

Materialized Composition of Capital and its Stability in the United States, 1948-2011

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Abstract: *The materialized composition of capital, a concept needing more attention, helps to correctly understand the value or organic composition that Marx discussed. For theoretical clarity, it is actually preferable and we review the development of Marx's thought on this important matter. Evidence from frequently utilized data indicates that the materialized composition in the United States has been stable since 1956 at a level around two. Changes in the value or oft-cited organic composition of capital have, therefore, been limited to changes in the rate of surplus value. This result has significant implications for studying the accumulation of capital.*

Marx's position on the composition of capital was an evolving one, for which the French edition of *Capital* was the one last explicated and the version that became incorporated into later German editions and the English edition, edited by Engels after Marx's death. The stages in this development of Marx's thought are laid out in the article by Orzech and Groll (1989). They note that this last version had three alternative formulations within a short description, the technical, the value and the organic compositions of capital, unlike prior discussions which were simpler. This last version was placed, for the first time, at the beginning of the chapter on "The General Law of Capitalist Accumulation", giving it heightened importance. It reads:

The composition of capital is to be understood in a two-fold sense. On the side of value, it is determined by the proportion in which it is divided into constant capital or value of the means of production, and variable capital or value of labour power, the sum total of wages. On the side of material, as it functions in the process of production, all capital is divided into means of production

and living labour power. This latter composition is determined by the relation between the mass of the means of production employed, on the one hand, and the mass of labour necessary for their employment on the other. I call the former the *value-composition*, the latter the *technical composition* of capital. Between the two there is a strict correlation. To express this, I call the value composition of capital, in so far as it is determined by its technical composition and mirrors the changes of the latter, the *organic composition* of capital. Wherever I refer to the composition of capital, without further qualification, its organic composition is always understood. (Marx, 1887, p.574)¹

The value composition of capital has been read by many as constant capital c divided by variable capital v .² This is fair enough, although constant capital can be understood to be either the flow of constant capital used up -- the consumption of constant capital -- or the stock of constant capital with which workers are working, either one of which would be measured in terms of labor hours. Marx is unclear

¹ Marx adds after this paragraph that his focus will be on a country, not a particular branch of production:

The many individual capitals invested in a particular branch of production have, one with another, more or less different compositions. The average of their individual compositions gives us the composition of the total capital in this branch of production. Lastly, the average of these averages, in all branches of production, gives us the composition of the total social capital of a country, and with this alone are we, in the last resort, concerned in the following investigation. (pp. 574-75)

² Orzech and Groll (p. 68) claim that the value composition, as distinct from the organic composition, is used “to express the influence of economic, i.e., market, factors on the composition of capital”. Mohun (1991, p. 404) argues that “divergencies appear between the values of inputs as they result from previous production processes (the OCC), and those same inputs as they are evaluated in terms of the values emerging from current production processes (the VCC)”. In practice, Marx himself (see, for example, his Chapter 8 in Volume 3) and modern economists doing empirical work refer to the value relation.

between the two possibilities, although a *mass* of means of production does suggest a stock concept.

Within empirical examples he provides elsewhere, Marx remains unclear, but Engels in editing of *Volume 3* for publication explicitly indicates that the stock of constant capital was meant, not the flow (Zarembka, 2010, pp. 146-148).³

In this paper we focus upon the problem of using as the denominator in the value, or organic, composition of capital variable capital v . The problem is that v can change without any change in the technical composition in circumstances in which workers can receive more or less producing under the same technology. Marx is aware of the implication: “If there is any change in the value of variable capital independent of the *organic composition*, it can only occur because of a fall or a rise in the price of means of subsistence” (Marx, 1910, p. 385). Thus, c/v can change without any change in the technical composition. This awareness may have led to greater precision by Marx by the time of the French edition than heretofore: “I call the value composition of capital, in so far as it is determined by its technical composition and mirrors the changes of the latter, the *organic composition* of capital”. In other words, the qualifying “in so far as” is a significant one.

Yet, many authors have forgotten, or not paid attention to, Marx’s qualification in the use of the organic composition or they read into the value composition as if it were also the organic composition. As one example of the latter that has stimulated this paper, Paitaridis and Tsoulfidis (2012) wish to analyze the changing rate of profit in the United States and so report in a graph the changing value composition of capital C/v where, for them, C is the net fixed capital stock over the period 1964-2007. It exhibits a substantial upward movement, nearly doubling over their period (p. 222, Figure 5). While their article is

³ Volume 3 of *Capital* was written before Volume 1 and Marx did not return to redrafting Volume 3.

