

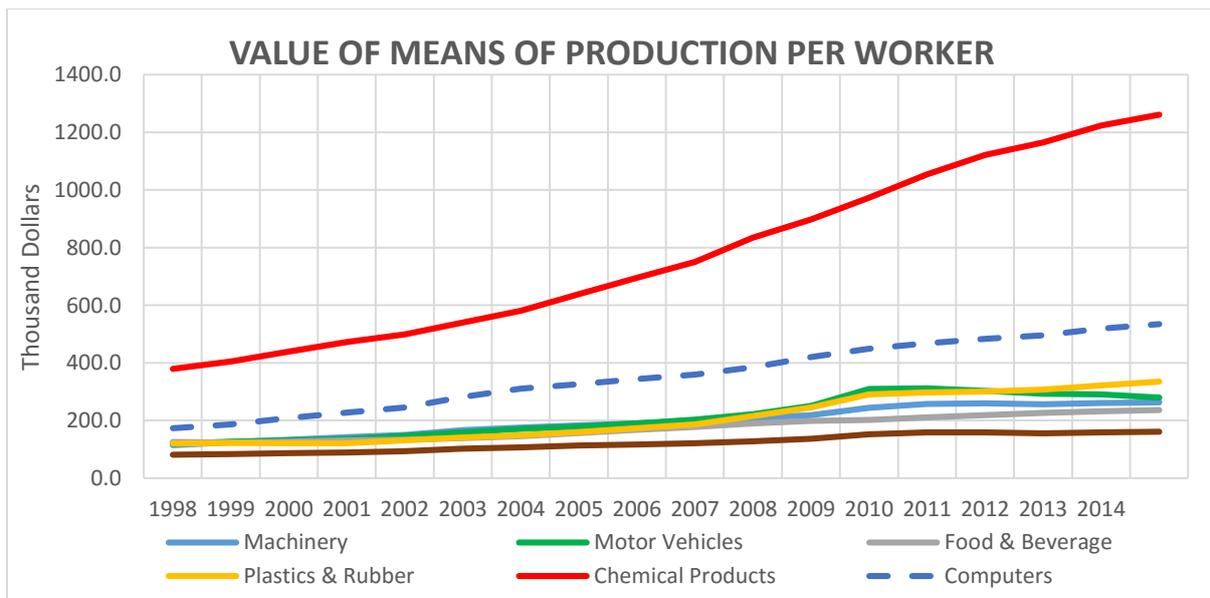
## THE COMPOUND ORGANIC COMPOSITION OF CAPITAL. INTRODUCING THE ADDITIONAL ELEMENT OF TURNOVER.

*The categories - technical composition, value composition and organic composition - play a central role in the Marxist understanding of the dynamics of the capitalist mode of production. Without an understanding of these compositions, how they vary and how they change over time, the equalisation of the rate of profit and its general rise or decline, remains inexplicable. This article shows that without the incorporation of turnover times, the value compositions remain crude. By incorporating turnover into the composition of capital, unexpected and exciting results are obtained. Some of these results begin to answer the anomalies thrown up by the data regarding the equalisation of the rate of the profit whose movement has been sticky rather than continuous. In developing these refined forms of capital compositions, both more accurate and complex, we are moving beyond Volume 3 of Das Kapital. This is as it should be. Marxism is an applied science which needs to be developed in accordance with the richness of data unavailable 150 years ago.*

The technical composition of capital is the physical comparison between the quantity of means of production and the quantity of labour found in production. As capitalism develops so each worker sets in motion in a greater quantity of means of production. Each worker uses larger machines and more of them, while each machine consumes more energy, raw materials and ancillary materials as its throughput increases. The larger the amount of physical means of production set in motion by each worker the higher is the technical composition of capital. This much is uncontroversial.

It is difficult of course to measure the growth in the means of production because of the diversified nature of machines, equipment and so on. One of the ways used to estimate this growth is plotting the value of these means of production against the number of workers using them. This is shown in the graph below. Means of production are here understood to be Fixed Assets plus Inventories.

**Graph 1.**



(Source Bea: Employment Table 6.4. Fixed Assets Table 3.1ESI, Inventories Table 1.BUC)

