THE OLD IS DYING BUT THE NEW CANNOT BE BORN

ON THE EXHAUSTION OF THE PRESENT PHASE OF WESTERN CAPITALISM

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I. SOME BASIC CONCEPTS. A fundamental tenet of Marx's theory of history and revolution is the contradiction between labour's productive forces and the capitalist production relation. "At a certain stage of development the material productive forces of society come into conflict with the existing relations of production … From forms of development of the productive forces these relations turn into their fetters" (Marx, 1970, p. 21). Traditionally, this has been read within the context of a theory of transition from capitalism to socialism or communism. But it applies just as well to the transition from one historical phase of capitalist development to the following one.

Let us begin with some basic concepts. Given that *A* stands for assets, *O* for output, *L* for labour and *s* for surplus value, the following four definitions will be employed: labor productivity (O/L), capital efficiency (A/L), capital productivity (O/A) and capital profitability (s/A). Then the rate of profit is s/(A+L).

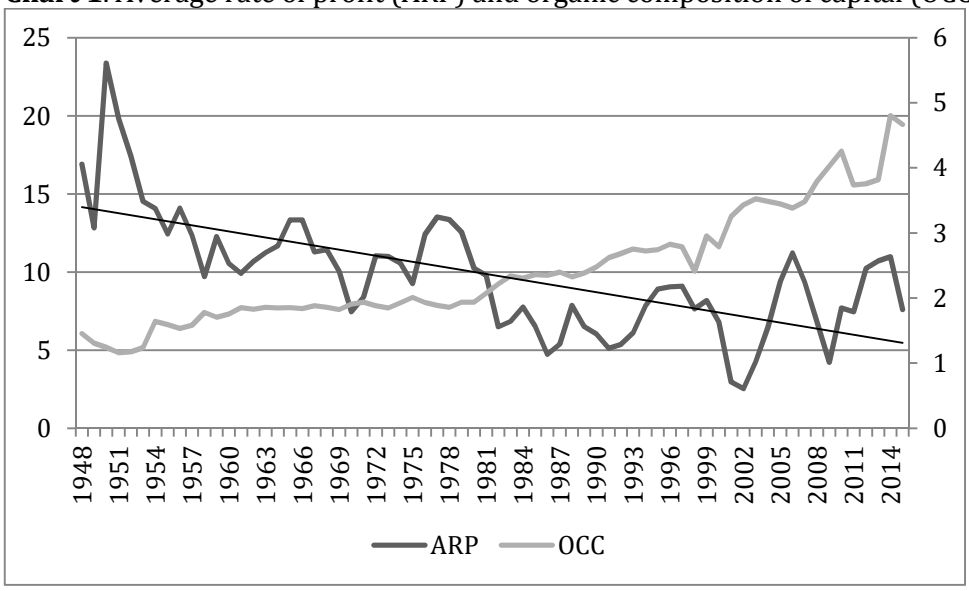
Let us begin with labour's productivity. This is *labour's productive force*, as measured by the quantity of output per unit of labour (O/L). The *relation of production* is the relation between capital and labour.

The contradiction between (labour's) productive forces and the (capitalist) relations of production is this. In a first stage of development the economy grows due to new investments in the same technologies. Employment grows but its relation to assets does not change (quantitatively, the relation of production do not change). Output (productivity and thus labour's productive force) increases too. But after that, due to technological competition, more capital is invested in new technologies, which are labour shedding. New technologies are productivity-increasing but labour-shedding. Then the greater is labour's productivity, the more is the labour shed by capital, the less is the value and surplus value produced per unit of capital (because only labour creates value and surplus value), the greater the organic composition of capital (OCC, i.e. the relation between constant capital (means of production) and variable capital (labour), the lower is the profit rate, *ceteris paribus*. The fall in the rate of profit is the synthetic manifestation of this contradiction: higher productivity and lower profitability. Within the context of a nation or a group of nations, what counts is the fall in the average rate of profit (from now on, ARP). The fall in the profit rate is the key variable to understand, not only economic crises, but also why and how the old, i.e. capitalism, is dying.

II. AVERAGE RATE OF PROFIT AND ORGANIC COMPOSTION OF CAPITAL. Let us consider the ARP of the US, the most important nation still nowadays.[1] Statistical data (chart 1 below) show that while the OCC, i.e. the shedding of labour, grows tendentially, the ARP is in a state of irreversible fall. The fall is tendential, i.e. through upward and downward cycles. But the trend, the empirical measure of the tendency, is clearly downward.

[1] The focus is on the productive sectors. Data are deflated. See the Appendix.

Chart 1. Average rate of profit (ARP) and organic composition of capital (OCC)[2]



The tendential replacement of labour by means of production causes the OCC to grow, from 1.4 in 1947 to 4.6 in 2015. Since there is an inverse relation between the growth of the means of production relative to labour (growth in the OCC) on the one hand and the rate of profit on the other, chart 1 shows that only labour creates value and thus surplus value. This chart is the empirical verification of the *labour theory of value's fundamental assumption,* i.e. that labour and only labour creates value and thus surplus value.

III. THE VARIABLE AND CONSTANT RATE OF EXPLOITATION. The fall in the ARP is the ultimate cause of crises. To see this, two adjustments are needed. The first is the constant exploitation ARP (CE-ARP).

Chart 1 shows that up to the mid-198os while the OCC rises, the ARP falls, conforming to Marx's thesis. However, starting from the mid-1980s, while the OCC rises, the ARP rises instead of falling. This has led some to question the general validity of the inverse relation between the ARP and the OCC.

But this critique neglects a fundamental point. If the ARP is a measure of the state of health of the economy, it must measure the surplus value generated because *more labour* is employed per unit of capital invested. The rate of exploitation is assumed to be unchanged. Both necessary value and surplus value grow. But more surplus value can be due to greater exploitation because the same quantity of labour per unit of capital invested is *more exploited*. But then, while surplus value rises, necessary labour (wages) fall. The sum of necessary labour plus surplus value is unchanged. The ARP can rise because, while the total value generated per unit of capital invested falls, a greater share of this smaller quantity might be appropriated by capital due to a greater rate of exploitation. There is no economic growth, no higher value created.

Then, to determine if higher profitability indicates economic growth, we need a measure of profitability in which changes in the rates of exploitation are factored out. One such measure can be obtained by computing the rate of profit with a constant rate of exploitation (*CE-ARP*). More generally, if the tendency (the declining generation of surplus value due to a higher OCC) is modified by the countertendency (the rise in

[2] This ARP is computed according to the temporalist method. See Appendix.

surplus value due to a rising rate of exploitation), the latter should be factored out. If this is done, the ARP falls throughout to 2015.

Chart 2. ARP with constant rate of exploitation (CE-ARP), 1948-2015[3]

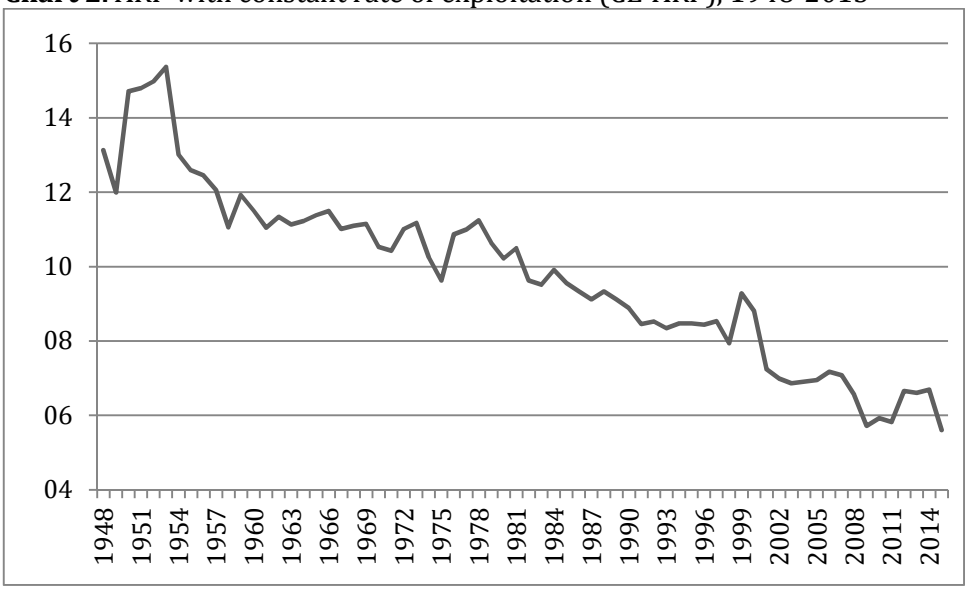


Chart 3 below compares the two measures of the ARP, the ARP with variable rate of exploitation (*VE-ARP* as in chart 1) and the rate of profit with a constant rate of exploitation (*CE-ARP* as in chart 2).

[3] This is the temporalist rate of profit. See Appendix.

Chart 3. CE-ARP and the VE-ARP

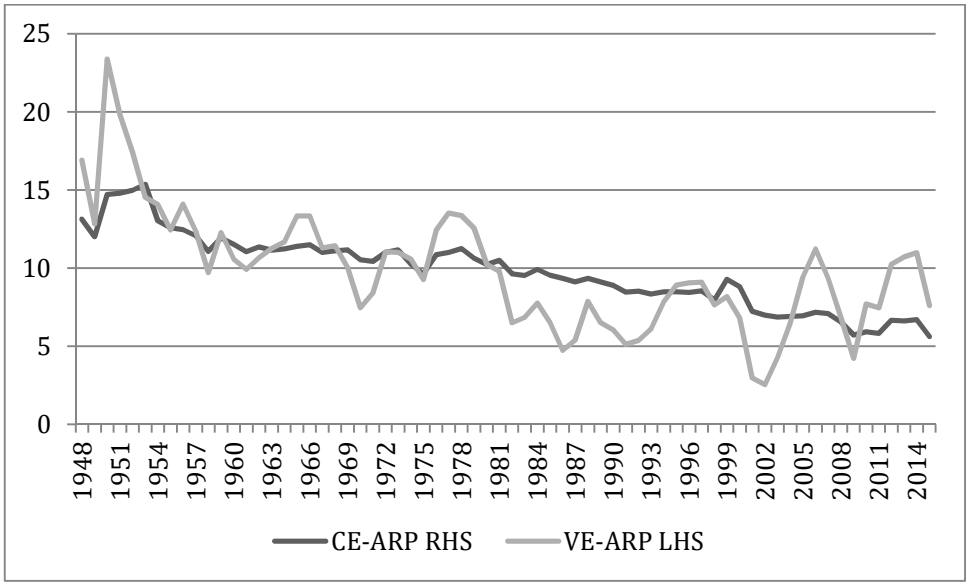


Chart 3 shows that, starting from the mid-1980s, the VE-ARP rises while the CE-ARP falls. The generation of surplus value per unit of capital invested has fallen, but a greater proportion has been appropriated by capital through rising rates of exploitation. The VE-ARP rises, but the rise in the VE-ARP is due to higher rates of exploitation rather than to higher production of value and surplus value per unit of capital invested. But chart 3 shows also another imporant point. *The VE-ARP fluctuates around the CE-ARP, i.e. variations (increases) in the rate of exploitation cannot hold back the fall in the CE-ARP.* Increases in the rate of exploitation are only a temporary counter-tendency.[4]

It has been objected that the CE-ARP does not measure 'real' profitability because, in reality, exploitation rates are variable. But is this not true of all models of reality that necessarily abstract from certain aspects of reality (e.g. current vs. deflated prices)? The CE-ARP is one of the possible ways to isolate movements in the production of value and surplus value from distributional changes between necessary and surplus value. It is no less real than the VE-ARP.

IV. THE VALUE RATE OF PROFIT. The second adjustment is the value rate of profit. It is commonly held that, while Marx's categories are in value terms, the only way to quantify value is by converting monetary prices (the manifestation of value) into value (labour) quantities. This conversion is supposedly impossible. A first reason would be that money prices, while being the necessary manifestation of the value (labour) contained in commodities, are also affected by factors other than their own value, for example variations in interest rates. However, these changes affect the distribution of new value (between capital and labour and between the state and the private sector), not the quantity of new value generated. Thus, in the computation of the *average* rate of profit, these distributional factors are of no importance.

Second, inflationary movements affect the representation of value, not the value contained in the commodities (their value). This is why deflated prices should be used.

Third, only money represents value. Credit represents debt and thus is not money. As such it does not represent value. It should not be converted into value.

[4] See for more details section 9 below.

Fourth, value is supposed to be contained in material, as opposed to mental, commodities. But value can be computed also for mental commodities.[5]

Fifth, according to some, it is impossible to know the labour that has gone into the production of the means of production because the means of production incorporate labour that has gone into previous means of production, and so on and so forth (the *infinite regression* critique). Thus, it would be impossible to know the labour and thus the value contained in the means of production and consequently the value of the product. If applied consistently, this approach would make any science (e.g. history) impossible. But this aside, the present value of the means of production is the *present valuation* of the hours actually spent in *the previous period* for their production. There is no infinite regression in time. One step backward is sufficient. This method has been pioneered by Carchedi in 1996 (Freeman and Carchedi, 1996).

