Determinants of the average profit rate and the trajectory of capitalist economies

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Abstract

The paper investigates the determinants of the average profit rate using the framework outlined by Farjoun and Machover (1983) and developed in Cottrell and Cockshott (2006). A dynamic equilibrium rate is derived that predicts the trend of the average profit rate. Long-run trends in the trajectory of capitalist economies are considered using empirical data from several countries.

1 Introduction

The basic unit of production in a capitalist economy is the firm, which is driven by the profit imperative. The decisions each firm take locally have macroeconomic consequences in terms of the division of value added into profit and wages; changes in prices and employment; investment and the demand it creates; technical change and productivity growth; and accumulation of credit and debt. Therefore *profitability*, i.e. the rate of return on the capital invested, is a crucial variable in the development of capitalist economies.

Since there is a large number of firms earning different rates of profit at any point in time the appropriate method is to model such economic variables as statistical distributions as outlined by Farjoun and Machover [8], in a framework which they call 'probabilistic political economy'. This is further developed by Cottrell and Cockshott [5] who investigated theoretical long-run dynamics of the mean value of the distribution of profit rates.

This paper continues their work and is organised as follows. First we will introduce the profit rate as a random variable and consider its mean value. Then we apply a stochastic labour theory of value in order to understand the macroeconomic significance and limits of the mean value. Finally its dynamics are investigated by deriving a dynamic equilibrium profit rate. Through-out the paper we will use data on some of the leading capitalist economies, but also the rising giants China and India in order to discern general patterns of development of capitalism.

2 Profit rate as a random variable

2.1 Theory

Consider a single firm in an economy. During a given period of time, say a year, it has a capital stock of K_i Euros invested in the form of buildings, machines, equipment etc., and earns an annual profit of P_i Euros *before* deducting payments of interest and taxes etc. Thus the annual profit rate of firm i is

$$R_i = \frac{P_i}{K_i}$$

We will assign each firm an economic weight proportional to its capital, $w_i = K_i / \sum_j K_j$, and model R as a random variable with a continuous probability density function $f_R(r)$ which gives the portion of the total capital in the economy earning a given profit rate.[1] See Figure 1. Let's first

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[1] There are various ways to measure the rate of return on invested capital but $R = \frac{P}{K}$ is a broad measure widely used in the literature. Moreover, for the annual rate of profit, the turnover time of the money-capital advanced in wages is

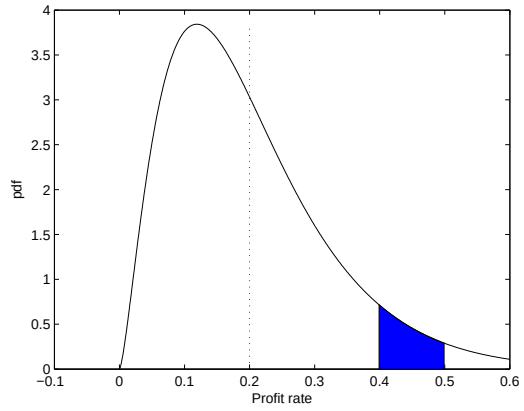

Figure 1: Example of the probability density function $f_R(r)$. Shaded area gives the proportion of the total capital earning a profit rate between 0.40 and 0.50. The dotted vertical line indicates the expected or 'average' profit rate $\mathrm{E}[R]$.

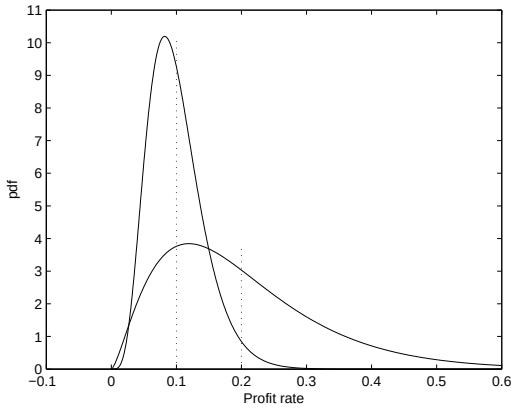

Figure 2: Example: Two different distributions $f_R(r)$ with $\mathrm{E}[R] = 0.20$ and 0.10, respectively. Note the reduction of the dispersion around $\mathrm{E}[R]$.

consider the lower bound of the distribution.