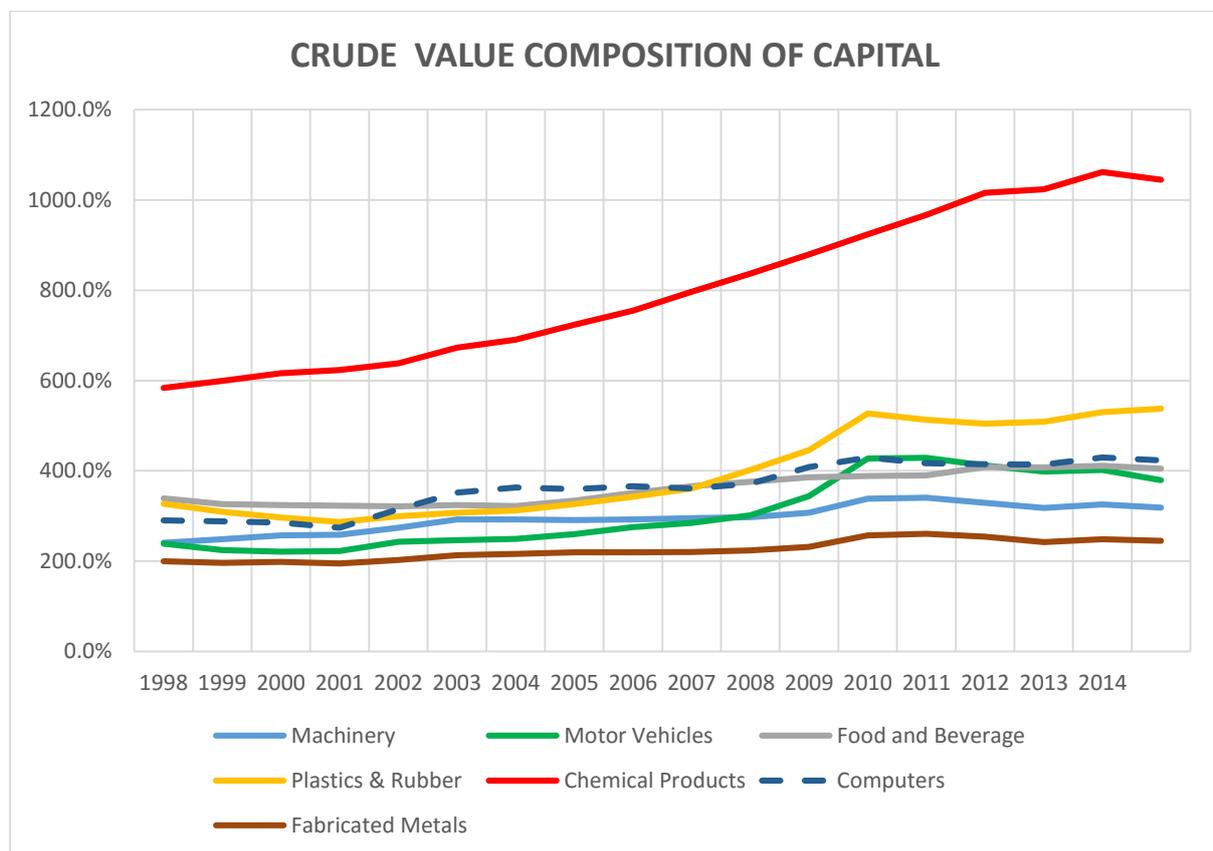
To be consistent all industries in every graph have identical colours. In Graph 1 we see a tight grouping with the exception of computers and chemical products. Using Graph 1 as our base we next move on

to the value composition of capital in Graph 2. It differs from the technical composition because both sides of the ratio are now measured in value terms due to the number of workers being converted into total compensation. No effort is made to separate out productive from unproductive functional workers, as duplication in manufacturing, with the exception of computers, is minimal. Unproductive functional labour within manufacturing firms is accounted for in the Profit and Loss Account, and between firms and industries by means of intermediate sales.

Each industry has different technical requirements so that average skill levels differ between them. Skills will be higher in plastics and rubber than say food processing. The result is that average wage levels per worker will be higher in the plastics and rubber sector than the food processing sector. The differing skill sets in each industry converts the total number of workers differentially into total compensation per industry.

Graph 2 has been deliberately labelled the “Crude Value Composition of Capital”. It is the one, unfortunately, that has often been used to describe the value composition of capital. As we shall see shortly, this composition is not only inaccurate it also yields incorrect results.