Sixth, the criterion adopted to reject the infinite regression critique allows us to determine the conversion from money to value quantities of the means of production. Consider a period, t2-t3, whose output at t3 is a computer, which is made with a machine, the input, at t2. Suppose we want to calculate the abstract labour (value) contained in the machine. We start our count *one period* earlier, something which can be done if we dispose of data going back to t1. Thus, to evaluate the value of that machine as an input of t2-t3, we start our counting at t1 and count the hours of new labour (NL) that were needed to produce that machine during t1–t2. This is necessary labour plus surplus labour. The quantity of money paid as wages (W) and profits (P) at t2 is also known at t2 and corresponds to, and is the manifestation of, this quantity of labour. Then, the following ratio can be computed at t2

(1) $\alpha = NL/(W+P)$

where W and P are wages and profits in money terms paid at t2 and NL is the (new) labour (value) carried out during t1-t2. Then, α measures the units of new labour represented by one unit of money. For example, if new labour is 40 million hours and wages plus profits is 80 million euros, α = 0.5. One euro represents 0.5 units of new labour. Given that both money and abstract labour are inherently homogeneous, α can be applied to the price of that machine also at t2 as an output of t1-t2. This is also the money paid for that machine as an input of the next period, t2-t3. Thus, the present valuation in labour hours of the price (M) of that machine at the start of t2-t3 is

(2) $\beta = M\alpha$

This is also the value of that machine as the input of the computer (output) at t3. For example, if at t2 the price of the machine is 150,000 euros, its labour content also at t2 is 150,000x0.5 = 75,000 hours. This is also the value transferred to the computer at t3. Then we can compute the value of the computer at t3. We compute the new labour (NL) gone in the production of the computer in the t2-t3 period. Suppose NL is 10,000 hours. Then, the value of the computer at t3 using that machine is

(3) $V = \beta+NL$

which in terms of the example above is 75,000+10,000 = 85,000 labour hours. This is the output's labour content at t3.

[5] Actually, all commodities are material, including mental commodities. The real dichotomy is between objective and mental commodities. See Carchedi, 2014.

The price (P) and the value (V) of the output are

(4) P = c+v+s (in money terms) and
(5) V = β+NL (in value, or labour hours, terms)

Then

(6) γ = P/V indicates the units of money representing one unit of value.[6]

We can now compute the ARP in terms of value (labour hours). Temporalism requires that the value of the means of production be computed at the beginning of a period and the value and surplus value at the end of that period. Consider t2-t3. The above allows us to compute the labour content of the inputs at t2 as the initial point of t2-t3. Next we count the hours of new labour in the t2-t3 period. Together, these are the value of wages and of profits at t3.

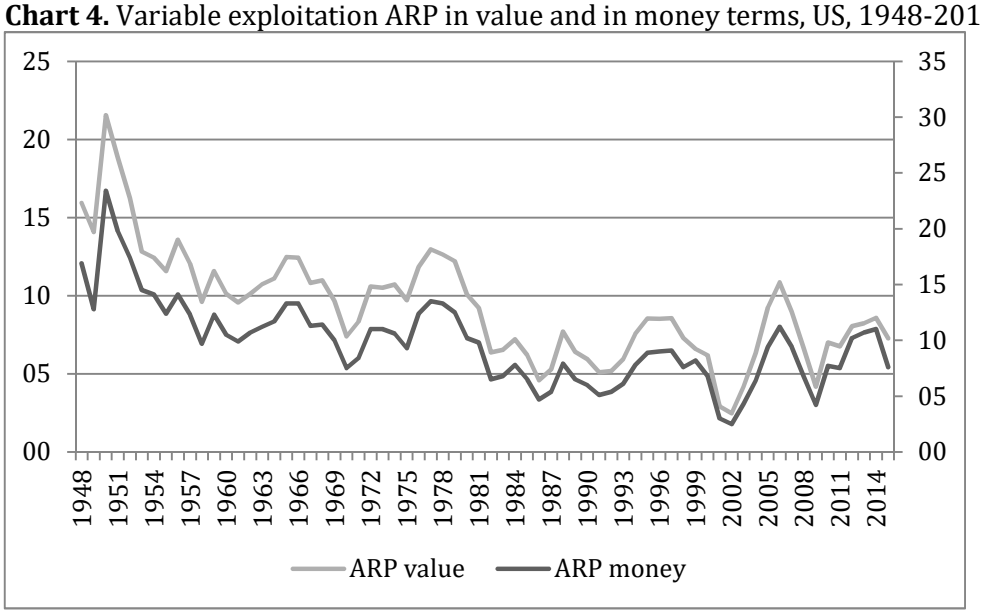
Now we need to split the new labour (NL) expended in t2-t3 into necessary labour (Ln) and surplus labour (Ls). At t3 we compute wages as a percentage of W+P. We do the same with profits. If we multiply these percentages by total labour units (NL), we obtain the value of labor power and of profits (i.e. in terms of labor) at t3. We now have assets in terms of labor at t2 as the initial point of t2–t3 and wages and profits also in terms of labor at t3 as the end of t2-t3. The temporal ARP in terms of labour (value) follows.

The two rates of profit are

(7) Money rate of profit = p/(c+v)
(8) Value rate of profit =Ls/(β+Ln)

An important result emerges: the two rates of profit track each other very closely, as shown by the very high correlation coefficient (0.98)

Chart 4. Variable exploitation ARP in value and in money terms, US, 1948-2015



Three conclusions follow.

[6] Notice that α refers only to new labour while γ refers to both new and past labour.

First, the hypothesis that money is the monetary representation of value is fully empirically substantiated. Money prices are practically the same as labour, value quantities. Then, quantitatively, money prices can be safely used as labour quantities. Marx's money numerical examples can be read (as Marx did) also as value quantities.

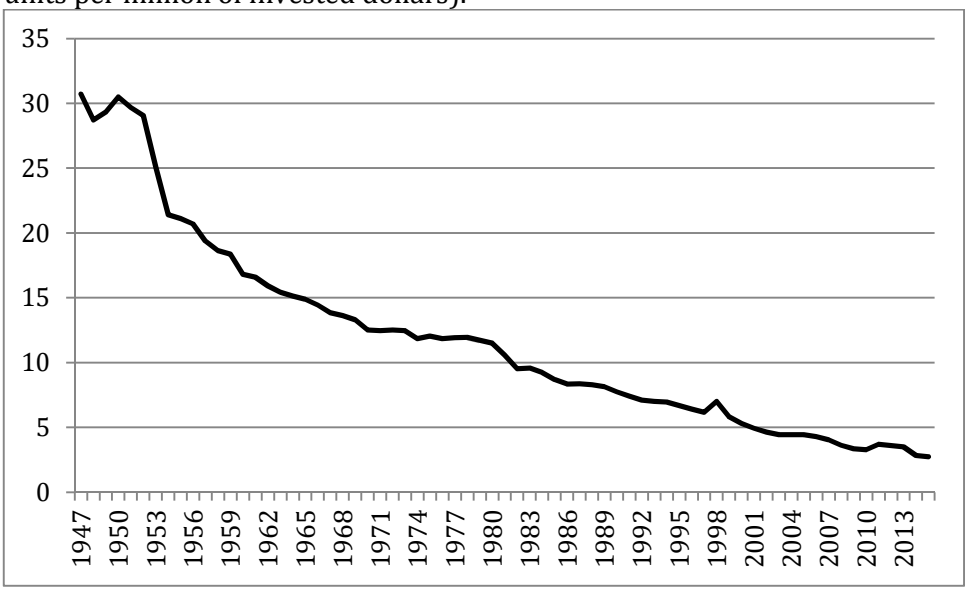
Second, it follows that price ARPs and value ARPs are only minimally quantitatively different; they are linked together in a single system.

Third, the measurement of new labour (labour units or labour hours) rebuts, besides the infinite regression critique, also the 'value form' interpretation, i.e. the notion that value does not exist before exchange (i.e. that it supposedly comes into existence only through, and at the moment of, exchange) or that if it does exist it cannot be quantified.[7] Value, if it can be measured before exchange, exists before exchange. It is new labour plus the present valuation of past labour. The moment of exchange is the moment of the realization of the previously generated value.

V. THE EXHAUSTION OF THE PRESENT HISTORICAL PHASE OF CAPITALISM. As mentioned above, the CE-ARP is the fundamental indicator of the state of health of the economy. But not all years of falling profitability due to a rise in the OCC are crisis years. This means that there are secondary causes of crises, secondary in the sense that they contribute to the emergence of crises while being themselves caused by the rise in the OCC (the primary cause). The rise in the OCC is not by itself sufficient to cause crises; it is necessary but not sufficient. Other pro-tendential factors must intervene. On the other hand, the rise in the OCC can be counteracted by factors that delay temporarily the emergence of crises (the countertendencies). The crisis explodes when the counter-tendential forces cannot hold back any more the tendential forces, *both the primary one* (the increase in the OCC) *and the secondary*, the pro-tendential, *ones.* The following two pro-tendential forces are particularly relevant.

(1) Employment as percentage of constant and variable capital invested

Chart 5. Employment as percentage of constant and variable capital invested (labour units per million of invested dollars).

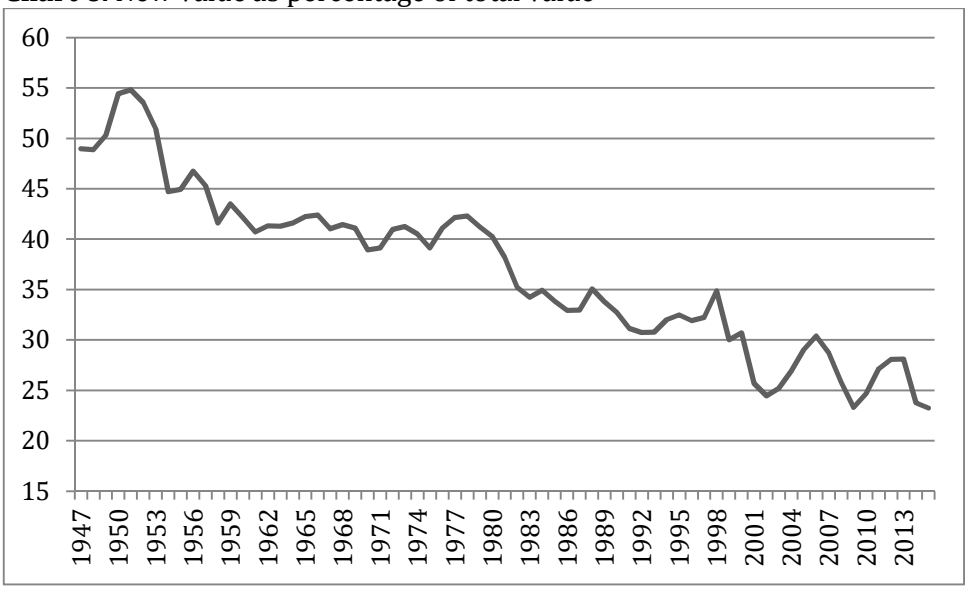


[7] Authors following this line of thought are, among others, Arthur, 2004; Milios, 2009; Murray, 2000; Heinrich, 2004. For a critique see Carchedi, 2011).

If the OCC rises, variable capital falls relative to constant capital. If variable capital falls, employment falls. If constant capital rises employment falls due to the labour shedding nature of new technologies). An increase in the total capital invested (both constant and variable) cannot prevent employment from falling, contrary to orthodox economics in all its forms and shades. And, as we shall see in expounding the Marxian multiplier, if total capital invested increases, profitability falls.

(2) The above implies that new value as percentage of total value falls.

Chart 6. New value as percentage of total value



The situation depicted by charts 2, 5 and 6 is dramatic. Chart 2 shows the long, secular descent of average profitability. Chart 5 shows that each unit of capital invested in both assets and labour power generates increasingly less employment. Employment per unit of constant and variable capital invested falls from 30.7 in 1947 to 2.7 in 2015, a fall by -91.2%. Employment threatens to disappear from the productive (of value) sectors. New value relative to the total value falls too by -52.5%, as in Chart 6. If the capital invested increases, the average rate of profit, employment as percentage of constant and variable capital invested and new value relative to total value all fall.

The above shows unequivocally *the progressive exhaustion of the present historical phase of capitalism*. No economic policy measures, either neo-liberal or (post) Keynesian, has held or will hold back this decaying process. The writing is on the wall, and it is written in capital letters.

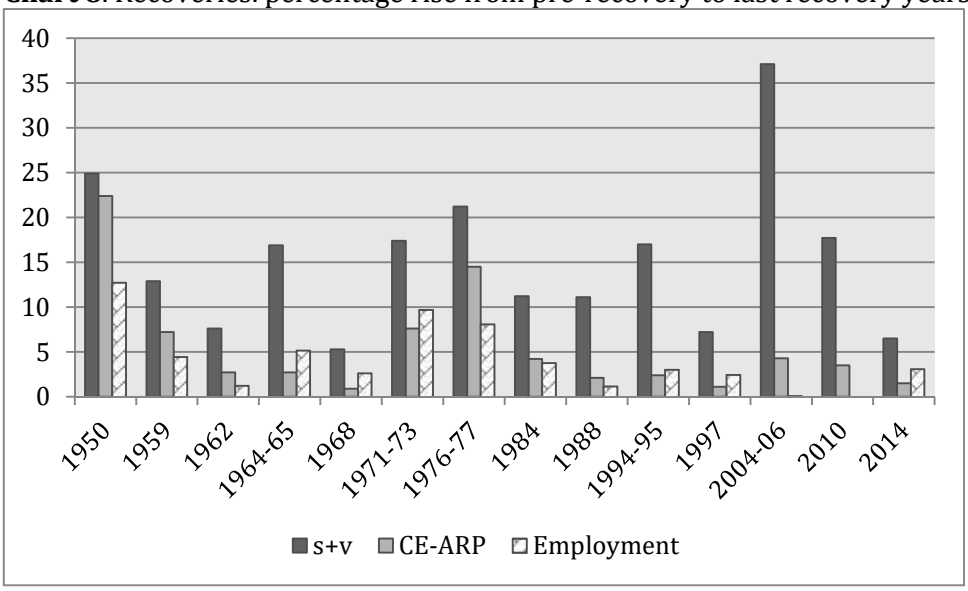
VI. CRISES AND RECOVERIES. This is the *general context* within which crises have emerged since the end of WWII. But when precisely do crises emerge? They emerge when *the rate of change of profitability, employment and new value is negative*. Crises emerge at the points of intersection at which *all* these three indicators' rate of change is negative. These points of intersection are the conjunctural manifestation of the persistent, long-term deterioration of the US economy in the productive sectors.