Therefore, its Chapter 8, “Different Compositions of Capitals in Different Branches of Production and Resulting Differences in Rates of Profit” cannot be reflective of his more advanced perception of the problem, even though Engels editing of it does so suggest (see the discussion by Orzech and Groll, p. 63).

quite interesting and useful in several respects, an oversight is represented when they claim that “The value composition of capital shows the degree of mechanization and the state of technology in an economy, while the rate of surplus value shows the distribution of income ...” (p. 223). In fact, the value composition may, or may not, or only partially, show the state of technology.

The substantial rise in C/v that Paitaridis and Tsoulfidis report can be separated between the technical factor and the distributional factor by using what Shaikh (1987) has called the *materialized composition of capital*, a concept not new but is particularly well laid out in the encyclopedia contribution. Basically, the idea is a simple adjustment in the ratio referred to by analyzing $C/(v+s)$ rather than C/v .⁴ The delineation is accomplished by reformulating:

$$C/v = (1 + s/v) \cdot C/(v+s)$$

Commentary by Shaikh on $C/(v+s)$ indicates that he expects the materialized composition to be rising (pp. 306-307). As it turns out, this presumption is not supported by the evidence.

Paitaridis and Tsoulfidis report a substantial rise in s/v , almost doubling between 1964 and 2007 (p. 222, Figure 4). With knowledge of $C/(v+s)$ and the above reformulation of C/v , we realize that much less is happening regarding the relation of the worker hours invested in constant capital to the hours being worked by the associated workers, much less than would be suggested by discussing the value, or organic, composition of capital C/v as if it were only technologically determined.

Following closely with Paitaridis and Tsoulfidis’ empirical work but extending the data backwards and forwards, we report in Table 1 calculations of $C/(v+s)$ from 1948 to 2011 using the same Bureau of

⁴ Shaikh actually uses c rather than C , but the intent is the same as Paitaridis and Tsoulfidis’s. Also, when Shaikh refers to $v+s$ he labels the sum as l .

Economic Analysis (BEA) database they use.⁵ As they do, we incorporate estimation of unproductive labor.⁶ Circulating constant capital is not included by them (nor in the work by Shaikh and Tonak, 1994, the intellectual basis of Paitaridis and Tsoulfidis' work) and we do not include it, either. Other work suggests that circulating constant capital costs (including incorporating adjustment for turnover of capital) amounts to approximately one-quarter of fixed capital (Zarembka, 2010, pp. 152-155).

We chose 1948 as a common post-World War II starting date, and report subsequent non-recession years of 1956, 1973, 1983, 1992, 2000, and 2007. To these years, we add 1974, a year of simultaneous recession and inflation, as well as the most recent year of 2011 (regarded by us as recessionary, the National Bureau of Economic Research's characterization notwithstanding).

Table 1 (next page)

Value Added and Net Fixed Capital Stock in U.S. Productive Sectors (billions of current dollars), and the Materialized Composition of Capital, 1948-2011

⁵ However, we are able to use the fixed-capital data revision of August 15, 2012 and the value-added revision of April 26, 2012.

⁶ We mostly follow their descriptions of uses and adjustments for the data, utilizing BEA data as posted. They mention that 'Eating and Drinking Places' has not been separated from retail trade in the old SIC classification, yet they wanted to include this subsection as productive, unlike for the rest of the retail trade sector. The NAICS data for fixed assets does include that subsector, even back to 1948. However, for value added, the first year for that subsector being reported is 1977 and we use the 71.8% of the 'Accommodation and Food Services' of that year for years prior to 1977 in order to remove the earlier subsector's incorporation into the retail sector and thereby including it as unproductive.

Paitaridis and Tsoulfidis also make a calculation as productive activity for 'computer data and processing services' that would otherwise be considered under unproductive 'business services'. We don't follow that correction for no better reason than that it is a complicated adjustment which would have little effect on our results. Thus, 'computer data and processing services' remains in the unproductive designation.