Firms that make a loss will not survive for very long and they tend to be start-ups with relatively small capital stock. Therefore the proportion of capital with $R < 0$ will typically be small, unless the economy is in a state of crisis. Moreover, firms with positive but low profit rates may, after payments for interest, taxes and dividends, also make a loss and go into bankruptcy. Thus the probability of bankruptcy increases rapidly as one approaches $R = 0$.

It follows that the dispersion of the distribution should decrease when $\mathrm{E}[R]$ approaches 0. A simplified example is given in Figure 2, but does not describe the process that reduces the dispersion or its social costs for that matter. That would require a more elaborate model of the dynamics of the distribution and the feedback between its first and second-order moments. For now, we maintain a weaker claim that a low $\mathrm{E}[R]$ puts greater pressure on the economic system to reduce the dispersion of $f_R(r)$. If more firms are pushed out of business, the *proportion* of total capital in the low profit rate bracket is reduced, thereby contributing to raising $\mathrm{E}[R]$. Note that even for very low $\mathrm{E}[R]$, there may still be a large fraction of capital earning high profit rates.

Since we are abstracting from the interconnection between firms we are unable to predict how changes in one sector of firms affects $f_R(r)$. For instance, increasing competition in one sector of firms may result in price cutting and lower profitability but raise profitability in those sectors which use its output as input. Conversely, rising prices may raise profitability in one sector at the expense of others.

Farjoun and Machover [8, ch. 3] hypothesised that the distribution in real economies is approximated by a gamma distribution, examples shown in Figure 2. Their motivation comes from statistical mechanics where the distribution of speed of the molecules in a gas in thermal equilibrium belongs to the class of gamma distributions. An isolated thermal system consists of a large number of uncoordinated particles that interact under a constraint on the total kinetic energy. This resembles firms operating in a capitalist economy. In economic systems, social labour can be seen as analogous to energy; during any given period of time there is a limited amount of person hours available which constrains the feasible net product and thus total profits earned.

An estimation of a distribution in real economies is given in Figure 3, using data from 48 industry sectors. The empirical estimates are right-skewed like gamma distributions. Wells [17] used a data

considered small.

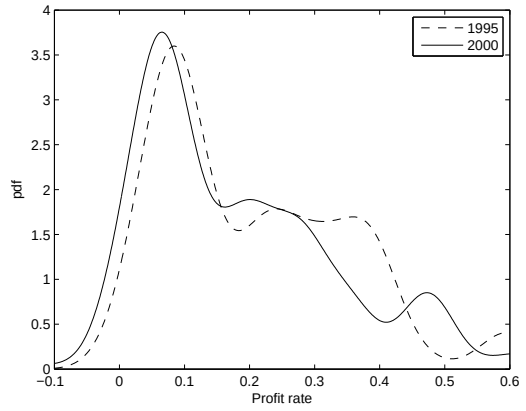

Figure 3: Estimate of empirical distributions $f_R(r)$ in Sweden for years 1995 and 2000. E[R] was 0.231 and 0.203, respectively, and standard deviation decreased from 0.211 to 0.193.

set of over 100,000 firms in the UK, and found the distribution to be right-skewed but with a power-law tail.

In the following we will investigate the macroeconomic constraints on the average profit rate E[R], which equals the ratio of the sum of all profits earned to the total capital in the economy. We begin by introducing some definitions:

Let the vector $\mathbf{n}$ describe the entire collection of goods and services that make up the net product of an economy during a year and $\mathbf{w}$ denote the subset consumed by the entire workforce. Let $\mathbf{k}$ represent all the goods that constitute the total capital stock. We let $\phi(\cdot)$ denote a price operator that maps a vector of commodities to their sum of market prices, so that $\phi(\mathbf{n})$, $\phi(\mathbf{w})$ and $\phi(\mathbf{k})$ are the market prices of the net domestic product (which is the total value added), consumption of the workforce and total capital, respectively. Finally, we denote the profit share of the value added as π. To summarize, the average profit rate can be written as:

$$\begin{aligned} \mathrm{E}[R] &= \frac{\sum_i P_i}{\sum_j K_j} \\ &= \frac{\pi\phi(\mathbf{n})}{\phi(\mathbf{k})} \end{aligned} \tag{1}$$

If we consider a closed economy and assume that the annual *net* savings of the workforce is negligable then[2]:

$$\pi \approx \frac{\phi(\mathbf{n}) - \phi(\mathbf{w})}{\phi(\mathbf{n})} \tag{2}$$

2.2 Empirical data

Our analysis of the average profit rate in the leading capitalist countries requires statistics on the total corporate profits and capital stocks. The data source used in this paper is 'Extended Penn World Tables' compiled by Adalmir Marquetti [11]. It has certain limitations since it does not exclusively cover the capitalist sector; it does not give an explicit estimate of profit-type income and the investment data includes gross residential capital formation, but allows for comparison between countries and will suffice for the trends of the variables.

