7 The Falling Rate of Profit as the Cause of Long Waves: Theory and Empirical Evidence

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Capitalist accumulation is a turbulent dynamic process. It has powerful built-in rhythms which conjunctural factors and specific historical events only serve to modulate, as long as they remain within the capitalist rules of the game. Any analysis of the concrete history of capitalist accumulation must therefore distinguish between the intrinsic patterns of capitalist accumulation, and their particular historical expression.

Business cycles are the most visible elements of capitalist dynamics. A fast (3 to 5-year inventory) cycle arises from the perpetual oscillations of aggregate supply and demand, and a medium (7 to 10-year fixed capital) cycle from the slower fluctuations of aggregate capacity and supply (Shaikh, 1989a, 1989b). Underlying these business cycles is a much slower rhythm consisting of alternating long phases of accelerating and decelerating accumulation which form the 'basic curve of capitalist development'. The various business cycles are articulated into this basic curve, and are modified by it (Mandel, 1975, pp. 126–7). Conjunctural influences and historical events feed into these intrinsic patterns. The stage upon which capitalist history is played out is always on the move.

Marx recognised that the analysis of the rate of profit is crucial because capitalist accumulation is driven by profitability. In recent times, Ernest Mandel has pioneered a return to Marx's emphasis on the laws of motion of capitalist accumulation, and on the centrality of the rate of profit (Mandel, 1975, 1978, 1980). In particular, he has argued that what we perceive as 'long waves' in various economic variables are the expressions of alternating long phases of accelerated

and decelerated accumulation which are tied directly to corresponding fluctuations in the rate of profit (Mandel, 1980, ch. 1). In the throes of a long depression, some positive combination of 'exogenous extraeconomic factors' triggers a sudden rise in the rate of profit, and this sets off an accelerated phase in accumulation (Mandel, 1980, p. 24). During this phase, two things happen: the organic composition of capital rises as capitalists invest in new and more capital-intensive technology; and the rate of surplus value rises as productivity growth generally outstrips the growth in real wages. The growth in the rate of surplus value initially outpaces the growth in the organic composition, so that the rate of profit continues to rise. But eventually national reserve armies begin to dry up, real wage growth accelerates, and the rate of surplus value begins to slow down and perhaps even stagnate. Now the effect of a rising organic composition of capital becomes dominant, the rate of profit falls, and the economy enters a long decelerated phase of accumulation (Mandel, 1980). On the whole, 'long waves of accelerated and decelerated accumulation' are direct expressions of corresponding 'long waves in the rise and decline of the rate of profit' (Mandel, 1980, p. 15).

My argument is similar to Mandel's, with one crucial difference. Mandel's is a long-wave theory based on up-and-down movements in the rate of profit. In contrast to this, I have long argued that Marx's theory of a *secularly falling* rate of profit provides a natural foundation for a theory of long waves (Shaikh, 1978, 1984; 1987a, 1987b). In what follows, I will first briefly outline the steps in this thesis, and then develop and analyse data on the long-run tendency of the rate of profit in the USA from 1899 to 1984. My aim is to identify the strong forces generated by capitalist accumulation, so as to provide an adequate foundation for subsequent analyses of its economic history.

LONG WAVES AND THE THEORY OF THE FALLING RATE OF PROFIT

The basic elements of the theory of the falling rate of profit can only be sketched here, due to limitations of space. Details are in the various references provided at the end of the chapter.

As noted earlier, capitalist accumulation is characterised by cyclical fluctuation around a long-term curve. Conjunctural factors and particular historical events then modify both cycle and trend. The overall movement of the rate of profit reflects all of these influences.

The present discussion concerns the forces which determine the underlying trend, the 'basic curve', of capitalist accumulation. This requires us to distinguish between the basic rate of profit r* corresponding to this underlying trend, and the actual rate of profit r which is the synthesis of the trend and all other factors. The basic rate may be defined as the rate of profit which obtains at some standard rate of capacity utilisation. Oscillations and other variations in the balances between aggregate demand, supply, and capacity, as well as changing trends in shift work, will then show up as fairly large movements in capacity utilisation which cause the actual rate of profit r to fluctuate around the slowly changing basic rate r*. Capacity utilisation thus plays a central role in medium- and short-term movements (Marris, 1984).

Karl Marx, like Adam Smith and David Ricardo before him, believed that the basic rate of profit tended to fall over time. His analysis of this tendency begins from the observation that the desire for profits is unlimited. This desire drives each capital to struggle against labour and against other capitals. The struggle of labour manifests itself in the mechanisation of production, in which workers are replaced by machines in order to raise the productivity of labour. But this increased productivity of labour can only be realised in the struggle against other capitals if it is expressed as a lower unit cost of production.

As a general rule, such lower unit costs of production are achieved at the expense of greater fixed capital tied up per unit output (and hence the *capitalisation* of production). To put it in the language of microeconomics, capitalist production displays an inherent tendency towards lower average variable and average total costs, at the expense of higher average fixed costs.

Individual capitalists take advantage of the lower unit costs afforded by a new method of production by lowering their prices and expanding their market share. To quote Marx: 'The battle of competition is fought by the cheapening of commodities' (Marx, 1867, vol. I, ch. 25, p. 626), in which 'one capitalist can drive another from the field and capture his capital only by selling more cheaply'. And 'in order to be able to sell more cheaply without ruining himself, he must. . .raise the productive power of labor as much as possible', which in turn is achieved 'above all, by a greater division of labor, by a more universal introduction and continual improvement of machinery' (Marx, 1867, p. 89). Aggressive price-setting and price-cutting behaviour is therefore inherent in capitalist competition. This simple fact can be shown to completely invalidate the so-called Okishio Theorem.[1]

The mechanisation and capitalisation of production lead to rising technical, organic, value (C/V), and materialised ($C/(v + s)$) compositions of capital. Very briefly, the rising capitalisation of production implies a greater amount of fixed capital tied up per unit output (a rising capital/net output ratio K/Y), which in turn implies a rising materialised composition $C/(v + s)$ (Shaikh, 1987a).

A rising materialised composition produces a downward drift in the general rate of profit, *even when the rate of surplus value s/v is rising faster than the materialised composition of capital $C/(v + s)$*. This latter result is quite remarkable. Rosdolsky has shown that Marx's discussion in the *Grundrisse* already contains the core of this result (Rosdolsky, 1977, chs 16, 17, 26, and the appendix to part V). Let s = surplus value, C = total (fixed and circulating constant capital), v = variable capital, and $l = v + s$ = living labour. Then we can write the basic rate of profit as

$$r^* = \frac{s}{C} = \frac{s}{l} \cdot \frac{l}{C} = \frac{s}{v + s} \cdot \frac{l}{C} = \frac{s/v}{1 + s/v} \cdot \frac{l}{C}$$