On this basis, since 1945, the following 12 crises can be identified. They correspond with the periodization of the NBER, with the exception of 1986, which is not considered a crisis year.

Chart 7. Crises: percentage fall from pre-crisis to last crisis years.[8]

Conversely, recoveries are years in which the three fundamental factors' rates of growth are positive. A less negative rate is an improvement of the economy, but not a recovery.

Chart 8. Recoveries. percentage rise from pre-recovery to last recovery years



The following Table 1 shows the succession of crises and recoveries from the post-WWII phase of capitalist development. In the years that are neither recovery nor crises some indicators are positive but others are negative. The economy is moving towards either one or the other direction.

Table 1. Crises and recoveries

Crises	1949		1954	1957-8		1960-1			
Recoveries		1950			1959		1962	1964-5	1968

[8] The only exception is employment in 1949. It rises by 2.1% from 1948. However, it falls by 4.5% from 1947.

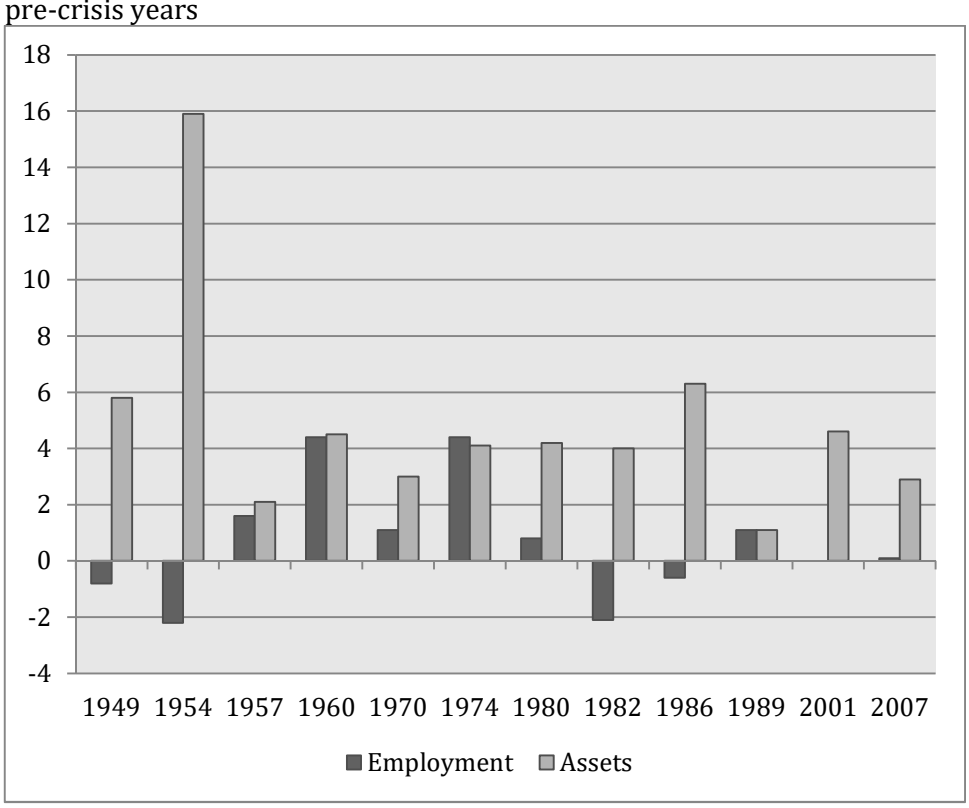
Crises	1970		1974-5		1980	1982		1986	
Recoveries		1971-3		1976-7			1984		1988

Crises	1989-91			2001-2		2007-9		
Recoveries		1994-5	1997		2004-6		2010	2014

VII. RISING PROFITABILITY BEFORE CRISES. It is usually assumed that if crises are (tendentially) determined by falling profitability, the latter should precede the former. However, that crises are *determined* by falling profitability in the productive sectors is not to say that falling profitability in those sectors must *precede* crises. The law of the tendential fall of the profit rate as the ultimate cause of crises does not say that the rate of profit must necessarily fall in the pre-crisis years. What the law says is that the ARP falls *in* the crisis year, i.e. from the pre-crisis year to the crisis year (the same holds for the two other indicators). This is the case in all 12 crises (see chart 7 above).

If the CE-ARP rises in the years before the crisis, the latter must have matured within this upward movement. More concretely, within the pre-crisis upward swing *either the rate of growth of wages falls while the rate of growth of assets rises or the rate of growth of wages rises less than that of assets.* What undermines profitability in the pre-crisis period is the different speeds at which assets and wages change prior to the crisis. Crises can be preceded either by falling profitability or by a *slowing down* of rising profitability. It is the latter that explains the sudden and unexpected change of direction in the profitability movement. To see this, let us consider the time period from two years before the crisis to the pre-crisis year.

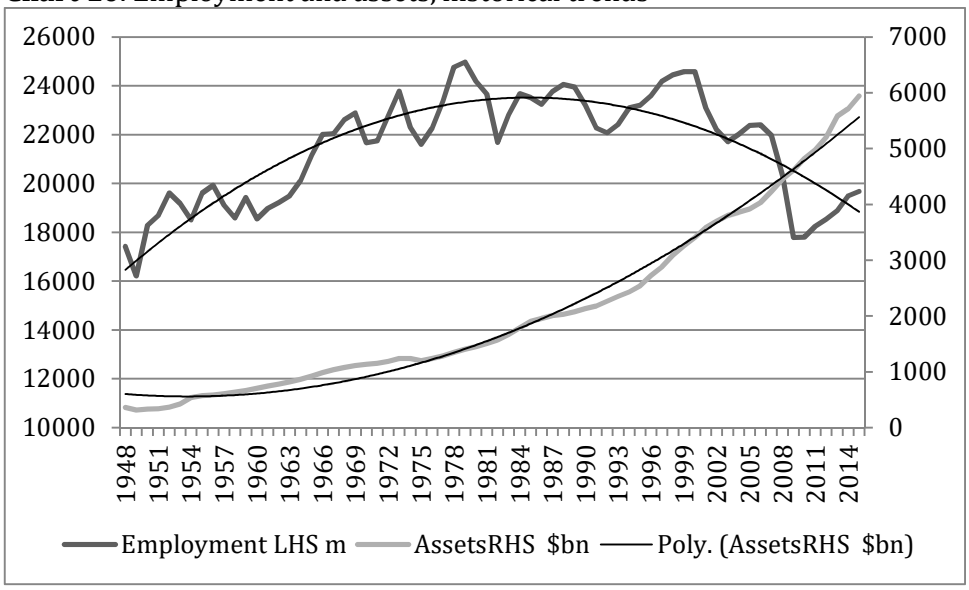
Chart 9. Assets and employment, percentage change from two years before the crisis to pre-crisis years



In four cases, in chart 9, employment falls while assets grow. This is in line with the thesis submitted above. In six cases, employment rises less than assets. This too is in line

with the thesis submitted above. In one case, 1989, the test is indeterminate because both employment and assets grow by the same percentage, 1.1%. There are thus eleven cases to be tested. Of these eleven cases, employment grows more (4.4%) than assets (4.1%) only in one case (1974). However, the difference is minimal. And this aside, the data are consistent with the hypothesis in 10 out of 11 cases. On the whole, empirical evidence is very robust.
The percentage change of assets and employment in the pre-crises years fits into the general long-term picture of assets growing more than employment.

Chart 10. Employment and assets, historical trends



In chart 10, up to 1979 (the year of maximum employment), employment rises by 43.3% while assets rise much more, by 291%. From 1980 to 2015, assets rise by 310% while employment falls by 18.6%.

VIII. RISING CAPITAL EFFICIENCY VS. FALLING CAPITAL PRODUCTIVITY. The ARP falls because of the specific nature of technological innovations under capitalism, the main cause of its dynamism. On the one hand, innovations replace labourers with means of production.[9] New labour falls relative to assets. Given the rate of exploitation, profits per unit of capital invested fall too and, with them, falls the rate of profit. On the other hand, innovations increase labour's productivity, i.e. each labourer produces an ever-increasing quantity of output (use values) with the help of increasingly advanced means of production.[10] The fundamental contradiction is an increasing mass of commodities (use values) containing a decreasing quantity of value. There is an inherent overproduction of use values, which is not the cause of crises but the consequence of the fall in the average rate of profit. [11]

[9] Innovations are labour-shedding, rather then labour-saving. 'Labour saving ' is a ideological term that should be avoided.
[10] Output per labourer is determined both by productivity proper (the change due to more efficient means of production) and by the rate of exploitation (the greater output as a consequence of an increase in the rate of exploitation). In economic literature these two factors are not separated for ideological reasons. Here, productivity proper has been computed with a constant rate of exploitation for reasons similar to computation of the CE-ARP.
[11]See Carchedi and Roberts, unpublished paper.

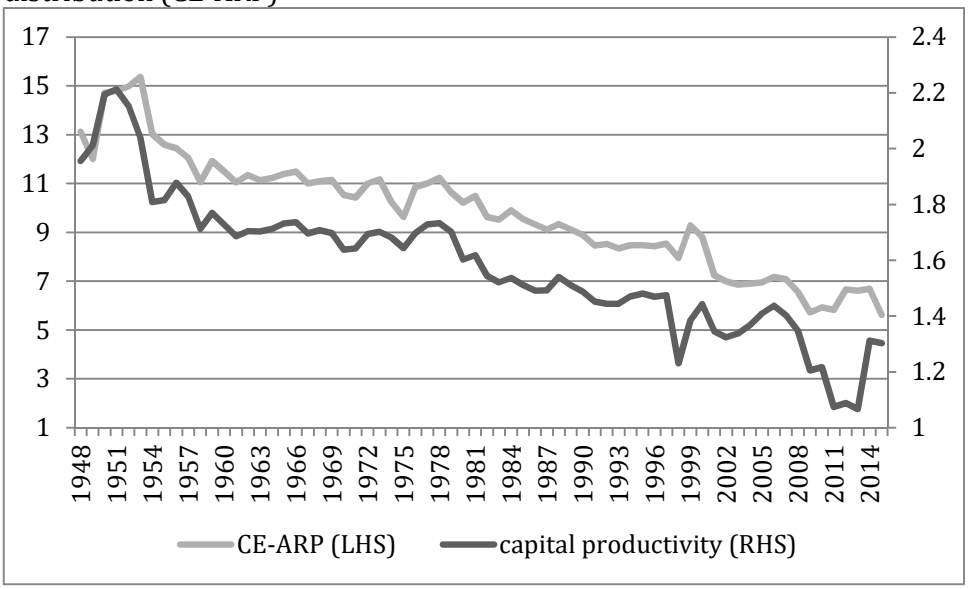
Some (also Marxist) authors challenge the thesis that *falling* profitability is caused by *rising capital efficiency* (assets/labor, or A/L). For them falling profitability is caused by *falling capital productivity*, defined as the ratio of output to assets (O/A). For example, for Gordon "After 1970 [capital, G.C] productivity growth slowed markedly"(R. Gordon, 2012). The outcome is slow growth. Mokyr on the other hand, holds that new technologies will increase [capital, G.C] productivity again and this will lift the economy out of its present predicament (J. Mokyr). There would be a positive relation between capital productivity and profitability. To show this, usually these authors decompose the ARP as follows:

(1) ARP = profits/assets = (profits/output)*(output/assets)

where the first term indicates the distribution of the output and the second indicates capital productivity. But first, given that labour (as the sole creator of value) is missing, this formula lies outside the determination of the rate of profit as in Marx. It is inconsistent with Marxist theory and as such cannot be used either to support it or to reject it. Formula (1) is a physicalist notion.

Second, in formula (1) there is a positive relation between capital productivity (O/A) and the ARP: if one falls, the other falls too and vice versa. The correlation coefficient is very high, 0.95, something that would seem to indicate causation. This is shown in chart 11 below.

Chart 11. Ratio of output to assets (O/A) and average profitability with constant distribution (CE-ARP)



This is not so strange, given that the ARP is computed in physical units (output and assets). It is thus a physical rate of profit and not a value rate of profit. In physical terms, the greater the output relative to assets, the higher is the ARP. Both capital productivity and the ARP move in unison with each other.