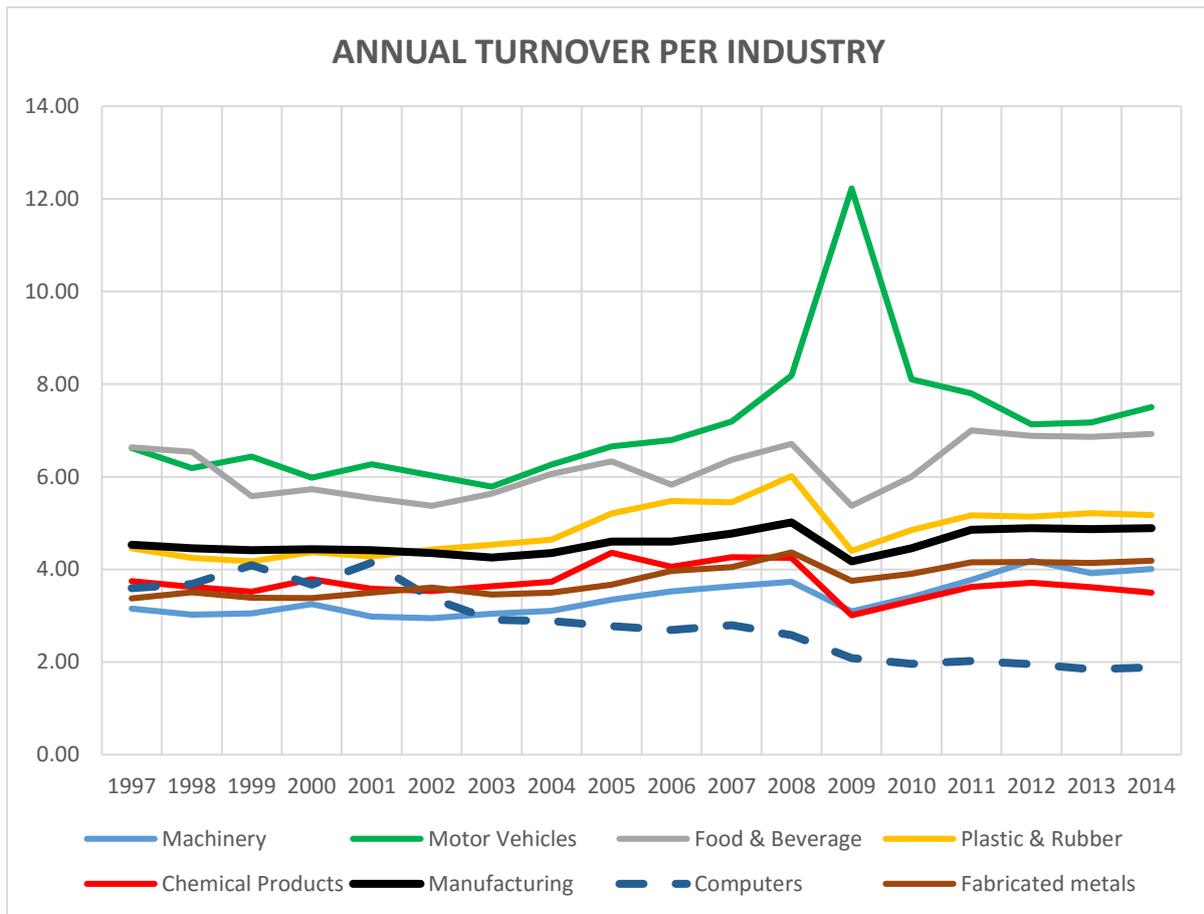
**Graph 2.**



(Sources: BEA as in Graph 1 plus Table 6.1 for compensation.)

We note that although Chemical Products retains its lead, its ratio now has a different gradient. Originally it started at a relatively higher level (580% vs 380%) but now ends at a relatively lower level (1045% vs 1260%). Plastics and rubber has risen to claim the second highest ratio having overtaken computers which has fallen significantly. These differences however, are rendered insignificant when we include turnover times. Graph 3 below, plots the turnover times for each industry.

GRAPH 3.



(Source BEA Interactive, KLEMS, Composition of Output.)

**(The counter posed movement in turnover for motor vehicles in 2009 results from a statistical aberration due to the bankruptcy of General Motors and Chrysler in 2009 and the near bankruptcy of Fords when Motor Vehicle sales plummeted from 16.5 million annualised in the first quarter of 2008 to only 9.5 million in the first quarter of 2009. GM and Chrysler required large scale restructurings and bail outs by the US government which distorted the figures. Shortly thereafter the automotive industry was stabilised and by 2010 regular turnovers were re-established.)**