Average profit rates

Total (net) profits were estimated as follows[3]:

$$\begin{aligned} \text{Profits} = &\text{ Gross Domestic Product} \\ &- \text{Depreciation of Fixed Capital} - \text{Wages} \end{aligned}$$

Total capital stock was taken as the net fixed standardized capital stock, estimated using the Perpetual Inventory Method. See [11] for details. The average profit rates of 8 OECD countries of varying institutional configurations and economic maturity from the mid-1960s to the end of the millennium are shown in Figures 4 and 5.

The trend is clear: the post-World War II boom was followed by a significant decline in average profitability until a turning point, between 1975 and 1983 depending on country, which was followed by a recovery or partial recovery of profitability.

Two countries that stand out are Japan and Italy. The average profit rate in Japan makes a dramatic turn from levels above 30% down to 7.5% during our period of investigation. Italy, on the other hand, not only recovers to its late-1960s levels of about 18% but reaches 25% by the end of the 1990s.

[2]However, this is not a central assumption in the analysis later on, which focuses on the labour-capital ratio that is the upper-bound to the average profit rate.

[3]I.e. the Net Domestic Product *less* Wages.

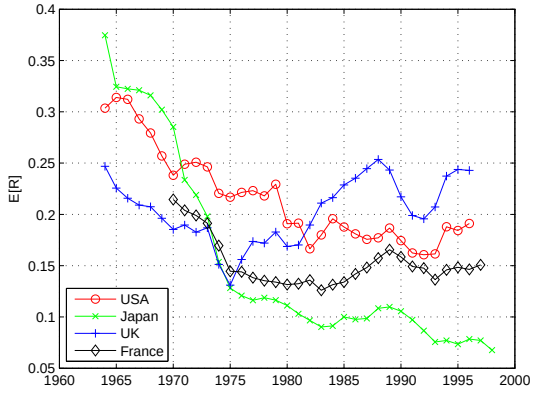

Figure 4: Estimate of average profit rate E[R].

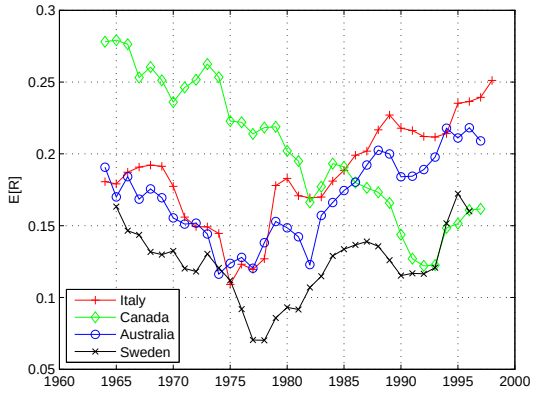

Figure 5: Estimate of average profit rate E[R].

A declining E[R] pushes the distribution of profit rates towards 0 and reduces its dispersion. The crisis of profitability of the mid-1970s resulted in a political and economic restructuring in which the rentier class was able to reassert its interests.[4] There is now a fairly large body of studies that supports this description of the development of advanced capitalist economies after WWII, c.f. [2, 4, 6, 9, 14, 16].

Rate of capital accumulation

The size of the total capital stock, measured in constant dollars, is an indication of the productive capacity of an economy. The average profit rate sets the upper limit to the growth rate of the total capital stock, or 'rate of capital accumulation', which would be reached if all profits were reinvested in production. Moreover, the profit rate is the best predictor of the rate of return that firms expect on new investments. The rate of capital accumulation of a random sample of firms within a low profit rate bracket is therefore likely to be lower than a sample in a high bracket.

The result is shown in Figures 6 and 7. Data is smoothed by a 5-year moving average using the current year and ± 2 years, in order to illustrate the trend. The post-WWII boom was a period of rapid capital accumulation but was drastically slowed down as the average profit rate was declining. Note that in the early 1980s, total investment in the UK failed even to cover depreciation resulting in a negative growth of the total capital stock. This indicates the extent of the decline of its manufacturing sector.