However, chart 11 above shows a puzzling feature: both profitability and capital productivity fall tendentially. If falling capital productivity determines falling profitability, why should capital productivity fall? This would be irrational from the point of view of the capitalists who invest in assets only if output grows more than assets, i.e. if capital productivity rises! Falling capital productivity is *irrational* from the

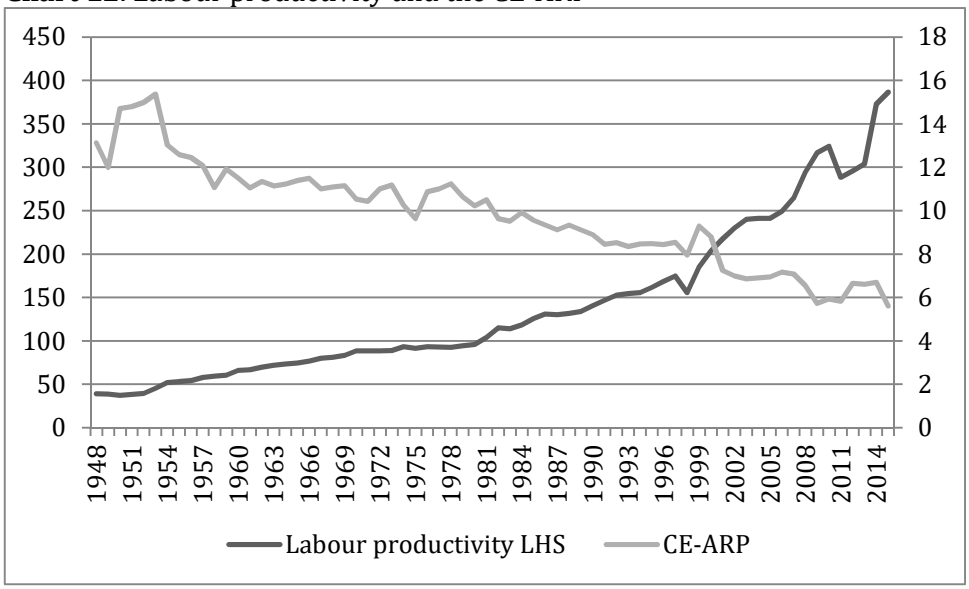
point of view of capitalism if the perspective is a *physicalist* one, *as in formula (1)* above. Thus decreasing profitability cannot be determined by falling capital productivity because the latter is inconsistent with capitalists' investment rationality.

So it must be falling profitability that determines falling capital productivity. In fact, if the OCC rises, the ARP falls. The rise in the OCC means that percentagewise assets rise while labour falls. The quantity of output (O) rises, but the value contained in this greater quantity falls. Thus in value terms, the value of the output falls too. If assets (A) rise too, O/A falls both because the numerator falls and because the denominator rises. Thus falling profitability determines falling capital productivity. But this cannot be accounted for by formula (1) because of its physicalist nature.

Actually, the view that changes in capital productivity determinate changes in profitability mirrors the perception of the technological leaders, those capitalists who increase output per unit of assets and thus appropriate part of the surplus value generated by the less efficient capitals. Changes in capital productivity explain the *appropriation* of surplus value by the technological leaders from the technological laggards.

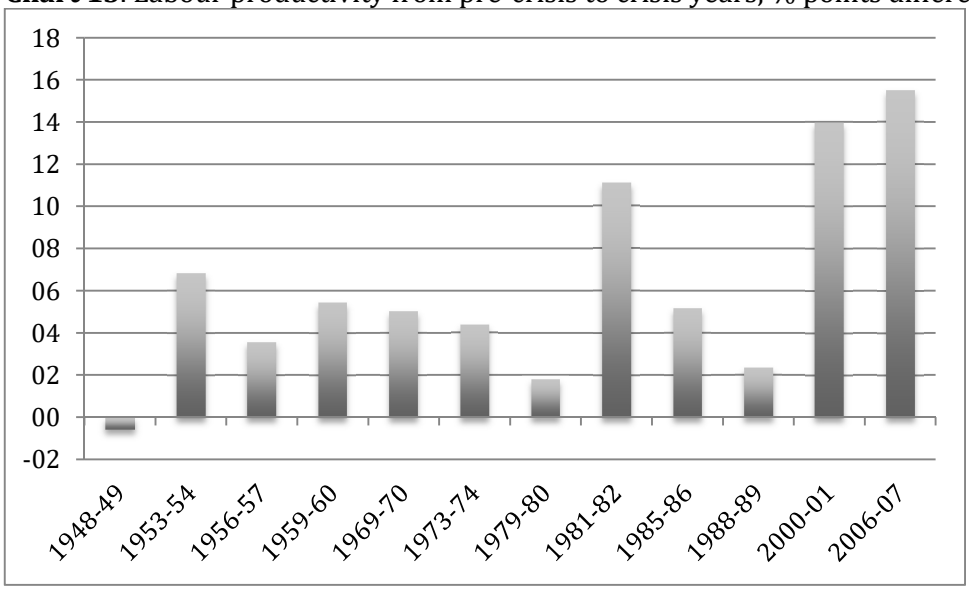
While for physicalism crises are determined by *falling capital* productivity, for Marx crises are determined by *rising labour* productivity, i.e. by the shedding of labour inherent in greater labour productivity. The correlation between labour productivity and profitability is thus negative, not positive. In chart 12, tendentially, labour productivity rises and the CE-ARP falls.

Chart 12. Labour productivity and the CE-ARP



The same result holds if we consider labour productivity percentage changes from the pre-crisis to the crisis year (Chart 13). The percentage change is positive in all cases (with the exception of 1949) conforming to Marx's hypothesis.

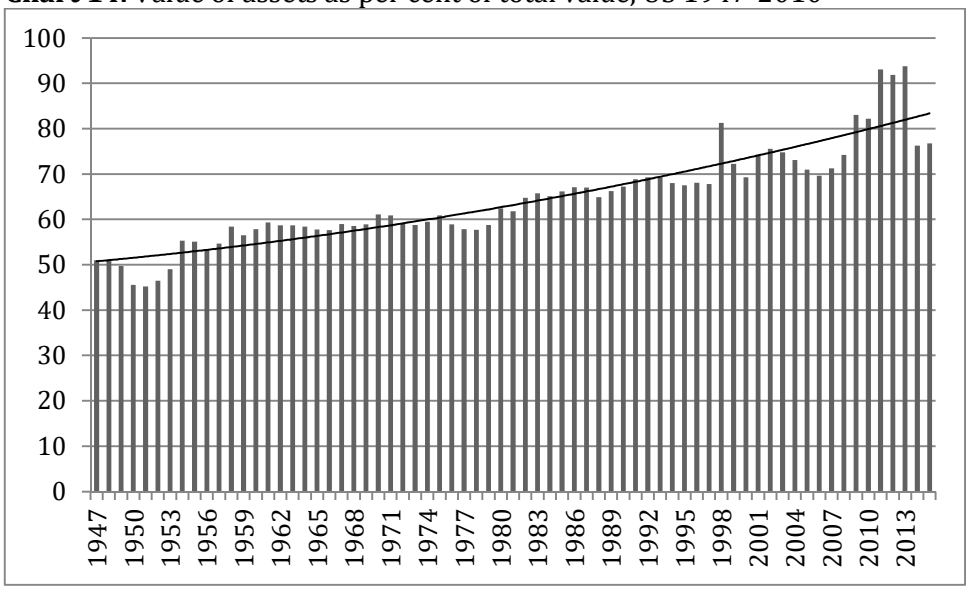
Chart 13. Labour productivity from pre-crisis to crisis years, % points difference



IX. THE FIRST COUNTERTENDENCY. The graphs above have shown that the ARP falls not in a straight line, but through upward and downward shorter cycles. The downward tendency is temporarily slowed down and its direction possibly reversed due to the action of the counter-tendencies. But the counter-tendencies cannot prevent the falling tendency to assert itself if the forces behind the countertendencies increasingly weaken. Three basic counter-tendencies are mentioned in what follows.

First, due to the greater labour productivity, technological innovations reduce the value of each unit of output. This holds also for the means of production *as outputs*. When these means of production enter a new production process as inputs, the denominator of the profit rate (the fixed capital invested, or assets) falls and the rate of profit rises on this account. Thus, the critics hold, the rate of profit does not necessarily fall. But empirical data show that over the long term the value of the assets *does rise* (Chart 14)

Chart 14. Value of assets as per cent of total value, US 1947-2010



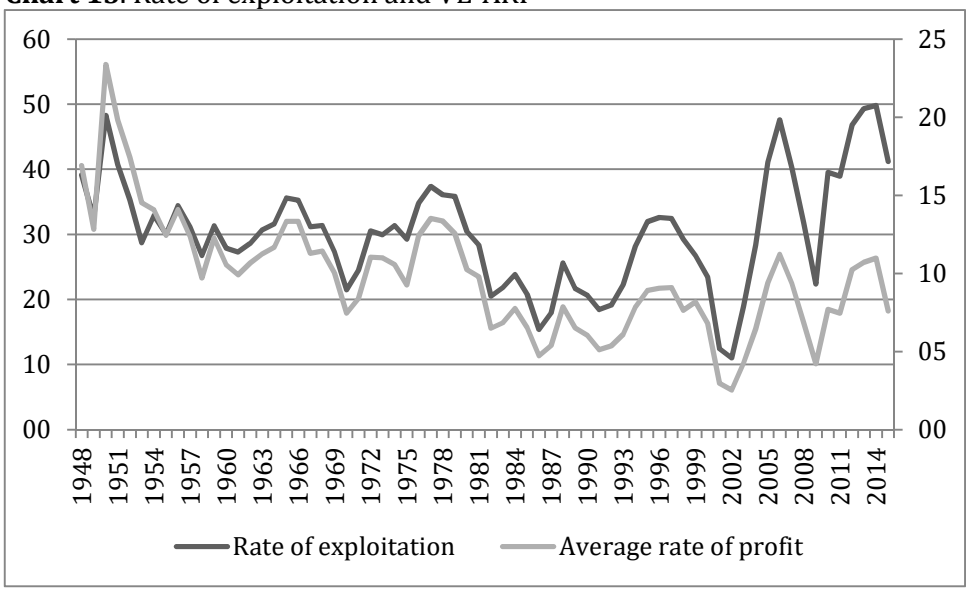
This graph bears out what Marx had observed in the Grundrisse, i.e. that the price of a single machine can fall, but that the price of the system of machines that replace that

machine grows both in absolute and relatively to the price of total output. This countertendency has not overcome the tendency.

X. THE SECOND COUNTERTENDENCY. The *second* countertendency is the increase in the rate of exploitation. Individual capitalists can increase their profitability by increasing the rate of exploitation, but this is not the case for the economy as a whole and for longer periods of time. This has been shown above by chart 3. The fluctuations in the VE-ARP cannot hold back the long term fall in the CE-ARP.

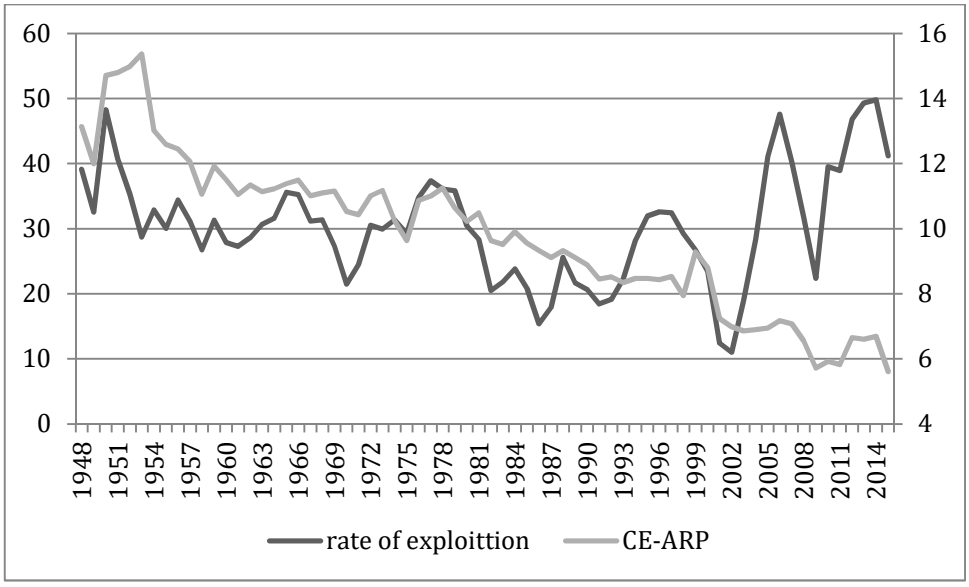
Let us now look at the same issue, but from a different perspective. Consider the VE-ARP. The correlation between rate of exploitation and the VE-ARP is strong and positive (0.67). If exploitation increases, profitability rises, and vice versa. This holds both for the individual capitalists and for the economy as a whole. This is what the following chart 15 shows.

Chart 15. Rate of exploitation and VE-ARP



From the positive correlation between exploitation and profitability with variable rate of exploitation (VE-ARP), neo-liberalist authors conclude that the way out of crises lies in higher rates of exploitation/redistribution, for example through budget cuts or wage compression. However, if the CE-ARP, rather than the VE-ARP, is considered, the picture is quite different.