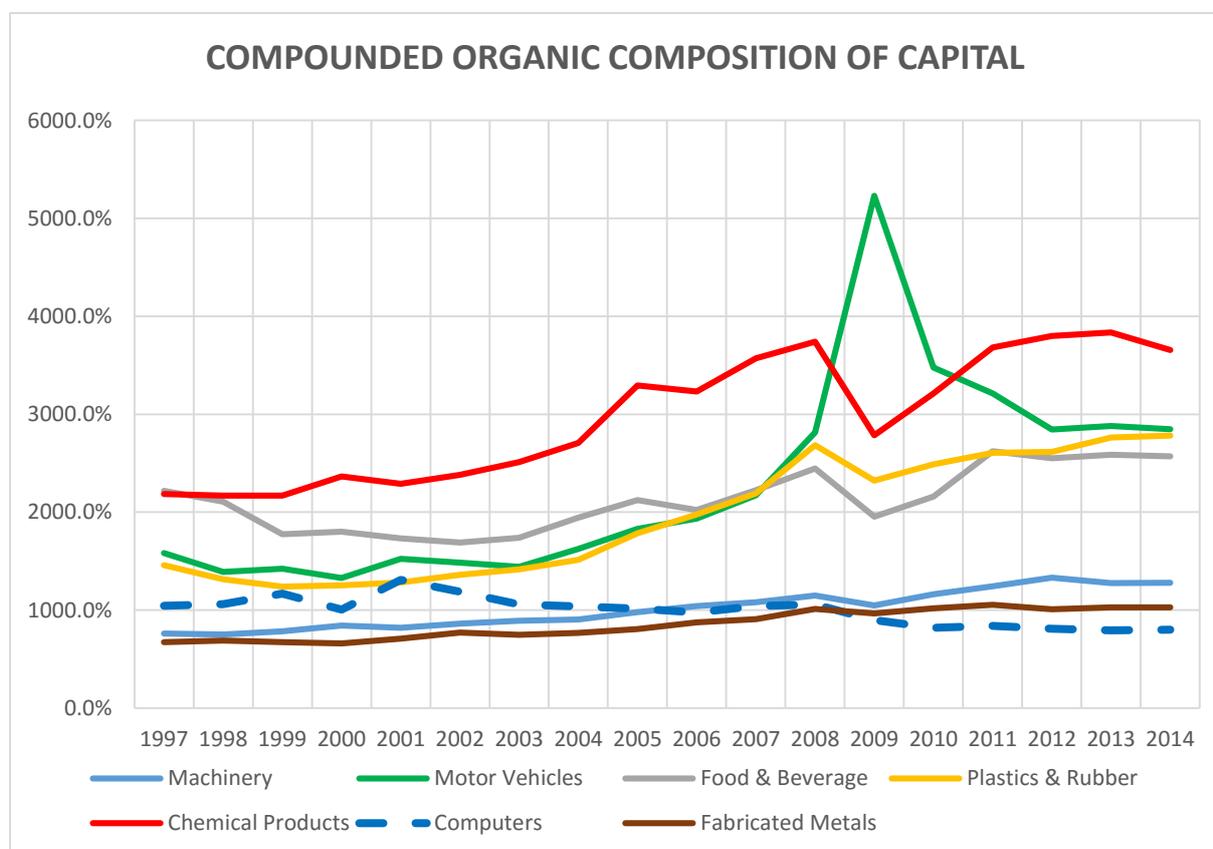
We notice there are a wide range of turnover times. As expected the food industry, because of its technical requirements has a high rate of turnover, while machinery and fabricated metals have a much lower rate of turnover because they have much longer production periods. The highest rate of turnover is Motor Vehicles. This reflects the restructuring that has gone on in this industry. Motor Vehicles are assembled within a couple of days with components supplied “just in time” by up to 4,000 suppliers. The turnover of computers is perplexing until we account for the deleterious effect of the capitalising of Intellectual Property which includes R&D and in-house software. This transfer from revenue to capital with the concomitant loss of intermediate sales is responsible for the collapse in turnovers in the computer industry rather than technical reasons. Evidence once again of the problem of double counting (imputed sales) which is particularly rife in the Computer industry. (Note 1.)

The wide range of turnovers has a profound effect on the final composition of capital. Though Marx often interchanges the terms value and organic composition of capital in Volume 3 of Kapital, it is clear that he considered these two categories distinct. They are. Two capitals with the same value composition can have very different organic composition because their turnovers will vary. And if their turnovers vary, then so too will their productivity. (Note 2.)

It is clear that the higher the rate of turnover, the greater will be the distance between annual compensation and variable capital. It also follows that the higher the rate of turnover, the greater will be the variation between the crude composition of capital and the compounded organic composition (c.o.p) of capital. Firstly, the c.o.p is in every case much higher. Secondly, depending on relative rates of turnover, the individual position of industries will change due to the multiplier effect of unequal rates of turnover.

The Food Processing industry with its rate of turnover double that of machinery, will find its annual compensation reduced by twice that of the machinery industry. It will enjoy a halving in its comparative variable capital. Clearly this differential reduction in variable capital will have a profound effect on the organic composition of capital whose denominator is variable capital not compensation. The effect is shown in Graph 4 below.

**Graph 4.**



We note firstly that in Graph 2 only one industry has a composition above 1000% and that was Chemical Products. In Graph 3 only one industry is below 1000% and that is Computers. On average compositions have risen 4.5 fold. This is entirely due to the reduction in variable capital relative to constant capital due to the effect of turnover.