Marx argues that the rate of surplus value tends to rise over time, because real wages will not generally rise as fast as productivity (firms which are forced to hand all the productivity gains of technical change over to workers' wages will not last long as capitalist enterprises). It is evident from the above expression for the basic rate of profit that even when s/v rises without limit, the ratio $(s/v)/(1 + s/v)$ rises at an ever decreasing rate, since in the limit it approaches 1. Thus, no matter how fast s/v rises, the rate of profit eventually falls at a rate asymptotic to the fall of l/C (which in turn is the rate at which the materialised composition of capital C/l rises). For *any* combinations of rates of rise of s/v and C/l, one can easily show that the basic rate of profit will inevitably fall. To see this, let us assume that both s/v and C/l are positive functions of time such that $s/v = f(t)$, $f' > 0$, $f'' \geq 0$, and $C/l = F(t)$, $F' > 0$, $F'' \geq 0$. Then

$$r^* = \frac{s/v}{1 + s/v} \cdot \frac{l}{C} = \frac{1}{\left(1 + \dfrac{1}{s/v}\right)(C/l)} = \frac{1}{\left(1 + \dfrac{1}{f(t)}\right) F(t)}$$

It is clear from the above expression for the basic rate of profit that as $f(t)$ rises over time, $1/f(t)$ gets smaller and smaller, so that the trend of r^* is eventually dominated by the trend of the materialised composition $C/l = F(t)$. Further analysis is in Shaikh (1984).

A secularly falling rate of profit necessarily produces a 'long wave' in the basic mass of profit, which first accelerates, then decelerates, stagnates, and even falls. Consider the following simple representation (more detail is available in Shaikh, 1987b). The basic mass of profit $P^* = r^* \cdot K$, where K = the stock of capital advanced. Assume that the basic rate of profit falls at some given rate a, so that $r^* = r_0{}^* e^{-at}$. Then the rate of growth g_{p^*} of the mass of profit is

$$g_{p^*} = g_{r^*} + g_K$$

where g_{r^*} and g_K are the growth rates of r^* and K, respectively.

But from the expression for r^*, $g_{r^*} = -a$. Morever, if in general the rate of capital accumulation is proportional to the rate of profit, so that $g_K = s_c \cdot r$, where s_c = the capitalists' propensity to save (Ricardo–Marx–Kalecki–Kaldor, and so on), then we may write

$$g_{p^*} = -a + s_c \cdot r^*$$

A long upturn comes about precisely when profitability has been restored to the point where the basic mass of profit begins to grow. Thus in the beginning of the long boom, $g_{p^*} > 0$. Now, as the rate of profit declines during the long boom (for the reasons elucidated above), and hence g_K declines until at some critical level of the basic rate of profit $r^{**} = a/s_c$, $g_{p^*} = 0$. At this point, the basic mass of profit has become stagnant.

To complete the argument, this analysis of the long wave in the basic mass of profit must be complemented by a corresponding analysis of the path of the actual mass of profit. The difference between depressions and normal accumulation becomes crucial here. In normal accumulation, the actual level of capacity utilisation tends to gravitate around some normal level. But in a depression, accumulation is stagnant and capacity utilisation can be below normal for long intervals. Thus the beginning of a long upturn will be attended by a rise in capacity utilisation, until such time as the normal mechanisms of accumulation cause the rate of capacity utilisation to once again gravitate to around the normal level. The actual rate of profit

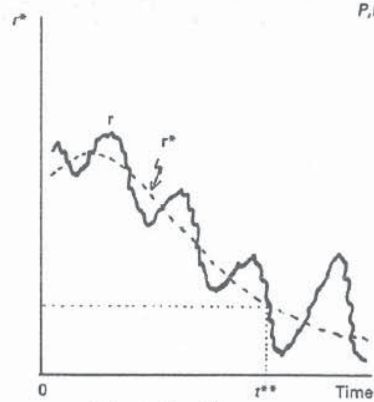

Figure 7.1 Rate of profit

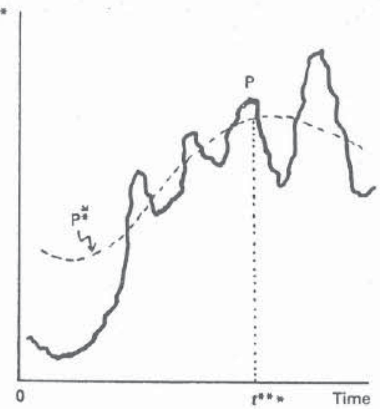

Figure 7.2 Mass of profit

may therefore initially rise even when the basic rate may be falling. Moreover, since the actual rate of accumulation is roughly proportional to the actual rate of profit, g_K too may rise initially. Both the rise in the actual rate of profit and the acceleration in accumulation will serve initially to raise the actual mass of profit faster than the basic mass of profit. Figures 7.1 and 7.2 illustrate this intrinsic dynamic, upon which historical factors then operate. The basic mass and rate of profit are depicted as dotted lines, and the actual mass and rate as solid lines. Note that the basic rate of profit is depicted as rising at the beginning of the long upturn, but then falling throughout the subsequent portion of the long boom into the long downturn. This emphasises the fact that in Marx's theory of the falling rate of profit the transition between long-wave phases is correlated with the movements of *mass* of profit[2] and not with that of the rate of profit (as in Mandel). It also makes it clear that Marx's argument does not exclude secular or conjunctural departures from the dominant tendency of the rate of profit to fall.

Marx calls the point of transition from normal accumulation to the crisis phase the 'point of absolute overaccumulation of capital'. It marks a *phase change* in all the major patterns of accumulation. The exact patterns in the long downturn phase depend on more concrete and conjunctural factors involving the credit system, on the role of the state *vis-à-vis* workers, businesses, and the banks, and on the strength of the class struggle.

The basic trends implied by Marx's argument are summarised below:

- Rising ratios of fixed capital to output and to wages. In Marxian terms, these ratios represent the money-forms of rising materialised and value compositions of capital, respectively.
- Productivity rising faster than real wages (in Marxian terms, a rising rate of exploitation).
- A falling rate of profit even in the boom years (as opposed to a rising rate throughout the boom, as in Mandel).
- The falling rate of profit leading to an eventual stagnation in the basic mass of profit.
- A stagnation of profit of enterprise signalling the beginning of the crisis phase, in which there is a qualitative change from stability to instability (Shaikh, 1989a).

As we shall see, these are exactly the patterns one finds over two successive long waves in the US.

LONG WAVES AND PROFITS IN THE UNITED STATES, 1899–1984

The preceding analysis requires us to distinguish the basic underlying rate of profit from the actual rate. A secularly falling basic rate gives rise to the 'curve' in accumulation which we perceive as a long wave. This curve will also be reflected in the actual rate, but only as a long-term trend hidden under turbulent and erratic fluctuations due to fast and slow cycles, historical events, and the ever-present anarchy of capitalist production. Since all this turbulence will be picked up in the rate of capacity utilisation, a good empirical measure of this rate becomes crucial.[3] Such a measure must pick up not only the large fluctuations associated with the cataclysmic events such as depressions and world wars and the fairly large ones associated with the fast (3 to 5-year inventory) cycle, but also the more subtle ones associated with the slow (7 to 10-year fixed capital) cycle and with long-term trends in normal shift work.

