 | \$141 | \$661* (* rounding off error) | 27.1% average |
| | | | | | -13 +(10 + 3) = 0 | |

We note that counterintuitively the variation has not increased in column (f) above. It is still only 2% or 13/660 similar to the 2% found in Case 2 (Table 10) or 11/560. There is however a greater fall in the rate of profit. Here the fall of one fifth is twice the fall of one tenth found in Case 2. This is due to a greater shift in value to reprice capital because of changes to composition. Whereas in Case 2, 20 was sufficient to reprice capital, in Case 3 that required 30.

It could be questioned whether the repricing of capital is superfluous. Tables 17 below provides the definitive answer. It is based on a single step - the equalising of profits - without the repricing of capital. Table 17 reprices inputs based on their "commodity price", a hybrid of price and value. (For the calculations leading up to Table 17 please see the addendum at the end.) The key elements are to be found in column (f.) The disparities no longer balance, -28 vs +7 leaving a gap of -21 not 0. This discrepancy of 21 would disrupt reproduction as the critics of Marx pointed out over time. However, when step 2 is engaged, as in Table 14, the discrepancies cancel each other out. The band of 2% in Table 14

would not be a significant impediment to reproduction. Capitalism may talk of perfect markets, but they are illusory.

Table 17.

| Dept | c | v | = C | + p | = New Output |
|---------------|--------------|--------------|--------------|--------------|-----------------------------|
| (a) | (b) | (c) | (d) | (e) | (f) |
| 1 | 225 | 49 | 274 | 83 | 357 (+7) |
| 2 | 68 | 41 | 109 | 27 | 136 (-12) |
| 3 | 57 | 58 | 115 | 31 | 146(-16) |
| inputs | \$350 | \$148 | \$498 | \$162 | \$660 |
| | | | | | +7 – (12 + 16) = -21 |

Summing up.

We can now devise the following rules.

1. A single distribution of surplus value and value cannot align inputs and outputs. A double distribution of equal magnitudes is always required, with the latter used to reprice capital and adjust profits. Only this double redistribution organised as above can yield prices of production which allow production and consumption to be commensurate.
2. The rate of profit, while equalised, will tend to be lower when measured by priced compared to being measured by value. The extent of this reduction depends on the amount of surplus value needed to be distributed between the departments. The lower the redistribution the lower will be the difference in the two rates of profit.
3. This redistribution is always required, so soon as the composition of capital rises above 100% and its magnitude is governed by the rise in the composition of capital itself. A rising composition of capital requiring more redistribution of surplus value will therefore tend to increasingly depress the rate of profit because of the relative price movement of constant capital. Prices of production may reward profits, but they are not kind to the capitalist class as a whole.

This modelling does not substitute for competition. But it does clarify the pathways competition will follow because of changing compositions of capital and the resulting flow of capital. For example in Table 16, the circulating prices in Department 1 will be confined in aggregate to between \$378 and \$391. We have been dealing with simple reproduction. But capitalism is based on expanded reproduction and thousands of industries. This ensures that the link between value and prices is elastic and complex. One of the first duties for communist statisticians after the revolution will be to disentangle all these interlocking prices, for unless we do so conscious planning cannot take place. This task requires as its first condition, understanding exactly how prices of production evolve. Only by contemplating a two-step transformation process do we understand the essence of the problem. “Embracing the now obvious enables theory.”

Note 1. It could be asked why the distribution needed to price capital is proportionate and involves both Department 2 as well as 3. After all, if it only involved Dept 2 the rate of profit would be unaltered because the rise in c would be compensated for a fall in v while s remains untouched. This however would differentiate the method found here from that found in Chapter 9. There Marx deploys 5 capitals without categorising them into

Departments. Any such categorisation was undertaken only after his death by more recent theorists. In Chapter 9, Marx notes that the distribution of surplus value involves all the capitals. And if that is the case then so must the repricing of capital. In any case the strict separation of industries into Dept 2 and 3 is a forced abstraction when based on use values alone. There is a large degree of overlap in the articles consumed by workers and capitalists. Take electricity. The same electricity which lights up mansions and hovels is produced by the same power plant. The petrol which fills the tanks of Bentleys is produced in the same refinery that produces the petrol that fills the tanks of 2nd hand Skodas. A Tesco in Chelsea and a Tesco in Tower Hamlets will offer many similar products but to be sure, in Chelsea many more expensive wines. Turning to proportionality. Competition tends to narrow differences, not enlarge them as is often thought. By using proportionality in the distribution of value to reprice capitals we are acting in accordance with the real world because the proportionate distribution of value will minimise the differences in the prices of the 3 Departments. Thus the probability that using proportionate distribution is correct, is higher than any other method.

Note 2. Here we account for the disparity of 11 between the various departments. In the previous two examples, (the first found in the preceding article and the second in this article under Case 1) each Department was of equal size and the rate of surplus value was uniform. Previously, Dept 1 was 33.3% of the total. It is now 37.5% of the total. In absolute terms, Dept 2 at 210 stands 23 above the average of 187 for the economy. The difference of 23 when set against the average rate of profit of 47.4% yields the additional 11 in surplus value needed to be distributed.

Addendum.

Calculating Table 17.

| Dept. | constant | variable | surplus v | Adjusted profit | rates | Commodity price* |
|---------|----------|------------|-----------|-------------------|--------------|-------------------------|
| (a) | (b) | (c) | (d) | € | (f) | (g) |
| 1 | 200 | 60 = 260C | 50 | 50 + 40 = 90 | 34.6% | 260 + 90 = 350 |
| 2 | 60 | 50 = 110C | 70 | 70 - 32 = 38 | 34.5% | 110 + 38 = 148 |
| 3 | 50 | 70 = 120C | 50 | 50 - 8 = 42 | 35% | 120 + 42 = 162 |
| Input > | 310 + | 180 = 490C | 170 | 170 profit | 34.7% | 490C + 170 = 660 |

| Dept | Cost Price | + Adjusted profit | Price of output | Average unit price |
|---------|------------|-------------------|-----------------|--|
| (a) | (b) | (c) | (d) | € |
| 1 | = 260 | 90 | \$350 | \$350/310 = \$1.13 each (+113%) |
| 2 | = 110 | 38 | \$148 | \$148/180 = 82 cents (-18%) |
| 3 | = 120 | 42 | \$162 | \$162/170 = 95cents (-5%) |
| Inputs> | 490 | 170 | \$660 | |

Table 17.

| Dept | c | v | = C | + p | = New Output |
|--------|--------------------|------------|------------|------------|------------------------------------|
| (a) | (b) | (c) | (d) | € | (f) |
| 1 | 225 (200 x \$1.13) | 49 | 274 | 83 | 357 (+7) |
| 2 | 68 | 41 | 109 | 27 | 136 (-12) |
| 3 | 57 | 58 | 115 | 31 | 146(-16) |
| inputs | 350 | 148 | 498 | 162 | 660* (* rounding off error) |

Brian Green, 17th August 2021.