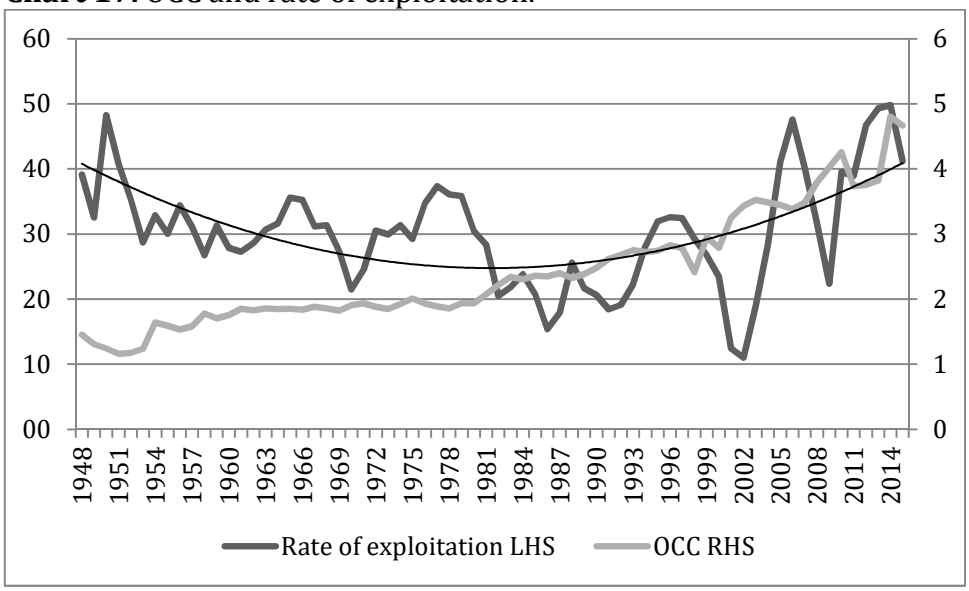
Chart 16. CE-ARP and rate of exploitation



Here in chart 16 the correlation between the ARP-CE and the rate of exploitation is insignificant, 0.06.

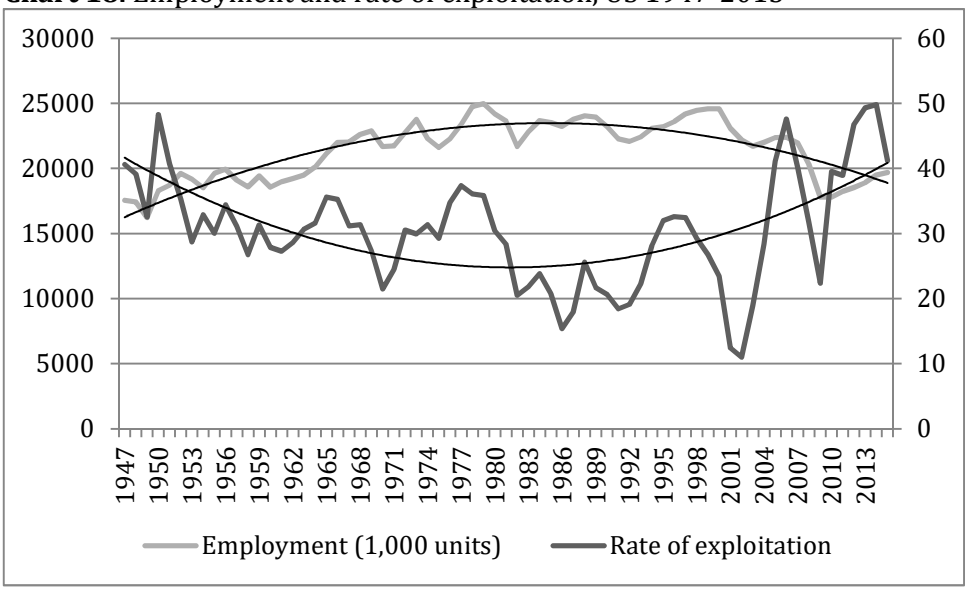
These two charts show clearly that changes in the rate of exploitation leave the economy's quantity of value and surplus value generated unaltered. If more of this quantity is appropiated by capital, profitability rises. But in spite of distributional changes, in the long-run, profitability falls, *whether exploitation rises or not*. It falls because the OCC rises more than the rate of exploitation. So this counter-tendency too cannot stop the tendency, the increase in the OCC, and thus the fall in the CE-ARP.

Chart 17. OCC and rate of exploitation.



Higher exploitation is also supposed to generate employment through higher profitability. What evidence is there that higher rates of exploitation cause higher employment?

Chart 18. Employment and rate of exploitation, US 1947-2015



If there were a relation of cause and effect between exploitation (austerity measures) and employment as suggested by neo-liberalism, the two indicators would be positively correlated: higher exploitation increases profits, they would be accumulated and employment would grow and vice versa for lower exploitation.

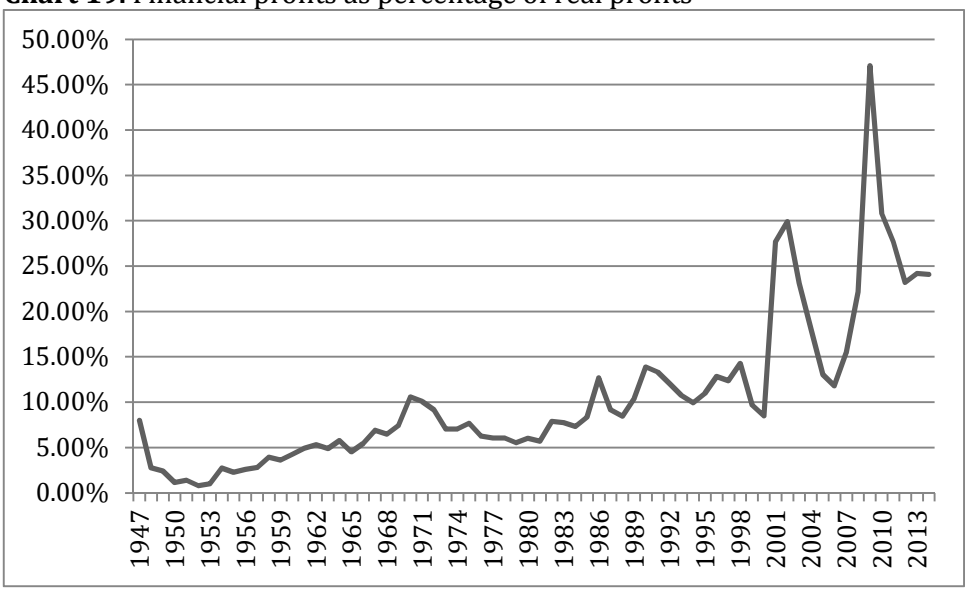
But chart 18 shows that their correlation is negative over the whole post-WWII period. *This chart belies the neo-liberal thesis*. The negative correlation holds also and especially for the shorter 2002-2015 period of austerity measures. While the rate of exploitation rises , from 11% in 2002 to 41% in 2015 (with a peak of almost 50% in 2014), employment falls from 22,189m to 19,678m. Given that labour 'flexibility' and deregulation boil down to higher rates of exploitation, the above is also indirect evidence that flexibility and deregulation do not increase employment. *Higher rates of exploitation do not create employment.* More generally, chart 18 shows that in the long run if the industrial reserve army falls, exploitation falls and employment rises due to a greater negotiating power of the working class.- and viice versa if exploitation rises.

This thesis has been recently corroborated by official institutions above suspicion. For example, the OECD (*OECD Employment outlook of 2016*, at www.oecd.org/els/oecd-employment-outlook-19991266.htm) states: "A new analysis of industry-level data show that reforms lowering barriers to entry [read: lower wages, G.C.] and the cost of dismissal induce non-negligible transitory employment losses"(p.18). And the World Bank goes back on its previous position: "New data and more rigorous methodologies have spurred a wave of empirical studies over the past two decades on the effects of labor regulation [read: anti-labour legislation, G.C.]... Most estimates of the impacts on employment levels tend to be insignificant or modest" (World Bank, 2013), *World Development Report 2013: Jobs*. Washington D.C.: World Bank Publications. p.261).

XI. THE THIRD COUNTERTENDENCY. *Third*, faced with falling profitability in the productive sphere, capital shifts from low profitability in the productive sectors to high profitability in the financial (i.e. unproductive) sectors. But profits in these sectors are fictitious, they exist only on the accounting books. They become real profits only when cashed in. When this happens, the profits available to the productive sectors shrink. The more capitals try to realize higher profit rates by moving to the unproductive sectors, the greater become the difficulties in the productive sectors. This counter-tendency, capital movement to

the financial and speculative sectors and thus the higher rates of profit in those sectors, cannot hold back the tendency, ie.the fall in the ARP in the productive sectors. Actually, profitability falls further in these sectors on this account. While in 1950 financial profits were 7.9% of real profits, in 2014 they were 24%, after a maximum of 47%% in 2009 (Chart 19).

Chart 19. Financial profits as percentage of real profits[12]



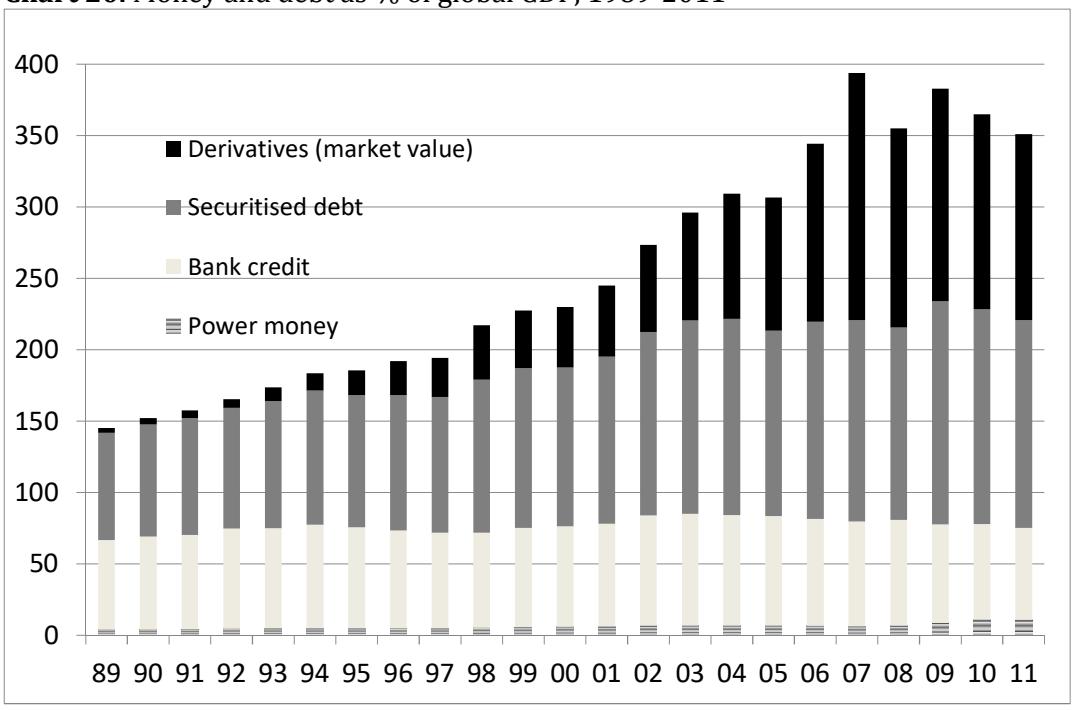
The focus in this paper is on the productive sphere of the economy (defined as in the Appendix). Some authors object that corporations in the productive sectors engage also in finance and speculation (which are not productive of value and surplus value). Since statistics do not separate the profits generated in the productive from those realized in the unproductive sectors, presumably the focus should be on the general ARP, i.e. on profits both in the productive and in the unproductive sectors. It would be impossible to know the profits in the productive sectors.

However, financial and speculative profits are not generated in the financial and speculative sectors. They are appropriations from the productive sectors. It follows that the profits realized by productive capitals through their operations in finance and speculation must have been previously generated in the productive sectors, even if not necessarily by the same capitals that have generated them and not necessarily in the same time period. So the financial profits realized by the corporations operating in the productive sectors *should not be deducted* from the profits realized in these sectors.

Financial profits have been claiming an increasing share of real profits throughout the whole post-WWII phase. The growth of fictitious profits causes an explosive growth of global debt through the issuance of debt instruments (e.g. bonds) and of more debt instruments on the previous ones. The outcome is a mountain of interconnected debts (Chart 20).

[12] The official figures for financial profits are not deflated.

Chart 20. Money and debt as % of global GDP, 1989-2011



Source: Michael Roberts, *The Great Recession*, Lulu

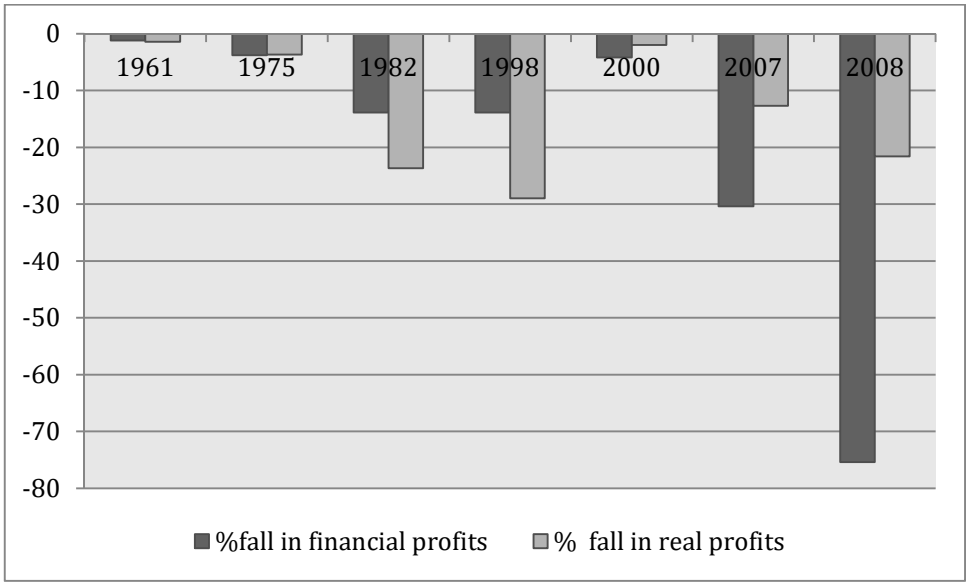
Real money (called power money in the graph) is the representation of value, labour congealed in commodities. As the chart above shows, this is a very small percentage relative to the three forms of credit: bank credit, securitized debt and derivatives. But credit represents debt, not value. It is not money, even if it can have some of the functions of money.