Conventional measures of capacity utilisation are inadequate because their very methods of construction orientate them towards short-term fluctuation. As a result, they tend to load all medium- and long-term fluctuations in capacity utilisation on to the estimate of the 'trend'. This is true of survey measures of operating rates such as from the Bureau of Economic Analysis (BEA), the Bureau of the Census, and Rinfret Associates, which tend to understate even short-term cyclical fluctuations. It is also true of peak-output measures such the Wharton index, which assume that all short-run peaks in output correspond to the *same* (100 per cent) level of capacity utilisation, thereby automatically excluding all medium- and longer-term fluctuations. The widely used Federal Reserve Board measure is based on an eclectic combination of survey data on operating rates and survey data on capacity levels, so that it too suffers from the same defect (Hertzberg, *et al.*, 1974; Schnader, 1984; Shaikh, 1987b).

The only measure which avoids these biases is the one based on the utilisation of electric motors which drive capital equipment. In a now classic study, Foss (1963) showed that it is possible to directly measure capacity utilisation by comparing the installed capacity of the electric motors which are used to drive capital equipment, to their actual use. Following the methodology developed by Jorgenson and Griliches (1967) and by Christensen and Jorgenson (1969), I have recalculated this series, modified it to incorporate Foss's new data on the slow change in the trend of normal level of shift work (Foss, 1984), and extended it back to 1899, as explained in the data appendix to this chapter, on page 190.

The great advantage of the electric motor index is that it is based on direct measures of capacity and use. Its major limitation lies in the fact that the data on installed capacity was no longer collected after the 1963 Census. However, for the post-war period there exists a completely different data source which also directly refers to industrial capacity and its use. The annual McGraw-Hill survey on business plans contains information on the annual additions to capacity in manufacturing (DCAP), and the annual proportion of gross investment which goes toward the expansion of capacity (E). These two series are widely used in research on capacity and investment spending, respectively (see, for example, Feldstein and Foot, 1971). I have shown that this data can be used to construct a new measure of capacity utilisation for the period 1947–85. As it turns out, this new

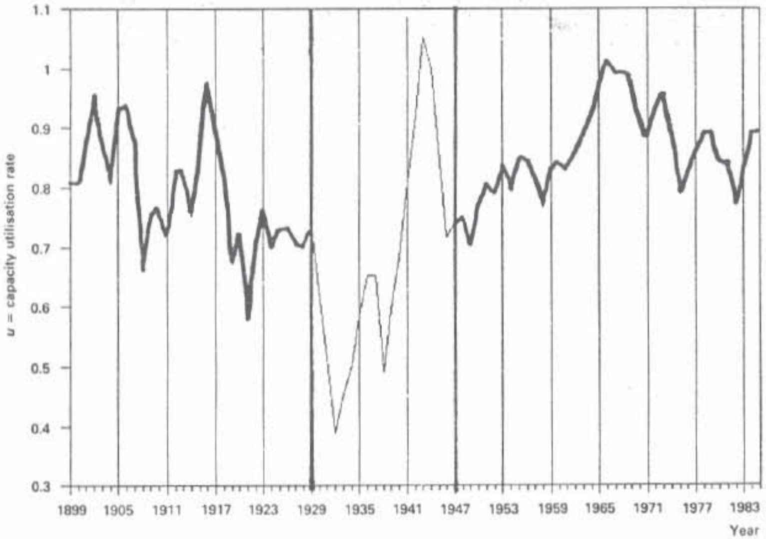

Figure 7.3 Capacity utilisation (electric motor and indexes chained)

measure corresponds closely to the electric motor measure of capacity utilisation over the 1947–63 period in which the two overlap (Shaikh, 1987b). This allows us to chain the two measures together, adjust for trends in the normal level of shift work (Foss, 1984), and end up with a new long-term measure of capacity utilisation for 1899–1984. Details of this and all other calculations are provided in the data appendix to this chapter (see page 189).

Figure 7.3 presents the long-term measure of capacity utilisation. As explained in the data appendix on page 192, this is a measure of actual production relative to normal economic capacity. The latter is defined as the capacity corresponding to normal levels of shift work. It subsumes normal reserves of capacity. The resulting measure of capacity utilisation therefore only reflects cyclical and conjunctural fluctuations, as is theoretically desired. Depressions and wars typically induce large fluctuations in capacity utilisation, but in less turbulent years the trend hovers around 80–90 per cent.

The existence of a good, long-term measure of capacity utilisation allows us to address the theoretical arguments outlined earlier. The theory of the falling rate of profit locates the basic trend at the level of the general rate of profit (the ratio of surplus value to normal capital advanced), not merely at the level of the normal business rate

of return. The profit rate measure shown here is therefore constructed to be as general as possible, with profit defined as the excess over costs of production, so that costs of sales and financial activities (realisation costs), as well as all taxes, are included in profit. This is, in fact, the general measure which business accountants call 'profit on sales' (profit minus costs of production), as opposed to the narrower measure called 'net income' (profit on sales minus taxes and administrative, sales, and financial expenses) (Meyer, 1964, pp. 49–51). Since realisation costs have generally risen faster than production costs over the long run, the business rate of profit is likely to fall relative to the general rate. But without some notion of the trend of the former, we would be unable to distinguish between primary and secondary influences on the trend of the latter (whose derivation and analysis is part of the continuation of this work).

In order to distinguish structural trends from short- and medium-turn cyclical and conjunctural fluctuations, we must adjust variables such as the capital–output ratio and the rate of profit for fluctuations in capacity utilisation. In this chapter, I make this adjustment in the simplest possible way, by deflating flow variables such as output and profit by the capacity utilisation rate in order to get normal capacity (that is, potential output and profit. More sophisticated techniques will be explored in subsequent work.[4]

The 95-year interval from 1899–1984 encompasses almost two whole long waves: one beginning in the mid-1890s and culminating in the Great Depression of 1929–33, and another beginning in the 1930s and continuing into the present. From the point of view of the theory of the falling rate of profit, it is of great importance to analyse the two associated phases of so-called normal accumulation, running from 1899–1929 and 1947–84, respectively. Figures 7.4–7.6 compare the adjusted and unadjusted measures for capital/production-worker wages, capital/output, and rate of profit, with trend lines superimposed on the adjusted measures.[5] It is evident in each case that even our simple adjustment for capacity utilisation captures a substantial portion (but not all) of the short- and medium-run fluctuations in the unadjusted variables, thereby helping bring out the secular trend. This is most striking in the Depression years after 1929, in which the levels of the adjusted variables are essentially stable, while those of the unadjusted ones fluctuate wildly. In Figure 7.6, for instance, the normal rate of profit r^* is more or less constant over the Depression, while the actual rate of profit first plunges sharply as accumulation collapses from 1929–33, and then rises sharply as accumulation