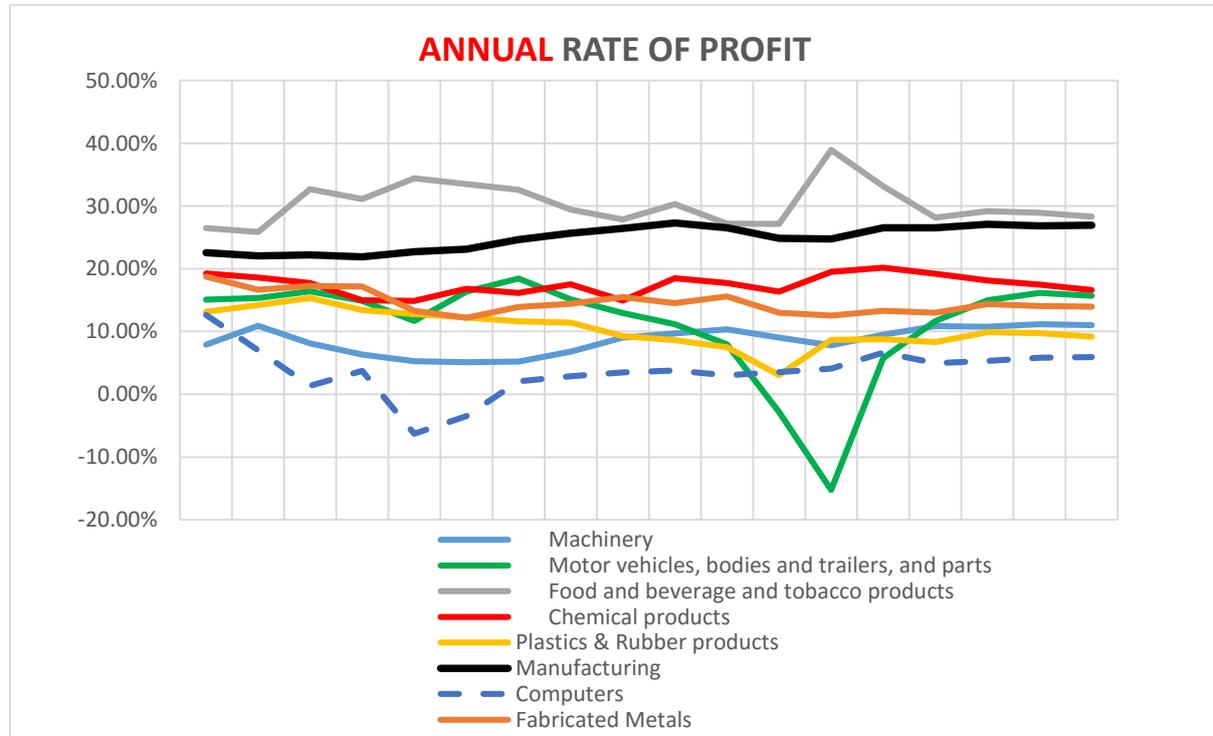
We also find a different arrangement of industries in Graph 4. Industries have changed places and or the gaps between industries have grown. Generally, the faster turnover industries have ascended while the slower rate industries have descended. This is particularly true of the computer industry which has descended from third place to last place (Note 1). On the other hand, the Food Industry, because of its above average rate of turnover has ascended from fourth place to third place. While Chemical Products still has the highest composition, the gap has been reduced significantly compared to motor vehicles the next highest (a relative gap of 95% has been reduced to just 31%).

Importantly, what is found here is that compositions of capital are grouped according to turnovers. With the exception of chemical products, the other top three capitals (food, plastics and motor vehicles) all have a rate of turnover above the average, defined as the average for manufacturing as a whole, (thick black line in Graph 3). The bottom three compositions of capital (computers, fabricated metals and machinery) all have turnovers below the average.

We have now moved beyond Volume 3. The compounded Organic Composition of Capital (which includes turnovers) is dissimilar to the original Organic Composition of Capital (which excludes turnover). The Compounded Organic Composition of capital or c.o.p is thus not only a function of the technical composition of capital but a function of turnover as well. It is their interaction that determines the final c.o.p. The results are unexpected. From now on, and this must be stressed, the organic composition must be seen in a new light. It can rise, not only due to the underlying rise in its technical composition but also due to alterations in turnovers. If it rises purely for technical reasons, this tends to depress the rate of profit, but if it rises due to the increase in turnovers this tends to increase the rate of profit.

As we saw in Graph 1, Chemical Products had the highest technical composition of capital. This is reduced in Graph 4 because of its below average rate of turnover. We also know that as profits are only produced in each period of turnover, the greater the number of turnovers, the larger the multiplier, the larger the annual rate of profit, and vice versa. The below average rate of turnover for Chemical Products means its annual rate of profit is reduced and it falls to the middle of the spread of rates of profit as shown in Graph 5. (Matters stand differently when we examine later, Single Period Rates of Profit.)