One noticeable fact is that while average profit rates recovered there was no comparable rise in the rate of capital accumulation. The reason is the rise of finance and reassertion of the power of the rentier class: An increasing fraction of profits earned by firms were going as interest payments, dividends and other unproductive expenditure, leaving less to be productively reinvested in the capital stock. [6, 7, 18].

By contrast we compare the rising capitalist economies in China and India, which by virtue of their size have a major impact in the world econ-

[4] This is evident by the deregulation of finance, sharp rise in the real interest rates and the share of rentier income, and a reversal of the downward trend of the share of wealth held by the wealthiest 1% of the households.

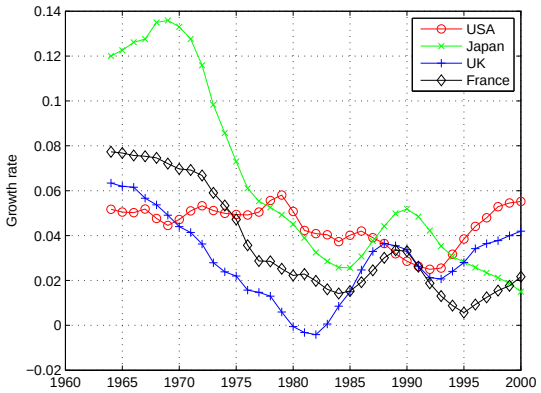

Figure 6: Rate of capital accumulation. For some perspective on the magnitudes here: a variable growing at 1% or 10% per annum will double in about 70 or 7 years, respectively.

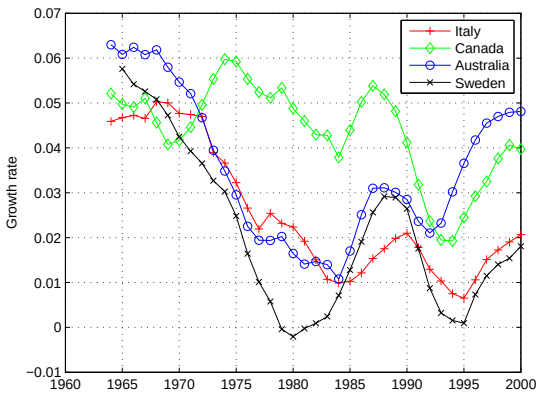

Figure 7: Rate of capital accumulation.

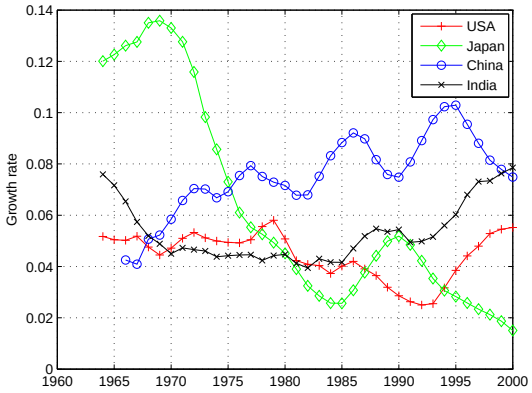

Figure 8: Rate of capital accumulation.

omy. See Figure 8. The difference between the trends of capital accumulation in Japan and China is striking.

GDP growth rates

The long-run growth of the output of an economy is an indicator of its dynamism. Figures 9, 10 and 11 illustrate the trend in the annual growth rate of the Gross Domestic Products. A 5-year moving average filter was applied. It is clear that the levels of economic expansion in the OECD countries have come down since the post-WWII boom. This is partly a result of the slowdown of capital accumulation, since investment constitutes a significant part of the demand that fuels GDP growth and contributes to raising the output per unit of labour.

Under varying degrees of state-led industrial development, rising capitalist economies could achieve rapid capital accumulation, high growth rates and low unemployment but they could not prevent the decline in profitability.

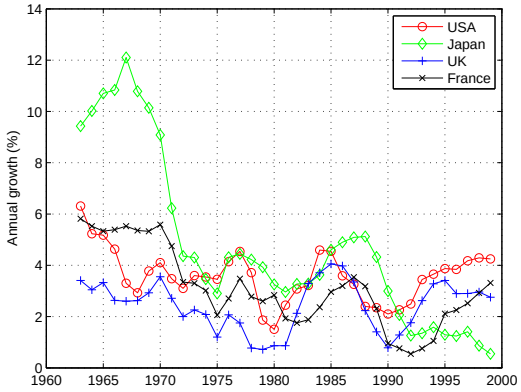

Figure 9: Trend of GDP growth.