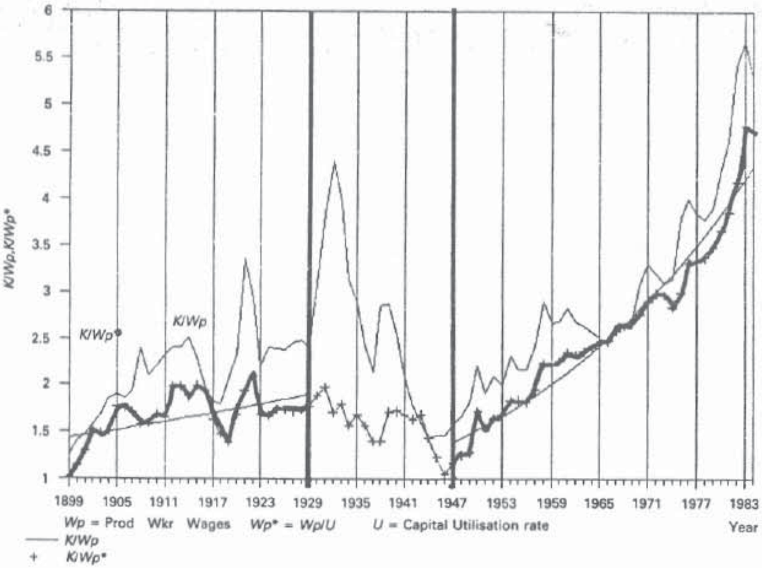

Figure 7.4 Capital/wages in manufacturing

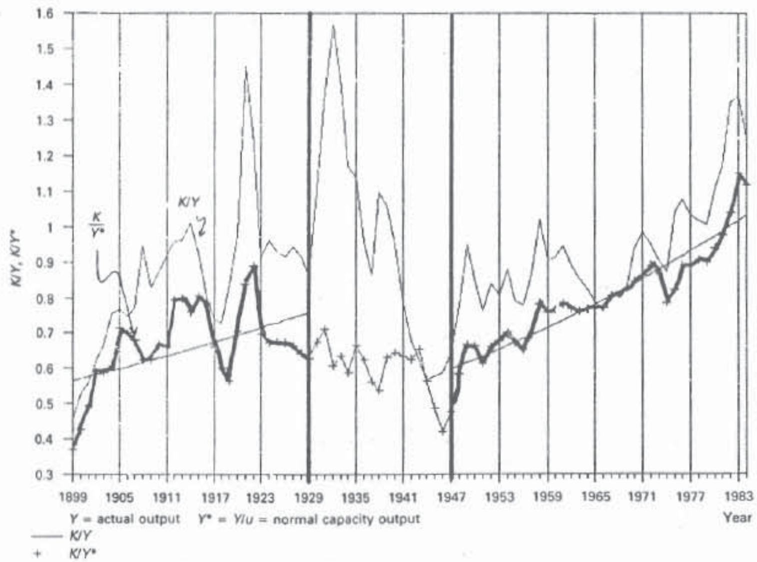

Figure 7.5 Capital/output in manufacturing

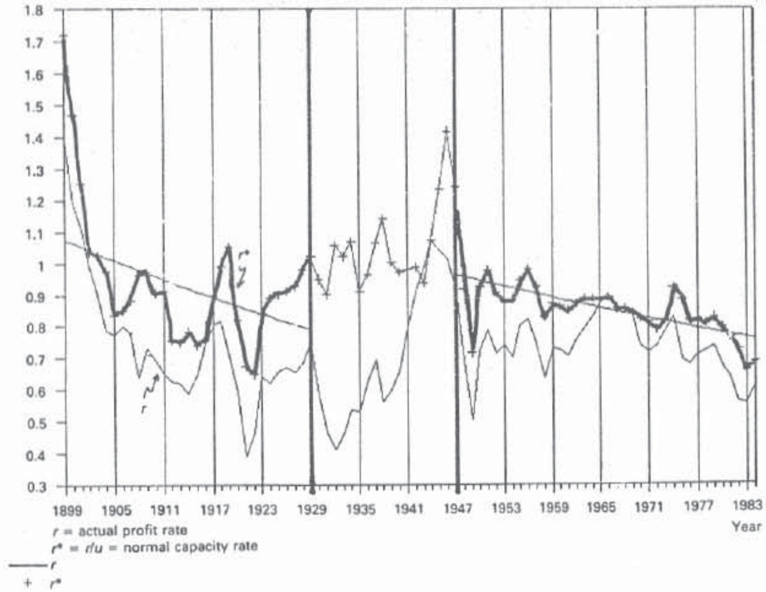

Figure 7.6 Rates of profit in manufacturing

recovers. As Figure 7.3 makes clear, the latter two effects are primarily due to fluctuations in capacity utilisation. Such fluctuations are *theoretically expected*, as was noted in the previous section.

Similarly, over the post-war period the normal rate of profit displays a clear downward trend. But this is masked by a 17-year wave in capacity utilisation, which rises sharply from 1958–66 and then declines just as sharply from 1966–75. The actual rate of profit thus rises in the upturn phase of the post-war long wave, and then falls in the downturn phase. Mandel would interpret this as evidence of a rise-and-fall in the actual rate of profit *causing* the long upturn and downturn (Mandel, 1980, ch. 1). I would interpret it as *an effect* of a secularly falling normal rate of profit, in which this falling profitability eventually chokes off the long upturn and reverses the rising level of capacity utilisation beginning in 1958 (see the earlier discussion around Figures 7.1 and 7.2 on page 179).

Figure 7.7 looks at the ratios of gross profits to gross value added P/Y and of gross profits to the wage bill of production workers P/Wp. Since these are ratios of two flows, they are not adjusted by u. They are essentially constant in the first period, but rise considerably in the

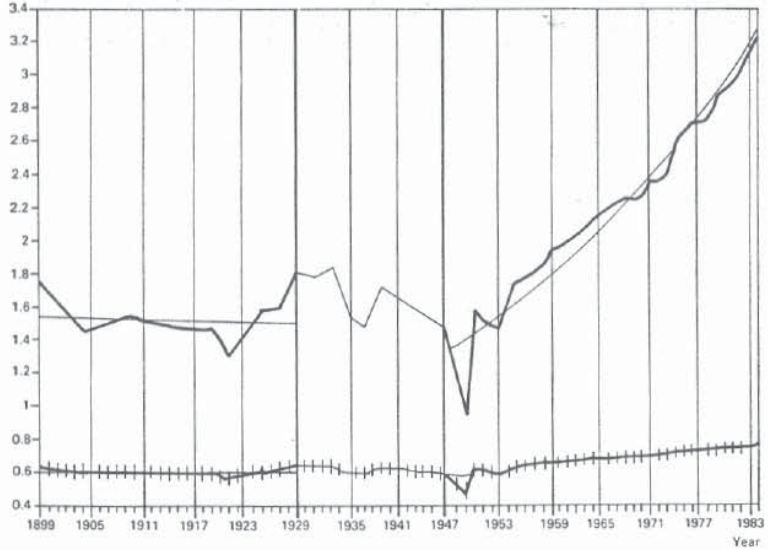

Figure 7.7 Profit/wages and profit/output

second. Figure 7.8 depicts a crucial linkage in the theory of the falling rate of profit. The top curve represents the normal maximum rate of profit R^*, which is simply the reciprocal of the normal capital–output ratio K/Y^*. The bottom curve shows the normal rate of profit r^*. As we can see, the two move in very similar ways in the pre-Depression period, and in fairly similar ways in the post-war period. The difference in the relative movements in the two periods is explained by the differences in the trends of the profit share P/Y in the two periods, as indicated in Figure 7.7 earlier. None the less, one can see that in both periods the long-term trend of the normal rate of profit is dominated by the trend of the capital–output ratio. We have already shown in the previous section that this dominance is a necessary consequence of a rising capital–output ratio.