**Graph 5.**



(Profit = Gross Value Added – Depreciation – Compensation. Table 3.4ESI for depreciation.)

(Capital = fixed, inventories and variable capital. No adjustment for the top 1% of wage earners is made.)

The food industry on the other hand has a c.o.p. lower than that of Chemical Products. This is due to a combination of a lower technical composition and higher rate of turnover. In particular, as its rate

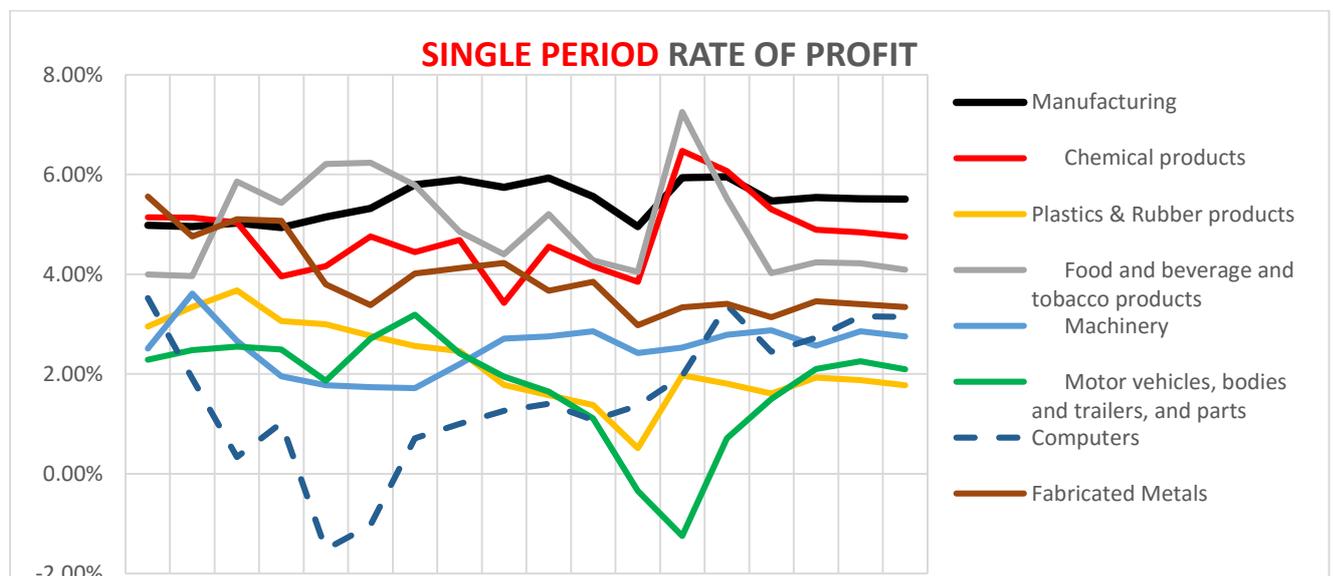
of turnover is double that of Chemical Products, this multiplies its annual profits catapulting it above the rate of profit obtained in Chemical Products (27% vs 17%). To reiterate, when the organic composition of capital rises due to increased turnovers it tends to yield a higher rate of profit everything else being held equal.

However, the Motor Vehicle industry with a similar turnover and a c.o.p. to that of the Food Industry suffers a lower rate of profit than that of the Food Industry. This results from the much higher levels of depreciation found in the Motor Vehicle industry which reduces the surplus used to calculate the rate of profit. However, in terms of cash flow they are similar, but cash flow does not enter into the determination of the rate of profit. (Note 1. Graph 7, Gross Rate of Profit)

Finally, we turn to the single period rate of profit. Single period rates of profit have been investigated before. However, only the turnover formula can yield results that are wide enough and deep enough to yield comprehensive results. Until turnover times were found the means to reduce annual rates of profit to single period rates of profit across industries and the economy was missing. It goes without saying that the primary rate of profit remains the annual rate of profit. It alone allows industries with differing rates of turnover to be compared. It alone is the moving average, combining newer capital recently added with older capital still being employed. As a result, it alone registers the over accumulation of capital, the point at which the older capital overwhelms the added productivity of the newer capital resulting in the absolute fall in the rate of profit. Its fall registers the need to purge the older capital from the system, heralding the initiation of the classical recessionary period.

Having eulogised about the annual rate of profit, it is true that single period rates of profit have their place, particularly with regard to investment decisions within a specific industry. Compared to the annual rate of profit, there is a relative deflation in the single period rate of profit for those industries with higher turnovers and a relative inflation in the single period rate of profit for those industries with lower turnovers. Hence Chemical Products and the Food Industry swop positions, with Chemical Products leading the Food Industry. This is as it should be if annual rates of profit are to converge. Had Chemical Products had a low single period rate of profit, this low rate when multiplied by a low turnover rate, would have yielded an annual rate of profit so low that capital would have fled this industry. Instead the higher single period rate of profit multiplied by the lower rate of turnover ensures that Chemical Products enjoys an average annual rate of profit.