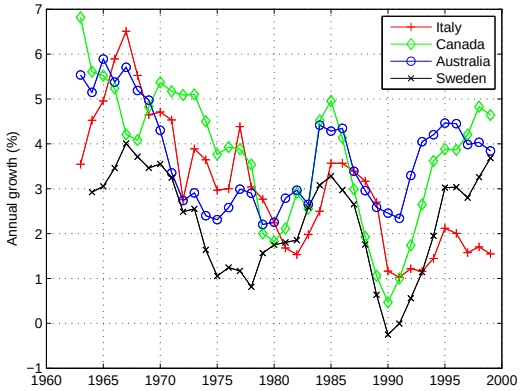

Figure 10: Trend of GDP growth.

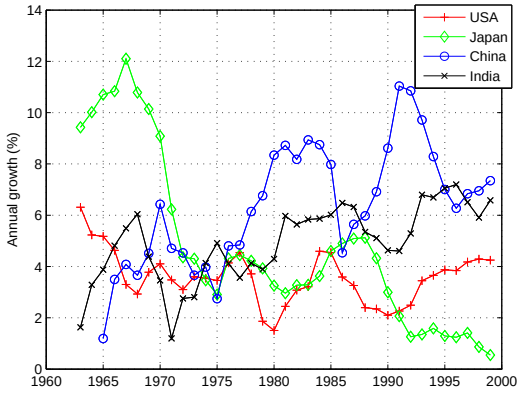

Figure 11: Trend of GDP growth.

3 Applying a stochastic labour theory of value

3.1 Theory

The labour theory of value[5] states that social labour is the basis of economic value. In its stochastic form, developed most rigorously by Farjoun and Machover [8, ch. 5], it predicts that market prices of commodities will be correlated with the quantity of social labour necessary to reproduce them. This prediction was subsequently confirmed by several studies, c.f. [12, 13, 3, 15, 19]. We will apply the labour theory of value in order to produce a very good approximation of $\mathrm{E}[R]$ as given in eq. (1).

Let $\psi(\cdot)$ denote the labour-value operator that maps a vector of commodities to the quantity of social labour necessary to reproduce it under existing standard conditions and define the labour-value estimator of $\mathrm{E}[R]$ as

$$r \triangleq \frac{\rho\psi(\mathbf{n})}{\psi(\mathbf{k})} \tag{3}$$

where $\rho = \big(\psi(\mathbf{n}) - \psi(\mathbf{w})\big)/\psi(\mathbf{n})$.

To show this, we need to introduce

$$\Psi_i = \frac{\phi(i)}{\psi(i)}$$

[5] Its historical roots go as far back as to the 12th century Arab scholar Ibn Khaldun and to the classical political economy of Adam Smith, David Ricardo and Karl Marx in 18th and 19th century Britain.

the ratio of market price to labour-value of commodity i from the set of all commodity transactions during a period, say, a year. Each transaction is assigned an economic weight $w_i = \psi(i)/\sum_j \psi(j)$ and Ψ is modelled as a random variable.

Consider a random sample of commodities $\mathbf{c}$. The ratio $\phi(\mathbf{c})/\psi(\mathbf{c}) = \sum w'_j \Psi_j$, where w'_j is the sample weight of commodity j, approaches $\mathrm{E}[\Psi]$ as the size of the sample increases. Thus for ratios with extremely large numbers of commodities, such as $\phi(\mathbf{k})/\psi(\mathbf{k})$ and $\phi(\mathbf{n})/\psi(\mathbf{n})$, we hold $\mathrm{E}[\Psi]$ as an excellent approximation.

If we multiply the numerator and denominator of ρ by $\mathrm{E}[\Psi]$ we see that it is approximately the profit share π in eq. (2). Similarly, if we multiply the numerator and denominator of $\psi(\mathbf{n})/\psi(\mathbf{k})$ by $\mathrm{E}[\Psi]$ it is clear that $r \approx \mathrm{E}[R]$. The economic meaning of eq. (3) becomes clear of we use worker-years, i.e. the number of workers working for a year, as the unit of labour-value.