Profit rates in manufacturing are good proxies for the social rate because profit rates tend to equalise across broad sectoral groupings. But the mass of profit depends also on the rate of growth of the sector, and here there need be no tendential equality across sectors. In this case, the weight of the sector in total social capital is important. For the pre-Depression period, manufacturing dominates total

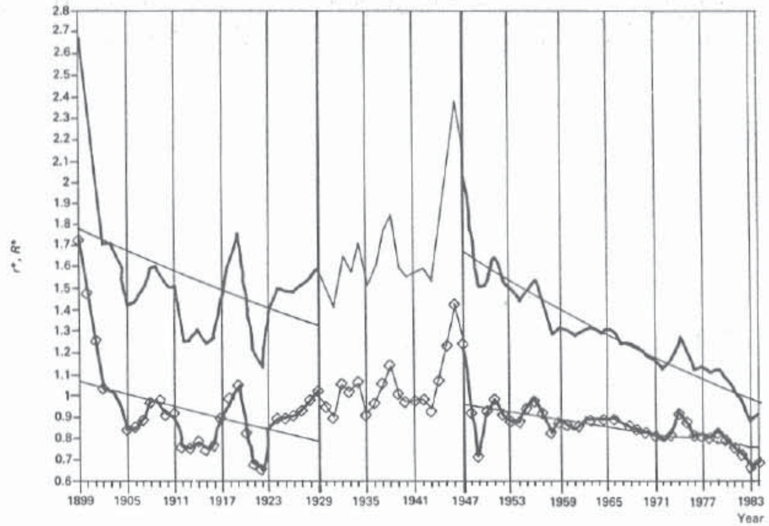

Figure 7.8 Normal and maximum normal profit rates

capital, so that we can safely infer the social movement from it. Figure 7.9 looks at the movement of the mass of actual and of normal profit in manufacturing 1899–1929. Most striking in this data is the slowdown and stagnation in the mass of profit during the 1920s, well before the Great Crash of 1929 which led into the Depression. In the post-war period one can no longer read the path of total profits from that of manufacturing profits. But I have shown elsewhere that exactly the same acceleration/deceleration pattern holds for total nonfinancial profit in the post-war period (Shaikh, 1987b). The profit data and the underlying theory would therefore lead us to locate the turning points in the two long waves in the 1920s and the late 1960s, respectively. More precise dating requires the development and analysis of more concrete measures of the mass of profit. None the less, these patterns provide important support for the theoretical argument about long waves.

Table 7.1 summarises the long-term trends depicted above. It shows that in spite of important differences between epochs, the general rate of profit nevertheless falls in both. Both the rate of surplus value (approximated by P/Wp) and the value composition of

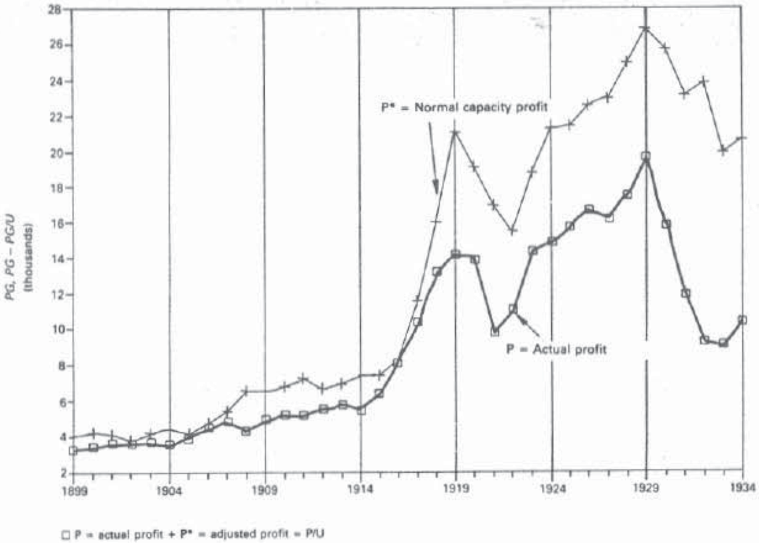

Figure 7.9 Mass of profit in manufacturing, 1899–1934

Table 7.1 Annual trend rates, in percentages

	1899–1929	*1947–84*
K/Wp^*	+0.9	+3.1
K/Y^*	+1.0	+1.5
P/Wp	+0.1	+2.4
P/Y	+0.0	+0.8
R^*	−1.0	−1.5
r^*	−1.0	−0.7

capital (approximated by *K/Wp*) appear to rise much more rapidly in the second period than in the first. None the less, the latter effect is dominant in both periods, so that the general rate of profit falls in both (albeit at a slower rate in the second).

SUMMARY AND CONCLUSIONS

I have tried to outline a theory of long waves based on Marx's theory of secularly falling rate of profit. The rate of profit falls because a

rising materialised composition of capital necessarily overwhelms even a rising rate of surplus value. The falling tendency in the rate of profit chokes off the initial acceleration in the mass of profit, which then decelerates and eventually stagnates. The point of stagnation in the mass of profit, which Marx called the 'point of absolute overaccumulation', signals the turning point in the long wave. It ushers in a phase change from stable and healthy accumulation to unstable and depressed accumulation. The empirical examination of the above thesis required adjusting the rate of profit for variations in the rate of capacity utilisation, so as to bring out the basic structural patterns and compare them to the above thesis. In this regard, the theoretical argument fares tolerably well.

There are several issues which need to be developed further. The general measure of profit used in this chapter needs to be linked to more concrete measures, so that we can move from the general rate of profit in the sense of Marx to the rate of return which businesses perceive. This would allow us to address the impact of circulation and realisation costs, and of taxes, on the final profitability of capital. Furthermore, the method of adjusting variables for variations in capacity utilisation needs to be refined. Lastly, it should be mentioned that all studies of profitability suffer from the fact that conventional measures of the capital stock (including our own) suffer from major deficiencies in their construction (R. A. Gordon, 1971; R. J. Gordon, 1969, 1970, 1971; Perlo, 1968). This too is an area which needs further work, for it is quite likely that the defects in the capital stock measures produce a bias in measure of the rate of profit. Attempts to correct for these defects are under way.

DATA APPENDIX

Some of the data series used below were not available for every year in the interval 1899–1984. Where possible, the missing values have been filled in, taking their ratio to some correlated variable and interpolating this between available points.

1. Manufacturing capital stock, value added, wages and profits

The capital stock measure used is the gross current-dollar stock of plant and equipment in manufacturing, 1889–1985. This is an unpublished backward extension of the series on input–output industry capital stocks, published by the Bureau of Industrial Economics (BIE). I thank Ken Rogers of the Bureau for making it available to me. It is the only consistent series current-dollar and constant-dollar series which goes back to 1889. Like most other such series, it suffers from the defect of being calculated on the assumption that the useful life of plant and equipment is independent of economic fluctuations, even when they are as cataclysmic as the Great Depression.