**Graph 6.**



In seeking to explain the equalisation of the rate of profit between industries, we need to include turnovers. Turnovers have the effect of smoothing out the differences between industries with substantially different single period rates of profit. (This linkage requires more investigation.)

There is another consideration that needs to be applied to single period rates of profit. In volume 3, Marx makes it clear capitalists will only invest to expand production, not when a new investment earns an extra profit, but only when it raises the rate of profit. If more capital is invested than the additional profit earned, then the rate of profit will fall and that investment will be counterproductive. What the single period rate of profit provides is the basis for determining whether or not an investment will yield sufficient profit so as to raise the rate of profit. If it does, the single period r.o.p. will rise.

When an investor is determining how much more profit can be made and how long it will take to be realised, they are of course calculating the single period rate of profit. Only later will they extrapolate it over a year to render it commensurate with other industries. Rephrased in the obscure and mystical language of the exploiters, if the single period rate of profit increases due to a new investment, all things being equal especially demand and supply, marginal costs will fall relative to revenue and vice versa if the single period rate of profit declines.

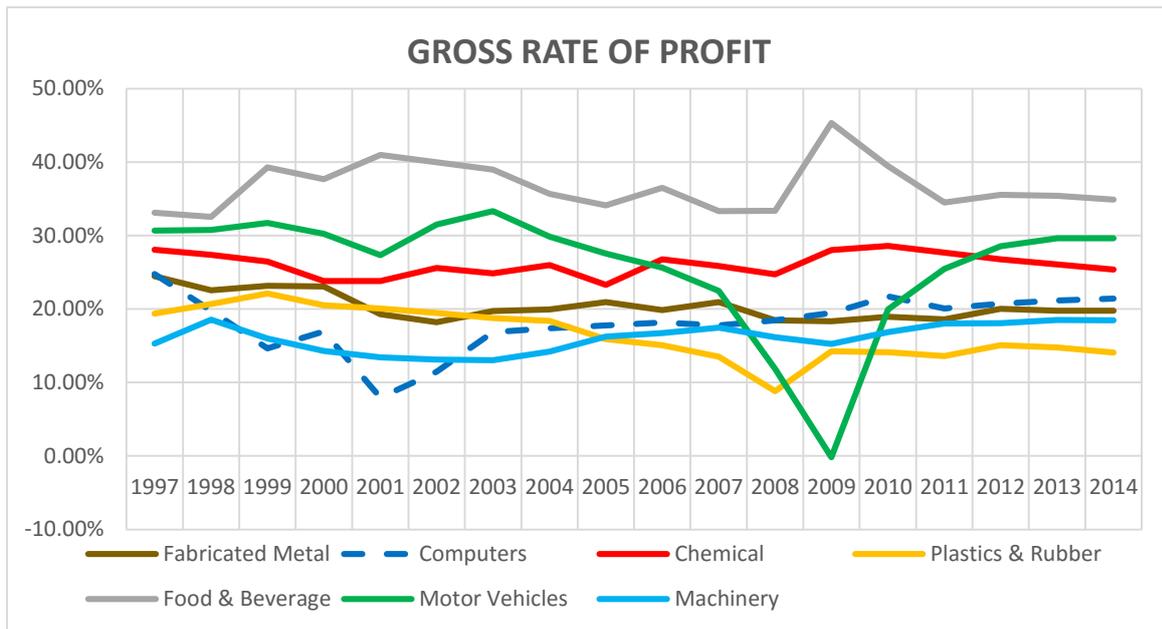
In conclusion, this article demonstrates that much of what has been written needs to be rewritten. It is no longer permissible to investigate the organic composition of capital without including turnovers. A failure to do so creates a disconnect between the organic composition of capital and the rate of profit. An increase in turnovers acts as a counter-vailing factor to the tendency for the rate of profit to fall. Hence if the organic composition of capital rises because the increase in the rate of turnover decreases variable capital relative to constant, it can be associated with a rise in the rate of profit. Conversely should turnovers fall, as is the case today, then a fall in the organic composition of capital owing to a rise in variable capital is associated with a fall in the rate of profit. In the USA from its peak in 2014, there has been an 11% fall in turnovers in manufacturing (or the loss of 28 working days in which to produce profits). While the current organic composition of capital is incalculable due to the absence of current fixed assets, what is available has shown a sharp contraction in the rate of surplus value and profit. Any investigation of the capitalist economy in general, and profitability in particular can no longer exclude turnovers. To do so today, when the data is available, not only violates the spirit of Marxism, but its methodology as well.