	1948	1956	1964	1973	1974	1983	1992	2000	2007	2011
VA: value added, private, current \$ (note 1)	239.2	383.1	572.9	1180.1	1276.8	3041.7	5442.0	8736.1	12268.8	13097.4
wholesale trade	17.1	27.0	43.0	91.8	104.2	222.4	380.1	617.7	816.7	844.9
retail trade	24.5	34.6	52.4	108.2	113.6	255.3	430.0	686.2	887.9	917.0
finance, insurance and real estate	28.3	56.7	95.7	203.8	224.0	611.6	1192.1	1997.7	2857.0	3007.9
professional services	3.6	7.6	14.8	37.7	41.6	137.4	347.4	662.4	1024.7	1171.1
management of companies	4.0	6.6	9.8	19.0	20.6	53.4	84.7	171.1	257.7	282.5
addition of food and drink services (note 2)	4.9	6.8	10.4	22.3	23.4					
VA*=VA less the unproductive sectors above	166.6	257.4	367.6	741.9	796.2	1761.6	3007.7	4601.0	6424.8	6874.0
Net fixed capital stock, private, current \$ (note 3)										
K: total non-residential (Table 4.1)	278.8	481.2	648.5	1468.8	1788.4	4474.1	6902.2	10562.7	16124.7	17632.0
wholesale trade (Table 3.1ES)	3.4	5.5	9.8	31.2	37.9	127.0	210.6	337.7	480.8	523.2
retail trade	15.4	22.4	30.3	75.1	90.0	219.4	388.1	654.2	1114.0	1177.1
finance and insurance	4.1	7.2	11.8	39.5	49.9	188.4	476.9	843.1	1347.0	1364.6
real estate services	0.8	2.4	4.0	15.1	17.6	38.3	63.9	223.7	336.6	324.0
professional services	1.2	2.6	4.3	11.5	14.0	43.2	94.1	210.8	369.5	439.2
management of companies	4.3	6.9	10.7	28.1	34.1	103.0	190.9	267.5	374.8	411.1
K*=K less the unproductive sectors above	249.6	434.2	577.6	1268.3	1544.9	3754.8	5477.7	8025.7	12102.0	13392.8
Composition K*/VA* (row 19 ÷ row 9)	1.50	1.69	1.57	1.71	1.94	2.13	1.82	1.74	1.88	1.95
Capacity utilization, mfg/min/util, June, % (90% = full)	83.6	85.3	85.4	88.1	86.4	74.0	80.7	82.0	80.4	76.3
Composition K*/VA*, adj. for capacity util. % ÷ 90%	1.39	1.60	1.49	1.67	1.86	1.75	1.63	1.59	1.68	1.65

Note 1: Value Added by Industry (from GDP-by-industry), representing $v+s$

Note 2: 71.8% of accom. and food services for 1948-1974 only (71.% was the level in 1977)

Note 3: The BEA first calculates constant dollar fixed capital, then converts to current dollars, in order to estimate the costs that would have been paid at the end of the year for the capital stock.

Source: Bureau of Economic Analysis, at www.bea.gov/national, accessed September 25, 2012.

The one significant addition to Paitaridis and Tsoulfidis' work that we make is to include an adjustment for the level of capacity utilization, an adjustment Shaikh and Tonak had also used. The reasoning is that workers would not be employed for idle capacity, and we want a clearer reading of the work hours associated with facilities being actually utilized. We take 90% capacity utilization as representing full capacity (knowing also that another benchmark percentage would not affect our time-series trend).

Paitaridis and Tsoulfidis base their work on Shaikh and Tonak's (1994) work which has extensive discussion of using the price system in circumstances where labor times are not directly reported. We do not depart from that practice in this paper, although we may prefer use of input-output economics such as Wolff (1977) has done since such methodology can explicitly incorporate a measure of labor hours. In order to examine the productive sectors of the economy, we are subtracting out unproductive sectors, similarly as do Paitaridis and Tsoulfidis and, before them, Shaikh and Tonak.

The results reported in Table 1 are remarkable. From 1956 to 2011, as reported in the last line of the table, *the materialized composition of capital*, as calculated for the productive economy, *is stable*. The only movement upward is from 1948 to 1956. The immediate conclusion is that the *entire movement of the value composition of capital since 1956 is due to a rise in the rate of surplus value, the distributional concept*. Therefore, it is incorrect to conclude that "the rising trend of the value composition of capital, when seen from the early 1980s, signifies the capital-bias technological change" (Paitaridis and Tsoulfidis, p. 223). After 1956, C/v rises only due to s/v rising.

As we have indicated, circulating constant capital costs have been excluded in these calculations. They suggest one-quarter higher levels for constant capital. If so, a more accurate conclusion is that the materialized composition of capital $C/(v+s)$ has been approximately stable around two in the United States since 1956. Therefore, use of that stable level of two for $C/(v+s)$, as in the long-run Marxist model of capital accumulation developed in Zarembka (pp. 160-165), is sustained.

Paitaridis and Tsoulfidis are ultimately concerned with the growth of unproductive labor and the rate of profit having a long-term falling trend. Since the rate of surplus value in the productive sector is rising substantially, they are able to address a source of the fall in the rising burden of the unproductive activities. Fair enough. But when they also refer to the burden of changing technological requirements in the productive sectors, evidenced by a raising value composition of capital C/v , they have missed the evidence that the materialized composition $C/(v+s)$ is actually flat, i.e. that changing technology in the productive sectors has not been a burden.

Elsewhere, we have argued that the accumulation of capital as a concept has been imprecisely used by Marxists (Zarembka, 2000). The basic message of this paper is to note a similar imprecise in the use of the value, or the organic, composition of capital. We are calling for much more attention to the materialized composition of capital in order to increase our accuracy in understanding changes in the economy.

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