The basic data for gross value added and production worker wages comes from the *Census of Manufactures, 1982*, Table 1, supplemented by subsequent Censuses for 1983–85 data. Gross profit was calculated as gross value added minus production-worker wages, as an approximation of surplus value realised in manufacturing. This makes it inclusive of nonproduction worker wages, corporate officer salaries, and depreciation charges. All such data is available annually 1949–1986, once in 1947, in two-year intervals from 1919–39, and in five-year intervals from 1899–1919. The missing years in our series from 1899–1949 were interpolated between available benchmarks using a series for current-dollar aggregate national product. This GNP series is available for 1929–87 in the *National Income and Product Accounts of the United States, 1929–82* (NIPA, 1929–82) and in subsequent Surveys of Current Business (SCBs), for 1909–28 it is available in Romer's re-estimates (Romer, 1987, Table 7, Appendix), and for 1899–1908 from *Historical Statistics of the US (HS, 1975)*, series F1. The interpolations were made according to the general procedure described above. This technique was also applied to estimate production-worker wages in the same missing years.

2. Capacity utilisation

The electric motor utilisation index for 1899–1963

I adopted the basic procedures developed by Christensen and Jorgenson (1969), Jorgenson and Griliches (1967), and Foss (1963), and used them in conjunction with the Rogers/BIE capital stock estimates for real gross stock in manufacturing equipment (KREQ), census benchmark data on installed capacity of electric motors (HPBNCH) from the Census of Manufactures, and annual data on electricity consumed by these motors (ELCONS) from the Survey of Manufactures and from my own estimates. The details are as follows.

HP Benchmark year estimates (HPBNCH) of the capacity horsepower of electric motors used to drive manufacturing equipment were taken from *Historical Statistics of the U.S. (HS, 1975)*, Series P70, for the years 1899, 1904, 1909, 1914, 1919, 1925, 1927, 1929, 1939, 1954, 1962 (the last available year), converted to billions of Kw-hrs as in Foss (1963) and interpolated between benchmark years using an unpublished BIE series on real equipment stocks in manufacturing (KREQ) from 1889–1984.

EMOTORS The electric power consumed (ELCONS) by manufacturing is available in various manufacturing censuses from 1939–62. Data for this interval was taken from *HS (1975)* as total consumption of electric power (Series S124) minus power consumed for nuclear energy (Series S125). This same source also lists data in earlier years, even though Census data for 1929 is incomplete and no Census data was gathered for the years prior to 1929 (*1954 Census of Manufactures*, pp. 208–20). The *Historical Statistics of the U.S.* (1975) series does not list any documentation for its sources or methods for the years prior to 1939. Calls to them revealed that no further information was available. In the light of this, I felt it prudent to re-estimate this series for the years prior to 1939. Foss (1963) estimates the 1929 value by assuming that motors driven by generated electricity were utilised at the same rate as those driven by purchased electricity, as is roughly true in the previously available benchmark year of 1939. But 1939 was a severe recession year, whereas 1929 was a near peak year. In the other near peak benchmark years of 1954 and 1962, the proportions in the two utilisation rates were systematically different from 1939. I therefore used the 1954–62 average proportions instead. Data between 1929 and 1939 benchmarks was interpolated using an index for the portion of manufacturing output which comes from plants using electric motors to drive machinery (QMAN*). This latter series was created by splicing together the estimates for total manufacturing output 1899–1938 in *Long Term Economic Growth 1860–1970*, Series A19, with corresponding estimates for 1939–1985 in *The Economic Report of the President 1987*, Table B45, Total Manufacturing, and multiplying the result by the proportion of electric motor hp in relation to total mechanical hp (Schurr and Netschert, 1960, Table 62, p. 187 for benchmark years from 1889–1954; *HS, 1975*, Series P70/P68, p. 681, for 1962; and linearly interpolated for years in between benchmarks). The resulting series for ELCONS from 1929–62 was extended backwards to 1899 using QMAN* and the trend of ELCONS/QMAN* between 1929–39. The final step was to multiply the electric power consumed in manufacturing ELCONS by estimates of the proportion of manufacturing electricity consumption which goes to run electric motors (EMPROP), to create the estimated electricity consumption of equipment motors in manufacturing (EMOTORS = ELCONS × EMPROP). The proportion EMPROP is available for 1929, 1939, 1954 (Foss, 1963, p. 11) and 1962 (Christensen and Jorgenson, 1969), Since it varies only slightly, the proportion in the intervening years was estimated by linear interpolation between benchmarks, and the trend between 1929–39 was used to extrapolate back to 1899.

UE The relative utilisation of manufacturing equipment (UE) was then calculated as the ratio of electric power consumed by equipment motors (EMOTORS) to the normal capacity horsepower of these motors (HPN) corresponding to the normal level of shiftwork. In his original study, Foss (1963) calculates a standard (40-hour) weekly shift measure of capacity hp by multiplying the installed capacity hp (which corresponds to the peak mechanical capacity) by the ratio of one shift (40 hours) to continuous weekly operation (168 hours). But later, Foss estimates (Foss, 1984) that the normal level of shiftwork rose between 1929 and 1976, which means that normal available capacity itself also rose. Normal capacity was therefore calculated by multiplying standard one shift capacity by the shiftwork index (Foss, 1984, Table 1, pp. 8–9 for 1929–76; the 1976 value was used for 1977–84, since this is a period of relative stagnation; the 1929–39 trend was extrapolated back to 1919 since the 1919–29 period was one of growth; and the 1919 value used for 1899–1918, for lack of better alternatives).

For 1947–86, McGraw-Hill survey data on capacity additions and on the proportion of gross investment devoted to expansion investment was utilised to create a completely different capacity utilisation index. Evidence indicates that this survey data refers to gross additions to capacity (Rost, 1980), so that the annual net addition to capacity can be estimated by multiplying the gross additions by the expansion investment/gross investment proportions in each year. The net additions can then be cumulated to get an index of capacity, and this divided into the Federal Reserve Board index of industrial production to create an index of capacity utilisation. *The resulting index behaves very much like the electric motor utilisation index over the period 1947–62, in which they overlap*. The procedure is described in more detail in Shaikh (1987b) Appendix B.

The final step was to splice together the previous two series on capacity utilisation so as to create one overall series from 1899–1985.

The resulting series represents a considerable improvement over all previous capacity utilisation series, and is the only one to cover so long a period.