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**Note 1.** The turnover formula always reveals the presence of double counting. It does so through an irregular fall in its rate. Nowhere is this truer than in the computer industry. I.P. forms a large element of the capital for the computer industry, and an even larger element of its depreciation, because I.P. is depreciated faster than equipment and structures. Graph 7 below, introduced for illustrative purposes only, demonstrates this effect. Here the Gross Rate of Profit is defined as Gross Value Added less Compensation which is then divided by Total Capital (C+v). Depreciation is now included in the gross surplus for all the industries.

Two results stand out. The computer industry now appears more profitable. In fact, it would be even more profitable if we were to adjust the I.P. component within its total capital. Whatever the case, its gross rate of profit lies far above its net rate of profit found in Graph 5. The second result is the relation between the Food Industry and the Motor Vehicle Industry. As has been noted, while both have similar turnovers and c.o.p., the Food Industry yields a higher annual rate of profit (Graph 5). However, when depreciation is included, as it has been done in Graph 7, the rates of profit converge because the Motor Vehicle Industry has a higher rate of depreciation.

Graph 7.



It is likely that the gross rate of profit does play some role in investment decisions as it yields the cash flow for any corporation, which the net rate of profit does not. It is the basis of financial models. Two measures are usually applied. Post tax rates of profit plus depreciation, amortization and interest payment less investment, yields *gross cash flow*. The more common measure is depreciation plus undistributed corporate profits less investment which equals *free cash flow*.

I.P. has become more important because of the restructuring of the world economy and in particular the outsourcing of production to foreign countries. I.P. allows the holding company or individual to harvest the surplus value produced by this value chain. Individuals and companies owning the patents or titles farm out the production of their commodity on a cost plus basis (like Apple) while retaining the resulting profits. It was the need to monopolise this entitlement, rather than the one-year rule, which created the urgency to convert all aspects of I.P. like R&D (its biggest component) from revenue into capital.

**Note 2.** The rate of turnover and the rate of productivity growth are intimately linked. If the rate of turnover increases, everything else being equal, so too will the rate of productivity. The reason is clear. When turnovers increase, workers produce more value in a shorter time when measured by market prices. If they produced \$10,000 every 60 days and now produce it every 54 days, then over 365 days they produce \$67,592 instead of £60,833 before. It follows that their productivity as measured by annual value added per worker will have gone up. (Now is not the time to investigate the causes for this reduction in turnover time, except to say it does not always result from a shortening of the production cycle, the normal measure of productivity.) In an earlier posting entitled “Why Is Productivity Flat Lining?” four reasons were given for the decline in the rate of productivity – deflation, low net rates of investment, investment redirected into unproductive spheres and the preponderance of luxury production. In fact, there are five reasons when we include turnover. Michael Roberts recent posting on productivity trends showing continuing deterioration in global rates suggests that turnovers and their recent decline are one of the major factors dragging down productivity growth.

**Note 3.** The average rate of profit for manufacturing (Graph 5) lies above most of the rates for the individual industries. This is primarily due to the exclusion of Petroleum and Coal Products which has the highest turnover of any industry, which was highly profitable and large, but volatile.

## Commentary.

One almost feels pity for the Federal Reserve. First they prepared the markets for a rate rise in July, then they ended up with egg on their face when the employment figures took a dive. The Fed has only one tool at its disposal – interest rates. It needs many. The US economy presents a mixed picture. On the one hand house prices are rising together with health costs, on the other everything is moving in the opposite direction. What is really needed are specific instruments to curb house price rises, such as the government building more houses (per head of population 60% fewer houses are being built compared to the 1970s and they are smaller), and the restructuring of the nightmare US medical industry.

Not that it matters that much. World interest rates continue their race to the bottom. Over \$10 trillion worth of government bonds no longer earn interest. Insurance companies, pension companies and savers are stripped of any income. This collapse in interest rates results from the \$170 trillion worth of fictitious capital give or take a few billion chasing a declining stream of revenue. It is this suffocating weight that is crushing interest rates. This phenomenon far more important and consequential **at this juncture** than levels of personal or corporate indebtedness.

As long as this inverted pyramid rested on rising revenues it could be preserved. Now that the source of that revenue, the mass of profits is contracting, this pyramid is rocking on its shrinking pedestal. This week the mood in the financial markets was most significant. For the first time in months the air of desperation was palpable as interest rates continued to sink around the world. Capitulation now stalks the markets. Many scribblers identified this mood correctly, a vote of no confidence in the future of the world economy. A classical event of lagging consciousness catching up with reality.

Capitalism resides in intensive care, on a drip of quantitative easing, nursed by a supine working class now getting restless, while its breathing grows shallower. Building a new workers international armed with a programme fit for the 21<sup>st</sup> Century has never been more important.