Debt implies repayment. When this cannot happen, financial crises ensue. This huge growth of debt in its different forms is the substratum of the speculative bubble and financial crises, including the next one. So this countertendency too can overcome the tendency only temporarily: the growth in the rate of profit due to fictitious profits meets its own limit, recurring financial crises and the crises in the productive sectors catalysed by them.

But what are financial crises, what causes them and when do they emerge?

XII. FINANCIAL CRISIS. The literature focuses on the size and number of financial bankruptcies, sets arbitrary criteria as to when these bankruptcies constitute a financial crisis, and concentrates on the specific features of each crisis. But the principal question is not the different, conjunctural causes of each financial crisis, but the common cause behind the specific characteristics of all these bankruptcies. By analogy with falling profitability in the productive sectors (for short, real profits) as the cause of crises in those sectors, this common cause is *falling profitability in the financial sectors*, the negative percentage growth of financial profits. Again, similar to the productive sectors where not all falls in the ARP are crises years, not all years of negative percentage growth in financial profits are financial crises. Real profits must also grow negatively because in this case financial profits cannot be cashed in. Financial crises are due to the impossibility to repay debts and emerge when the percentage growth is negative both for financial and for real profits. On the basis, the following seven post-WWII financial crises are identified (Chart 21).

Chart 21. Financial crises.



The 2000 financial crisis marks a turning point because, contrary to the previous financial crises, the percentage fall in financial profits is greater than that in real profits in this year and in 2007-8. This is one element explaining the severity of these crises.

Chart 20 reveals that the first 30 years of post-WWII US capitalist development have been free from financial crises, except for the relatively minor 1961 crisis. But in the 40-year period from 1975 to 2015, there have been six major financial crises. If the 2000 crisis is disregarded, these crises have been increasingly severe and culminate in the strikingly 75% fall in financial profits in 2008.

The reason should be sought in the productive sphere. After the war, with the liberation of the pent-up purchasing power and the transformation of the war economy in a civilian economy (see below, section XIV), employment (in the goods producing industry) grew from 17.417 million in 1948 to 24,970 million in 1979, an increase of 43%. But assets grew much more, by 291% (see chart 10 above). The average rate of capacity utilization was at a high average of 83.3There was expanded reproduction both of labour and means of production. In this first phase there was no need to prop up the productive economy through the creation of fictitious capital and profits. However, beneath this surface the CE-ARP had already begun its long descent, from 13.1% in 1948 to 10.6 % in 1979 (chart 2). Employment as percentage of constant and variable capital invested falls from 28.7% in 1948 to 11.7% in 1979 (chart 5). New value as percentage of total value falls from 48.8% in 1948 to 41.2% in 1979 (chart 6). The Golden Age was being undermined from within.

In the second period, the CE-ARP continues its descent, from 10.6% in 1979 to 5.0% in 2015. Employment falls to 19,678m in 2015, a percentage fall of -21% while assets rise by 310%. But average capacity utilization falls to 79.2%. As assets grow and employment falls, new value as percentage of total value falls from 43.9% to 30.4%. Due to the worsening of all the relevant indicators, capital accelerates its migration to the financial (unproductive) sphere, which takes the upper hand over the real economy. Finance and its increasing reliance on debt has become a way to escape decreasing profitability and production of (new) value. Financial crises follow.

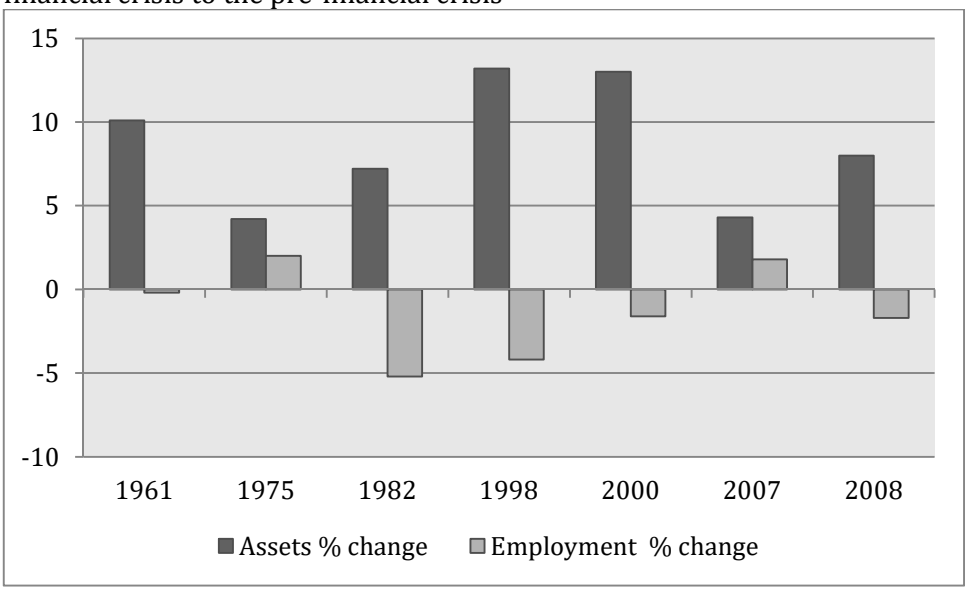
A point of controversy is whether financial crises determine crises in the productive sectors, for short economic crises, or vice versa. It is held that financial crises are

determined by economic crises if the latter precede the former but not in the opposite case.

But this is not the point. The question is whether financial crises are preceded by a decline in the production of value and surplus value, which are not necessarily years of economic crises. These are years in which assets grow more than employment. Therefore, they are years of potential economic crises. But they are also years in which the financial sectors have increasing difficulties in appropriating surplus value from the productive sphere to sustain financial profits, due to the decreasing quantity of new value generated. Financial profits decline and financial crises emerge. Debt is increasingly resorted to. The financial bubble inflates and eventually busts.

Financial crises can emerge before economic crises. In this case, they are the catalyst of economic crises, they are the factors for the realization of the potential economic crises. Of course, financial and economic crises can emerge at the same time. The deterioration in the generation of new value is the factor determining both economic and financial crises but does not determine which appears first.

Chart 22. Assets % change and employment % change from two years before the financial crisis to the pre-financial crisis



Five out of seven financial crises coincide with crises in the productive sectors (see chart 9 above), where assets grow more than employment in the pre-crises years (chart 22). The same holds for 1998, which is not a crisis in the productive sector. The 2000 financial crisis precedes the 2001 economic crisis. However, this does not imply that in this case the financial crisis determines the real one. In the two years preceding the 2000 crisis (from 1997 to 1999) assets in the productive sectors grow by 13% while employment falls by1.6%. The 2000 financial crisis precedes the 2001 crisis in the productive sphere but is determined by the deterioration in the productive sector. The deterioration of the productive sector in the pre-crises years is thus the common cause of both financial and non-financial crises. If they have a common cause, it is immaterial whether one precedes the other or vice versa. It follows that the productive sector determines the financial sector, *contrary to the financialization thesis.*

XIII. CAPITALISM IS ON A COLLISIONCOURSE WITH ITSELF. We are witnessing:

(1) a persistent tendential and irreversible fall in the (global) profit rate, even if with counter-tendential jolts.
(2) The share of the means of production to total value is growing: they are increasingly expensive instead of becoming cheaper (chart 14 above).
(2) There is a tendential fall in new value relative to total value since the end of WWII (chart 6 above).
(3) The increase of the rate of exploitation increases the rate of profit (VE-ARP), but this growth is 'doped' because it does not denote an increase in the surplus value produced per unit of capital invested (CE-ARP), but hides its fall.
(4) The exponential growth of fictitious capital and fictitious profitsinflate the speculative bubble and then cause it to burst, bringing financial crises of increasing severity.

The conjunctural factors that will become the catalysts of the next profitability crisis are:

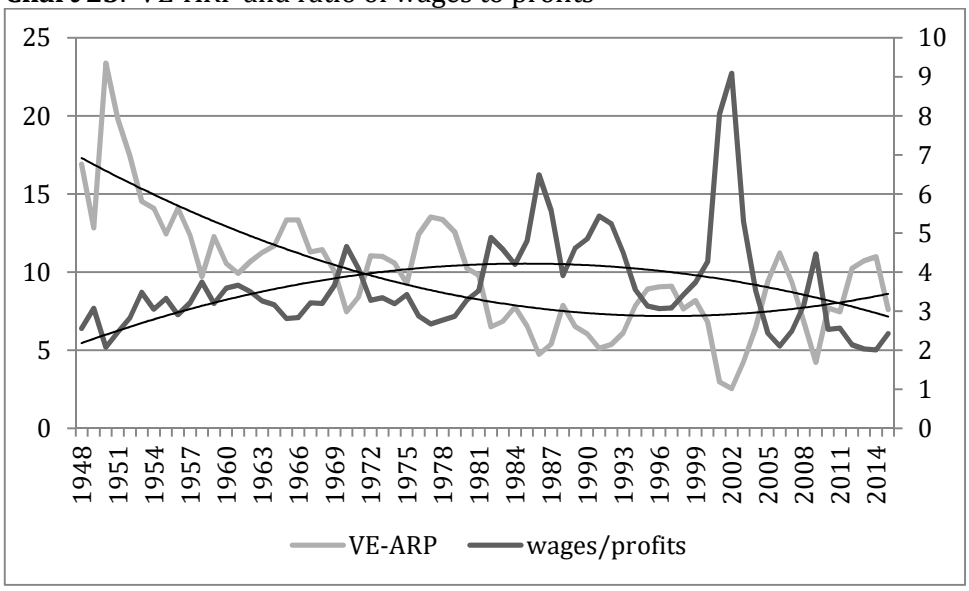
(1) the first signs of commercial wars, which would reduce international trade and thus first the realization and then the production of value and surplus value;
(2) the persistent growth of international debt and the inflation of the speculative bubble;
(3) local wars, especially in or over oil rich countries, which can easily spread to wars among the great powers. In this case, the producers of weapons (in the dominant imperialist countries) would increase their profits but due to the Marxist multiplier (see below) the ARP in those countries would fall; in the war theatres, value and wealth would be destroyed;
(4) the growth of right-wing, ultra-nationalist, racist and fascist parties and movements – fanned also by austerity measures – which form a cultural background congenial to military adventures.

It could be held that, if capitalism cannot rejuvenate in the advanced capitalist world, it could get a new lease of life in the so-called emerging economies. The fallacy of this argument is that the same contradiction marring capitalism in the advanced economies is part and parcel of the economies of the emerging countries as well: the contradiction between increasing labour productivity on the one hand and the shedding of labour inherent in the technologies imported from the technologically advanced countries of the West on the other.

After a first period of enlarged reproduction, the tendency for the rate of profit to fall would emerge again with its concomitant side effects. The West thus transmits its technologically-caused disease to the rest of the world. To mention only one example: the degree of dependence of the Chinese iron and steel industry on the technology of the advanced countries varies from 65% for the production of energy, to 85% for the casting and transformation of semi-processed goods, to 90% for the systems of control, analysis, safety measures and environmental protection.

XIV. THE IMPOTENCE OF REDISTRIBUTION. Alternatively, it could be held that capitalism could go through a new phase of growth if Keynesian policies, i.e. either pro-labour redistribution or massive investments in the civilian economy, were resorted to. Let us consider pro-labour redistribution first.

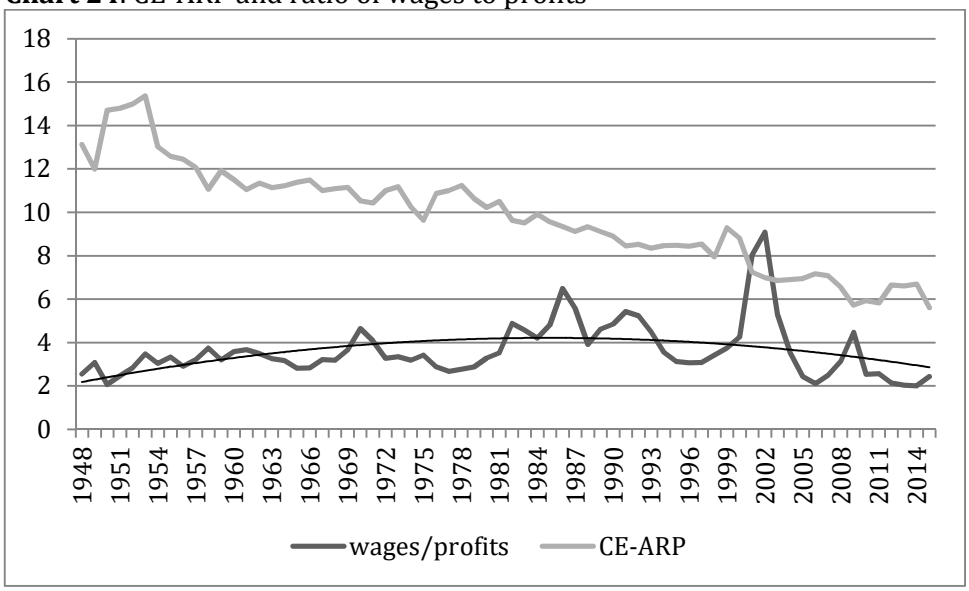
Chart 23. VE-ARP and ratio of wages to profits



Higher wages relative to profits decrease profitability, according to Marx. So any increase in labour's purchasing power is no antidote. Chart 23 confirms this. From 1948 to 1986 wages increase relative to profits but the ARP falls. From 1986 to 2015 wages relative to profits fall (with the exception of 2001-2002) but the ARP rises, again contrary to the Keynesian thesis.