NOTES

1. In the neoclassical notion of perfect competition, upon which most neo-Ricardian and neo-Marxian writers base their representations of competition, capitals are assumed to be passive 'price-takers' who expect prices to be constant even in the face of technical change. In this case, profit-rate maximising behaviour necessarily leads to a *rising* general rate of profit for any given wage (Okishio, 1961). On the other hand, if it is assumed that prices are expected to fall with technical change in the face of price-cutting behaviour, then the same profit-rate maximising behaviour will favour techniques which have lower unit costs (Nakatani, 1979). Now it is the Okishio theorem which is invalidated. The movements of the general rate of profit then turn out to depend precisely on the factors analysed by Marx (organic composition of capital, rate of surplus value, and so on).
2. At a more concrete level, this argument applies to what Marx calls the mass of profit-of-enterprise, that is to profit over and above the equivalent of interest, because it is this profit of enterprise which is the characteristic element of industrial investment (as opposed to the mere financial investment and speculation).
3. Adjustment via capacity utilisation is the theoretically appropriate technique for identifying the basic rate of profit. Filtering methods generally require economic data to first be 'detrended', which presupposes knowledge of the very trend we seek to identify (for example, Rainer Metz in Chapter 4, this volume).
4. The general problem may be approached as one of unobserved components. Let $r = r^* \cdot r_c$, where r_c = the cyclical and conjunctural component of the rate of profit r, and r^* = the structural (trend) component. Since the capacity utilisation rate u is our index of the cyclical and conjunctural influences, we may suppose that $r_c = f(u)$. Then $r^* = r/f(u)$, and our problem becomes one of determining an appropriate $f(u)$. My procedure in this paper amounts to assuming $f(u) = u$.
5. Trends were calculated as log-linear regressions of the variable against time. The anti-log of the resulting predicted value was then superimposed on the original variable.

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COMMENT

Boe Thio

The theoretical exposition in Shaikh's paper desires to establish the hypothesis of a falling 'basic' rate of profit. Since the figures on actual rates of profit do not show such a tendency (see also Shaikh's Figure 7.6 on page 185), the factors explaining discrepancies between actual and basic rate are important to establish a trend in the rate of profit. The empirical part of the paper does three things:

1. It presents new data on capital stock and capacity utilisation for the US manufacturing sector.
2. It draws attention to the influence of capacity utilisation on profitability.

3. It attempts to substantiate empirically a long-run decline in the rate of profit for the US economy.

As to the first point, it is difficult to comment on the quality of the data on capital stock and capacity utilisation because they are not fully presented. Therefore, my comment will concentrate mainly on the application of the data and the plausibility of the results. As to the second point, I agree with Shaikh that the influence of capacity utilisation on profitability may be important. The relevant definitions are:

$$r = (Y - Wp) / K = P / K = (P / Y) / (K / Y)$$

and

$$K / Y = (K / Y^*) / (Y / Y^*).$$

If we define

$$ps = P / Y; u = Y / Y^*$$

$$k = K / Y; k^* = K / Y^*$$

it follows that $k = k^* / u$ and the (observed) rate of profit equals

$$r = ps / k = u.ps / k^*.$$

In Shaikh's definition the normal capacity rate of profit equals

$$r^* = ps / k^* \ (= r/u).$$

This 'normal rate of profit', which has a central place in Shaikh's study, attempts to measure the rate of profit that would obtain if a normal rate of capacity utilisation prevailed. With higher effective demand and output, other things being equal, a higher observed rate of profit would be realised. It is implied, then, that the normal rate of profit would not be affected by a change in effective demand. We run the risk, however, of confusing pure definition and causation, because the profit share will never be unaffected by changes in effective demand.

Introduction of the utilisation rate u enables us to distinguish *by*

definition a change in the observed capital output ratio k into a change of the capital coefficient k^* and a change of the utilisation rate u. When we look for the influence of u on the rate of profit, we have two effects: a higher utilisation rate means a lower observed capital output ratio (by definition) and thus a higher rate of profit r. At the same time a higher u may coincide with a higher profit share; this, however, is expressed in the observed profit share. One should therefore be cautious when presenting the 'normal profit rate' as defined above as the profit rate prevailing at normal capacity utilisation; r^* equals *actual* profit share divided by normal (or 'technical') capital output ratio. So r^*, though 'corrected' by dividing through the utilisation rate, is not causally independent of u, because it affects the observed profit share. Only if the profit share ps is insensitive to changes in the utilisation rate, the normal rate of profit r^* as defined here indicates the rate of profit obtainable at full capacity. For the measurement or construction of the rate of profit from *observed* variables, the rate of capacity utilisation is, however, dispensable. The *measurement* of the actual profit rate is in no way affected by the rate of capacity utilisation.

We may observe that the utilisation rate can deviate from an 'average' level for a longer period of time and through more than one business cycle. The economy may alternate longer periods of 'near full employment' with periods of low demand pressure. It may be true that variation of the rate of capacity utilisation is underestimated, as Shaikh asserts, due to overestimation of changes in capacity and capital stock. If we accept that, observed fluctuations in the rate of profit would represent an underestimation.

Shaikh states that we can extend this argument to the long run. On this point I have some comments. His construction of the capacity utilisation figures is heavily dependent on the long-run trend in shift work. Without correction for this, the measured rate of capacity utilisation would rise substantially during the observed period, so it is doubtful whether such a measure is valid.

As to the construction of the utilisation index by Shaikh, one should observe that it is based on an indirect measure of the ratio of the use of electricity for electric motors and the energy use of these motors at full capacity. Even if such a measure could be completely correct, there may be reasons why it shows a long-run trend quite apart from changes in the utilisation rate, such as gradual development of techniques to apply machines of appropriate size, or learning on the basis of experience how to integrate electrical machinery in the production process. There is no need to interpret an observed trend in the actual use of electric motor capacity as a trend in the utilisation rate. Therefore I find the construction of this utilisation index and its application not sufficiently founded.

As to the third point – the author's view on the development of the rate of profit in the long run – his main thesis is that there is a clear downward tendency in the rate of profit during the period 1899–1929, and 1945 up to the present. This tendency is explained mainly by an increase of the normal capital output ratio k* (see above). This thesis challenges most other publications in this field. See, for example, the chapter by A. V. Poletayev in this volume (Chapter 6), Weisskopf (1979), Dumenil, Glick and Rangel (1987). A systematic decline of the rate of profit is not commonly found, and the idea that a falling rate of profit in the long run could be substantiated by a steady increase of the capital output ratio does not find support in other statistical sources. If one takes Maddison's (1982) indices of gross capital stock and GNP figures for the USA in order to obtain an index of the macroeconomic capital output ratio, one would find (with 1950 = 1) 1900 = 1.20, 1913 = 1.30, 1929 = 1.28, 1950 = 1, 1960 = 1.03, 1975 = 1.10. So one finds substantial fluctuations, but no systematic increase. Feinstein's (1972) figures for the UK show a pattern of increasing capital output ratio until the end of the 1920s, a decline till the early 1940s and some increase thereafter. It appears that technological development is able to increase the efficiency of capital goods with respect to output. It should be remembered, however, that the concept of profit in the present chapter differs considerably from the concept of profit in the national accounting sense. It is rather a global measure of surplus value: value-added minus the wage bill of production workers. Therefore we get a systematic *increase* in the share of profits in this sense. Whereas the share of *all* wages and salaries is rising over time.

Shaikh argues that although the rate of surplus value in this sense is rising, the rise of the (normal) capital output ratio even dominates this effect so as to produce a downward tendency of the (normal) rate of profit over the whole of the twentieth century. Clearly, Figure 7.6 displays no particular trend in the actual rate of profit, and the same is true for the actual capital output ratio in Figure 7.5 – except for the first five years, which could very well be a statistical artifact. At the same time we do observe long movements of the profit rate around a more-or-less constant level. It is not clear how movements in the

utilisation rate *in the long run* could be helpful in explaining the rate of profit.

To summarise, Shaikh's attempt to give a new and more precise measurement of the rate of capacity utilisation for the USA is subject to doubt. His idea that the rate of capacity utilisation could be relevant to the analysis of fluctuations in the profit rate may be applicable in the short- and medium-term, but does not add to an understanding of long-run movements of the rate of profit.

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REJOINDER

Anwar Shaikh

I thank Boe Thio for his thoughtful and insightful comments on my chapter. We agree on some points, but disagree on others. As is usually the case, basic differences about the theory of capitalist accumulation play a crucial role.

Let me first note the areas of theoretical agreement. Thio agrees that capacity utilisation u is an important factor to consider when trying to explain the movements of the observed rate of profit $r = (P/Y) / (K/Y)$. He goes on to note that my procedure for identifying the influence of u on r is not entirely adequate since I only adjust the denominator but not the numerator for variations in u. There are really two issues at stake here: the precise statistical manner in which one identifies the influence on u; and the question of whether one operates on r as a whole, or separately on each of its constituent components, such as P/Y and K/Y. My statistical procedure was to adjust K/Y for u because K/Y is a stock–flow ratio which necessarily varies with u, but not to adjust P/Y because this is a flow–flow ratio which need not vary with u, though it may, of course, do so. An alternative way to view my adjustment procedure is to see it as a simple form of an unobserved components model in which the adjustment is done on r as a whole through the function $f(u) = u$ (see my Note 4, page 193). In any case, it is not hard to see from my Figure 7.7 that the profit-share P/Y is quite stable when compared to the (unadjusted) capital–output ratio K/Y in Figure 7.5. Thus while Thio is right to point to the theoretical possibility of an influence of u on P/Y, this is not particularly important at an empirical level.

A second point on which we completely agree is the need to distinguish between the most abstract form of profit, which is the surplus over the costs of production, and its more concrete forms such as business net income (production profit minus sales and administrative expenses) and even business net income after taxes. I made the same point myself (see pages 183 and 189). The most abstract definition corresponds roughly to the mass of surplus value realised in manufacturing, whereas the more concrete forms correspond to those portions of surplus value which capitalist enterprises retain as profits. Since Marx's argument for a falling rate of profit is located at the most general level, and not at the level of increasing administrative costs, sales costs, or taxes, it was important to assess the empirical evidence at the theoretically appropriate level. Only in this way is it possible to distinguish between the proposition that in creased costs of circulation merely *exacerbate* the downward trend of the basic rate of profit, from the proposition that they are the *cause* of a falling (concrete) rate of profit. I hold to the former, and Thio implicitly espouses the latter.[1]

There are two areas of disagreement, also rooted in theoretical considerations. My capacity utilisation measure is the ratio of actual production to normal economic capacity, the latter being defined by the normal length and intensity of the working week (measured by the normal number of weekly shifts). The normal length of the working week is a social and historical variable which varies over time, as Marx long ago emphasised. It changes slowly, and perhaps discontinuously, as new norms are established. Foss (1984) finds it rises between pre- and post-second World War periods by about 25 per cent, probably because an increasing capital-intensity of production is itself an incentive for higher levels of shift work (Winston 1974, p. 1307). In any case, the *effective economic capacity* so defined acts as the centre of gravity for actual output over the fixed capital cycle, other things (such as depressions and wars) being equal. Thus, only when economic capacity is properly defined would one expect the measure of capacity utilisation to be devoid of a long-run trend – as it in fact is, in my Figure 7.3. Yet this is precisely what Thio objects to. He wishes to remove the adjustment for normal levels of shift work, and then, finding that the remaining index would 'rise substantially during the observed period', rejects my measure completely. In effect, Thio wishes to substitute an *engineering* measure of capacity (one-shift capacity, or perhaps 24-hour capacity) for an *economic* measure of it. But this is simply an error. While engineering capacity might be useful as an historical benchmark, it is not the capacity around which production and investment decisions are geared. Only an economic measure of capacity will suffice for an analysis of the economics of accumulation.[2]

Thio also argues that my analysis of the long-run trend in the rate of profit and the capital–output ratio does not conform to the results of others such as Poletayev in this volume, or Weisskopf (1979), Dumenil, Glick, and Rangel (1987), and Maddison (1982) (see Thio, page 198). This is a most curious argument. Having himself emphasised the importance of capacity utilisation in the analysis of the rate of profit, and having conceded that conventional capacity utilisation measures may be biased, he then falls back on empirical studies which either use these same conventional capacity utilisation measures to adjust the profit rate (Weisskopf) or *which fail to adjust it at all* (Maddison, Poletayev, and Dumenil *et al.*). Since these defects are the very ones which I criticise, I can hardly be blamed for failing to 'live up' to them.

Again and again, Thio returns to the point that the observed rate of profit does not fall over the long run. But he is a bit hasty here. Even a cursory glance at Figure 7.6 indicates that in the pre-Depression period from 1899–1929, the actual rate of profit r has precisely as strong a downward trend as normal rate of profit r*. But in the ensuing debacles of the Great Depression, of the Second World War, of the subsequent sharp recession as the war ended, and of the quick succession of first the Korean War and then the Vietnam War, any trend in the US rate of profit was bound to be buried under the virtually continuous turbulence. It is not until the mid-1960s that the shocks from these events died out. Is it then any wonder that only after 1965 can one 'read' the trend of the normal rate of profit from that of the observed rate? Is that a deficiency in the theory? I would argue not. On the contrary, it is only by distinguishing between major conjunctural events and the basic underlying 'curve of capitalist development' that we can hope to make sense of capitalist history. To the extent that Thio and I disagree on this, the difference is essentially theoretical and methodological, not empirical.

Notes

1. My data shows that the share of production-worker wages is falling, as evidenced by a rising production profit share in Figure 7.7. Thio argues that the share of *all* wages and salaries, which additionally include the wages of sales and administrative personnel, is rising. This implies that the share of the residual, that is, of net business income, is falling, solely because of a rising share of circulation and administrative costs. Elsewhere, he argues that the capital–output ratio shows no trend. Thus the concrete rate of profit falls because of a rising share of nonproduction costs. So he implicitly espouses the argument first advanced by Joseph Gillman (1958).
2. Thio also suggests that the rise in the capacity utilisation measure unadjusted for shift work (that is, in the utilisation of engineering capacity) might be explained by the fact that electrically-driven equipment is utilised better as more experience is gained in using it. But this simply does not fit the facts. As shown in Schurr and Netschert (1960, Table 62, p. 187), electrically-driven equipment was dominant by the 1920s (comprising 82 per cent of total installed hp in manufacturing by 1929). Yet capacity utilisation unadjusted for shift work is essentially stable up to 1939, only jumping to a new stable level after the Second World War. And this jump-pattern corresponds precisely to the pre-war/post-war jump in shift work found by Foss (1984).

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