The next chart 24 tells the same story. If the CE-ARP is considered, profitability falls whether the wages/profits ratio rises or falls. *These two charts belie the Keynesian thesis.*

Chart 24. CE-ARP and ratio of wages to profits



Marx had already noticed that crises are preceded by rising wages. This has not changed. Of the 12 post-WWII crises, 11 have been preceded by rising wages and only one by falling wages (the 1991 crisis). See Table 2.

Table 2.*

		wages		wages		wages		wages
	1952	310,5	1955	357,9	1958	358,7	1968	581,1
	1953	341,2	1956	380,2	1959	391,0	1969	609
Crises		**1954**		**1957**		**1960**		**1970**

		wages		wages				
	1972	632,0	1978	725,9	1980	716,6	1984	776,1
	1973	669,1	1979	725,9	1981	726,2	1985	806,8
Crises		**1974**		**1980**		**1982**		**1986**

	1987	836,0	1989	869,8	1999	1067,5	2005	1108,1
	1988	872,3	1990	861,0	2000	1223,3	2006	1135,5
Crises		**1989**		**1991**		**2001**		**2007**

*Crises years are in bold. Wages are billions of deflated dollars

Pro-labour redistribution has not worked and will not work. The theoretical argument is as follows. Suppose there is falling profitability and unsold commodities: features of crises periods. The government could print money or extend credit to households: "helicopter money", as has been called. However, after an initial rise, the ARP would fall again, even with the full realization of previously unsold commodities and even if this would spur new investments. The reason is that new investments would be labour-shedding so that the production of new value would find its limit in the Marxist multiplier (see below).

XV. THE KEYNESIAN MULTIPLIER VS THE MARXIST MULTIPLIER. As for state-induced investments, the question is who could finance them? The state can appropriate the necessary value only from either labour or capital. If it does not, then the state has to resort to debt. But in a crisis, debt is already very high and moreover further debt would further inflate the speculative bubble. The Keynesian answer is that the state could borrow the necessary funds (value) *temporarily* in order to finance public (great) works of civilian investments.[13] These investments would spur other investments in the private sector and these would spur still other investments, thus multiplying employment and profits. The economy would exit the slump. State revenues would increase and the state debt could be paid back. This is the Keynesian multiplier. However, both theory and empirical work show that it does not work. Let us see why.

First, under capitalism, higher profits are a condition for higher investments. But as argued above, in a period of economic crisis or stagnation, profits are not or are insufficiently invested in the productive sphere. They are either saved or they find their way into the higher profitability, but unproductive, sectors. The Keynesians disregard the distinction between productive and unproductive investments; for them all investments can start the multiplier because all investments are productive. The Keynesian multiplier fails right when it is most needed, in the slump.

[13] What follows holds also for military investments.

Second, profitability moves not according to the Keynesian multiplier but according to the Marxist multiplier.[14] Let us review it. Let us distinguish between two categories of capitalists. The first are the capitalists who receive the state construction orders and who in their turn commission other capitalists. Let us focus on the means of production, which in what follows encompass also semi-finished products and raw materials. The capitalists who receive commissions for means of production from other capitalists are as a rule those who can sell at cheaper prices, those whose workers are more productive because percentagewise more means of production than labour are employed. These are the capitals whose labourers produce more assets but less value and surplus value per unit of capital invested. At each stage of the chain of investments, the more efficient capitals' employment might grow in absolute amounts but falls percentagewise, so that less surplus value is generated and the average rate of profit falls. Employment rises, but profitability falls, as shown in chart 18 above. In that chart, the VE-ARP is used. The divergence would be even greater if the CE-ARP were used.[15]

The capitalists who form the second category are those who are excluded from the chain of investments resulting from the initial state expenditures. They produce the same means of production as those produced by the more efficient capitals, but with a higher unit value (price). The purchasers of the means of production will tend to buy them from the more efficient capitals because of their lower unit prices. Consequently, the less efficient capitals will have to lower their prices. Some of these capitals might go bankrupt or might have to reduce their scale of production. This category's profitability and employment fall. The average rate of profit falls also on this account. The real weakness of state-induced investment policies is the fall in average profitability for both categories, those who participate in, and those who are excluded from the state induced wave of investments. This is empirically substantiated in chart 25: the correlation between government expenditures and the profit rate is strongly negative (-0.72).

Chart 25. Government expenditures as % of GDP and ARP with variable exploitation, 1948-2015

[14] See Carchedi, Could Keynesian policies end the slump? An introduction on the Marxist multiplier. *International Socialism*. October 2012, Issue 136; Carchedi and Roberts, *The long roots of the present crisis: Keynesians, Austerians, and Marx's law,* in Carchedi and Roberts, *The World in Crisis*, forthcoming

[15] If commissions are placed abroad, the beneficial effects on employment are lost.

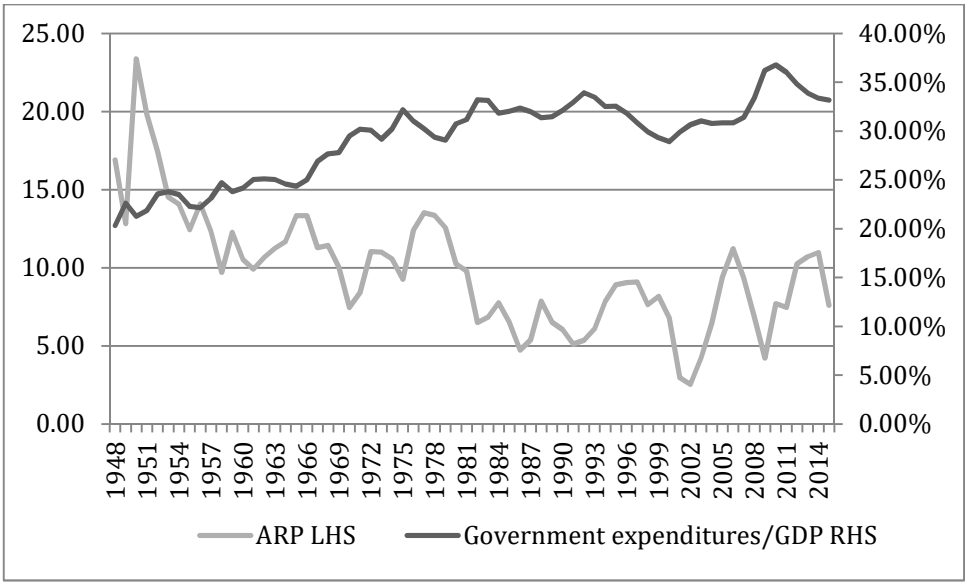
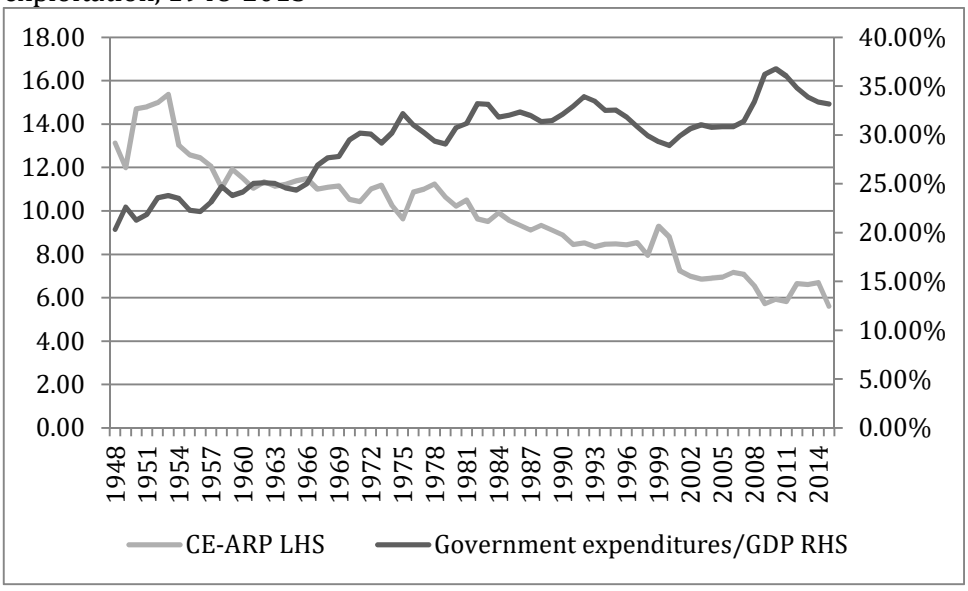


Chart 25 shows that up to the early 1990s rising government expenditure could not contain the fall in the ARP. Thus the Keynesian thesis fails. Starting from the early 1990s the VE-ARP grows together with growing government expenditures. This would seem to support the Keynesian thesis. But the ARP grows because the rate of surplus value grows and not because of growing government expenditures. In fact, as Chart 18 above shows, the rate of exploitation rises from 11% in 2002 to 47% in 2006, then falls to 22% in 2009 but shoots up to almost 50% (the highest rate since the end of WWII) in 2014. If the rate of surplus value is kept constant, the negative correlation holds for the whole secular period (Chart 26).

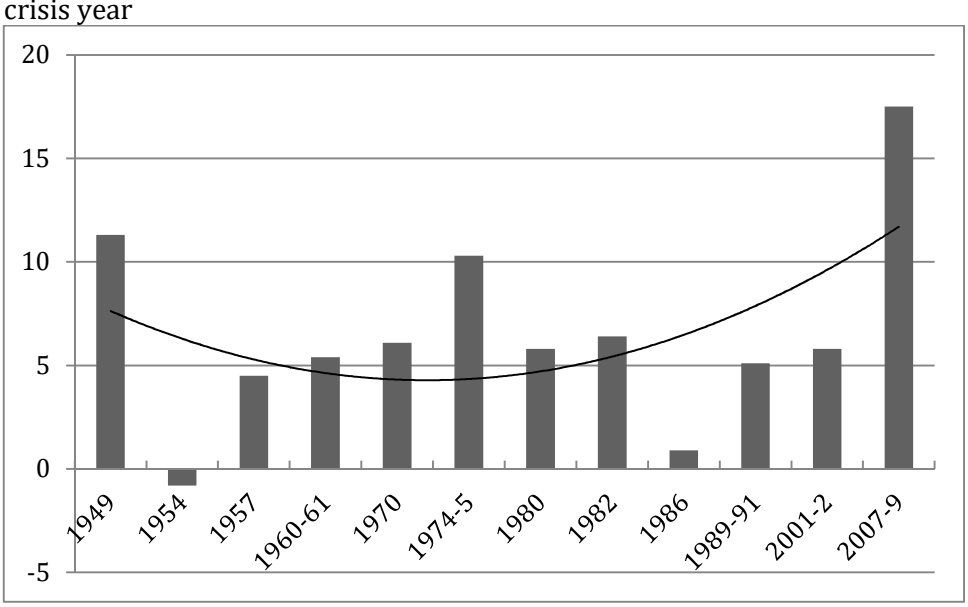
Chart 26. Government expenditures as % of GDP and ARP with constant rate of exploitation, 1948-2015



From the end of WWII to present, growing government expenditures have not reversed the tendential fall in the production of surplus value per unit of capital invested, which is the main indicator of the state of health of a capitalist economy and the main cause of crises.

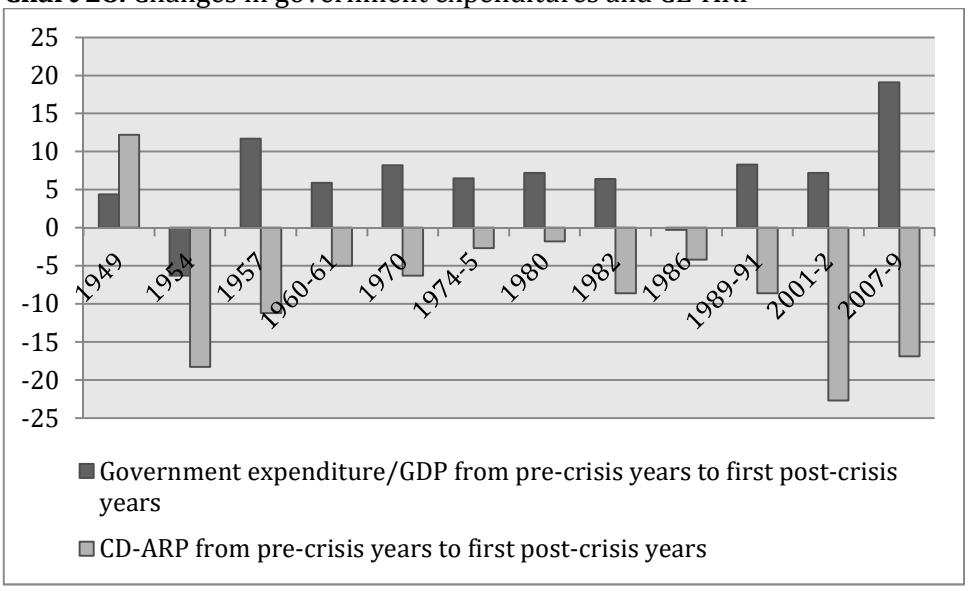
This result is replicated for each individual crisis: government expenditures rise from the year preceding the crisis to the last crisis years in all cases, except 1954 (Chart 27). So rising government expenditures did not avoid crises.

Chart 27. Government expenditure/GDP: percentage growth from pre-crisis year to last crisis year



If government expenditures cannot avoid crises, could not they be the factor for exiting the crisis? The test implies that both government expenditures and the ARP be measured from the pre-crisis years to the first post-crisis years. The Keynesian thesis holds only if both the ARP and government expenditures change in the same direction. It fails if government expenditures rise but profitability falls or vice versa. Chart 28 shows that the correlation between government expenditures and the ARP is negative in 10 out of 12 cases. Government expenditures do not reboot the economy.

Chart 28. Changes in government expenditures and CE-ARP



It is fashionable nowadays to try to integrate Hyman Minsky and Marx. But two radically different theories cannot be integrated. For Minsky, government spending (deficits) can offset private spending and increase profits (Minsky, Hyman, 1982, "Can 'It' Happen

Again?", in *Essays on Instability and Finance* (M.E Sharpe), pp.64-65). But the above has shown that this is not the case. The generation of surplus value per unit of capital invested is not increased. Empirical data showing the non-existence of the Keynesian multiplier are overwhelming.

XVI. THE DESTRUCTION OF CAPITAL. If both Keynesian and neo-liberal policies fail, the only way out of the crisis is that generated spontaneously by capital itself: its rejuvenation through a massive destruction of its less efficient units. The world economies exited the 1929-33 crisis with WWII, not through state-induced investments.

The story for the US was different from that of the other warring parties. In the US, destruction of capital meant principally the destruction and the regeneration of capital as the production relation, the relation between capital and labour. First, there was the transformation of the civilian economy, beset with high unemployment, low capacity utilization of the means of production, and a falling rate of profit, into the war economy, characterized by full employment both of labour power and assets, state-guaranteed realization of the output, and a high level of both profitability and savings. This was the destruction of capital in the civilian sphere and its reconstitution as a military economy.

After the war, the economy was again reconverted into a civilian one. Capital was destroyed in the military sphere and reconstituted in the civilian one. Government expenditures as a percentage of GDP fell from about 52% in 1945 to 20% in 1948. The high level of labour savings guaranteed the purchasing power needed for the new consumption goods, which in their turn required the production of new means of production. A whole range of war-related inventions was applied to the production of new civilian commodities.

While in the US the productive apparatus remained unscathed, the other belligerent nations suffered a huge destruction of means of production and labour power. Capitalism was revitalized for a quarter of a century. But at what price? After a quarter of a century of vigorous growth (the so-called Golden Age, see above), the fall of the ARP, of employment (also as percentage of constant and variable capital invested) and of new value relative to total value accelerated.

Thusthe cost of this relatively short (golden)season of expanded reproduction was tens of millions of dead, atrocious suffering and terrible poverty from the war. This is what labour, in addition to financing the war, had to pay to give new vitality to the system.

XVI. THE OLD, THE NEW AND THE DECLINE OF WESTERN CAPITALISM. Section V argued that the descent of western capitalism started right after WWII and is still continuing because it is inherent in the nature of the system. Are we approaching an inevitable breakdown, the end of capitalism?

This is not in the nature of the beast. Lacking a truly revolutionary change, capitalism will exit this long downward secular period. But first capital will have to be massively destroyed, both in the financial and in the productive sphere.

Related to this question there is Gramsci's 1930 reflection, which still applies nowadays: "the old is dying [but] the new cannot be born" (Gramsci, 1971, pp. 275-6).[16] Gramsci meant the radically new, communism. If the radically new cannot be born, the old will continue, but in a new shape.

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[16] Gramsci, A. (1971), *Selections from the Prison Notebooks*, *"Wave of Materialism" and "Crisis of Authority"*, International Publishers, New York

At present, it is difficult to foresee when and how a new historical phase will be ushered in and the shape it will take. What is clear is that, as argued above, the present phase of capitalism is increasingly exhausting its capacity to reproduce itself. It is dying. It might be replaced by a new phase of capitalism or by a superior society. But the latter will not be possible without the intervention of working-class subjectivity.

A condition for the emergence of this class-consciousness within this society is that the struggle by labour for better life and work conditions is fought from the perspective of an irreconcilable antagonism between capital and labour and not from the Keynesian perspective of class collaboration. Keynesian policies have not worked in the past and will not avoid the approaching end of this historical phase. This awareness is the condition for the rising of "the new", as Gramsci put it, of labour as "the full development of activity itself… [of the labourer's] rich individuality." (Marx, 1973, p. 325).[17] Without this, capitalism will rejuvenate and will enter a new phase in which its domination over labour will be even greater and more terrible.

In this new phase of capitalist development, the new technologies being developed now will play a fundamental role. Marx noticed that "a crisis always forms the starting-point of large new investments. Therefore, from the point of view of society as a whole … a new material basis for the next turn-over cycle." (Marx, Capital Vol. II, p.186). New and massive investments will take the form of new technologies, which will be not only labour-shedding and productivity-increasing, but also in new forms of domination of labour by capital. In Marx's words: 'It would be possible to write quite a history of the inventions made since 1830, for the sole purpose of supplying capital with weapons against the revolts of the working class.' (Marx, 1967, Capital Vol. I, p. 436.). Nothing could be more topical.

I have dealt with this question in past works (see Carchedi, 2011 and 2014 among others). Here I will mention only one recent example: wearable technologies. They make it possible both to increase the productivity of labour and at the same time to increase surveillance. For example, in warehouses "arm-mounted wearable computers in effect make the humans become an extension of the information systems that drive the supply-chain. The human is no longer given a list of products to find, and then be expected to use initiative and knowledge to find the products. Instead, the information system plans the best route for the human to take, and in effect pre-optimizes the human being's itinerary. Since the specific location of all products are known the system can be programmed to estimate the amount of time the human takes to obtains the products, and can build the item-by-item information into an asset-tracking process (the human is another machine asset in this type of business) that provides continuous and comprehensive performance information for managers" (Michael Blackmore, Surveillance in the Workplace: an overview of issues of privacy, monitoring, and ethics, Briefing Paper for GMB September 2005, https://stopthecyborgs.org/2014/06/18/surveillance-in-the-workplace-an-overview-of-issues-of-privacy-monitoring-and-ethics/)

"If employees do not have to learn the layout of a warehouse, but are told where to go by instructions sent to computers that they `wear', then their training overheads are reduced, and the skill-set needed in reduced" … These technologies are strongly linked to the de-layering of staff, and in the de-skilling of staff" (ibid.) Staff is reduced and labour power is dequalified and thus devalued.

[17] Marx, K. (1973), *Grundrisse*, translated by Martin Nicolaus, Penguin Books

There is at the same time ubiquitous surveillance, "the creation of a permanent awareness of being observed … ensures power to take effect automatically... Everything an employee does can be recorded, filmed by CCTV or logged in databases: all conversations, the duration of conversations, timings and durations of meal and toilet breaks, personal searches when entering the premises" (ibid.).

To properly evaluate these technologies, consider the difference between old and new technologies in the past century. While old technologies (roughly, before WWII) forced human functions to adapt to the motion of machines (e.g. the conveyor-belt), the new, post-WWII, computer-based technologies replicate human functions in a machine-like fashion and thus replicate in a machine-like manner both bodily movements and the self-reflexivity of thought (robots).

The class content of these technologies is that they mechanise human thought, human creativity, and human life itself so that they can be replicated (cloned) and better controlled. Consequently, these new technologies make possible the substitution of humans not only by machines (as in previous techniques) but also by human-like machines. The ideological ramifications are all pervasive. These machines propagate a view of humans as highly skilled machines and elevate the machine-like mimicking of human functions to the ideal and most complete form of these functions. Since these machines can perform computational tasks that are impossible for humans, they propagate the notion that machines are the perfect form that can be reached by humans (and by human intellect). In the end, they secrete the notion that a perfect human is a machine-like human, a machine. If the perfect human is a machine, nature and thus life is also a machine and thus subject to mechanical reproduction.

At present, large quantities of money capital are waiting to be profitably invested after the next large-scale destruction of capital. These capitals will be invested in the new technologies that are being developed since the end of the past century. For example, with biotechnology and genetic engineering (agribusiness, pharmaceutical chemicals, medical business, animal and human cloning, and so on) the mechanical reproduction of life achieves its greatest success. Nature is seen as a programmed and thus as programmable matter. Already in 2000, the Patent Office of the European Union granted Amstrad, an Australian firm, the patent for the creation of 'chimeric animals', that is, beings made up of human and animal cells. Other examples include nanotechnology (that aims at the control of matter on an atomic and molecular scale); bioinformatics (the application of information technology and computer science to the field of molecular biology); genomics (the determination of the entire DNA sequence of organisms); bio pharmacology (the study of drugs produced using biotechnology); molecular computing (computational schemes which use individual atoms or molecules as a means of solving computational problems~~;~~ in the long run, molecular computing is likely to replace traditional silicon computers); and biomimetic (the science of copying life, i.e. the transfer of ideas from biology to technology).

What is then the *class content* of all these, and others to come, new developments in science? I think it is the further fusion of nature and techniques, the melting of one into the other, in ways and forms such that the outcome will enormously increase the possibilities to control humans on behalf of capital and to shape their potentialities according to capital's rationality and interests. In this, they do not differ from previous technologies in the sense that only those techniques will be developed and applied that will be functional for capital's domination, even if they can be used by labour to resist capital's domination.[18]

[18] See Carchedi (2011) for a full analysis of these topics.

These are some of the technological innovations that will become the hallmarks of the 21st century just as the old technologies have been of the past century. After these new technologies will have permeated society, society, as we know it, will have changed beyond imagination, just as the inventions and technologies introduced in the post-WWII period have caused a complete transformation of pre-war capitalism.

Inasmuch as machines replace labourers, mental labour is bound to increase in importance. Much has been written on this topic, but almost never from the angle of Marx's labour theory of value. As I have argued elsewhere, given certain conditions, mental labour can be productive of value and surplus value just as objective labour, erroneously called material labour. Therefore, mental labour is subjected to the same rules dominating objective labour. On the one hand, new forms of mental labour allow the introduction of new forms of exploitation together with greater rates of exploitation. On the other, new technologies replace mental labourers with means of production, just as in the case of objective labour, and thus affect negatively, profitability. But perhaps the most important consequence of this analysis is that mental labour under capitalist production relations is part of today's proletariat. The proletariat is not disappearing, but contrary to a dominant thesis, is expanding with different features. In spite of its specific features, mental labour is not capitalism's elixir of life.[19]

Marx has shown masterfully that capitalism generates spontaneously unemployment, poverty, exploitation, wars and a host of other human predicaments. All this will not change. What will change is the form of these predicaments. Even if new and more fertile seeds will be found out, hunger will not disappear. New forms of wealth will arise but they will be a tiny island in an ocean of new forms of poverty and destitution. Nanotechnology might eliminate some forms of pollution (as some supporters of green capitalism hold) but will create new toxic waste. But even assuming a completely clean capitalism, the system would still be what it is, exploitative, destructive and insane in terms of human needs. The new technologies will be part of this system. Through them, capitalism will continue to shape the world in its own likeness and thus will shape - more than ever - human potentialities in forms consonant with capital's needs and rationality. Capitalism will not self-destroy. If labour does not destroy it, it will come out of this crisis stronger and more virulent than ever.

Perhaps the title of this paper should have been: The old is dying, but what will the new be?

APPENDIX . STATISTICAL SOURCES AND METHODS.

Profits: Profits are from Bureau of Economic Analysis (BEA) tables 6.17A, 6.17B, 6.17C, 6.17D: "Corporate Profits before Tax by Industry" (billions of dollars). They include agriculture, mining, construction, manufacture and transport.

The profit rate. Following the temporalist approach, profits at time t2 (the end point of t1-t2, the present period) are divided by the constant and variable capital at time t1, the starting point of the present period, which is also the end point of the previous period.

Fixed assets. The BEA defines fixed assets (constant capital) as "equipment, software, and structures, including owner-occupied housing". The data considered in this paper

[19] Carchedi, 2014, 'Old wine, new bottles and the Internet', *Work Organisation, Labour & Globalisation*, Vol 8, No 1.

covers agriculture, mining, construction manufacturing and utilities. Fixed assets are obtained from BEA, Table 3.3ESI: "Historical-Cost Net Stock of Private Fixed Assets by Industry" and the price deflator from Table 5.3.4. Conform to the temporalist approach, historical costs have been chosen instead of replacement costs.

Wages: Wages for goods-producing industries are obtained from Fred.stlouisfed.org (billions of dollars).

Employment in goods-producing industries: This is obtained from US Department of Labor, Bureau of Labor Statistics, series ID CES0600000001.

Financial profits from BEA tables 6.17A, 6.17B, 6.17C, 6.17D: financial profits

Government expenditures/GDP from Fred. Stlouisfed.org

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