Thus $\psi(\mathbf{k})$ equals the number of worker-years required to reproduce the total capital under existing standard conditions of production, which we will write as k for notational simplicity. Similarly, $\psi(\mathbf{n})$ equals the number of worker-years for producing the entire net product of one year. By definition this is the total number of employed workers, which we will denote as n. Therefore ρ is the fraction of surplus labour. To summarize, the approximation of $\mathrm{E}[R]$ is expressed as

$$r = \frac{\rho n}{k}$$

Since the profit share is bounded, so is $\rho \in (0, 1)$ but in fact varies in a narrower band than that. Thus the upper bound to the average profit rate is n/k, i.e. the ratio of the number of workers employed in capitalist firms to the size of the total capital stock in terms of labour-value. In other words, the distribution of profit rates is constrained by material factors.

3.2 Empirical data

Profit share

We have taken ρ to be approximately equal to the profit share of net value added and plot the variable in Figures 12 and 13. With rapid capital accumulation there was a high demand for labour-power

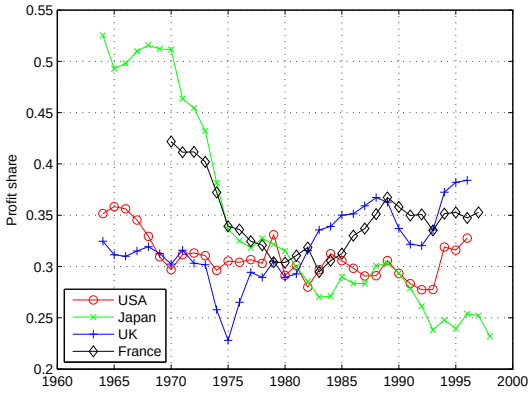

Figure 12: Approximation of ρ.

and even labour shortages in some sectors, which drove up real wages. Low unemployment, in turn, strengthened the bargaining power of trade-unions. The result was that real wages increased faster than the net product during certain periods.[6]

The decline in ρ and its subsequent reversal was highly dependent on the political-economic configuration of each country. But the sharp rise in unemployment rates is indicative: during the period 1965-1974 it was 4.6% in the US but had risen to 7.7% during 1975-1984. In Europe it was 1.8% rising to 6.1% for the same periods [6, p. 45].

Labour-capital ratios

The labour-capital ratio n/k is the upper bound to $\mathrm{E}[R]$ and will rise or fall depending on whether the workforce grows faster or slower than the total capital stock (in terms of labour-value)[7]. The ratio is shown in Figures 14 and 15. We see that it is precisely in the period of rapid capital accumulation that the total capital stock has grown faster than the workforce which depressed the labour-capital ratio.

[6] The depressing effect on the profit share was exacerbated by rising material costs outside the OECD countries and increasing employment in unproductive sectors such as finance and the arms industry which are a drain on the productive sectors.

[7] $\psi(\mathbf{k})$ can be estimated by dividing the total capital stock in terms of money $\phi(\mathbf{k})$ with $\mathrm{E}[\Psi]$ which was taken as the net value added per worker-year.

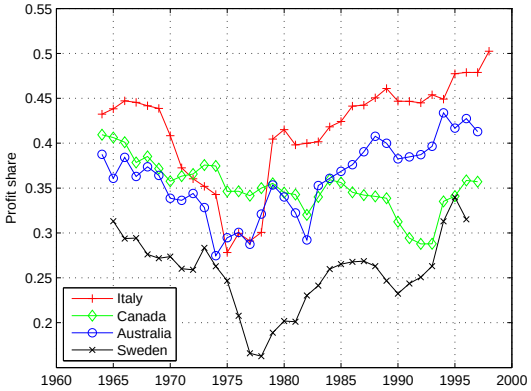

Figure 13: Approximation of ρ.

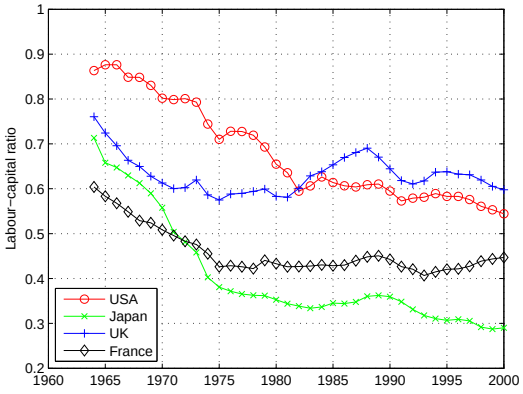

Figure 14: Ratio of labour to capital stock in terms of labour-value, n/k.

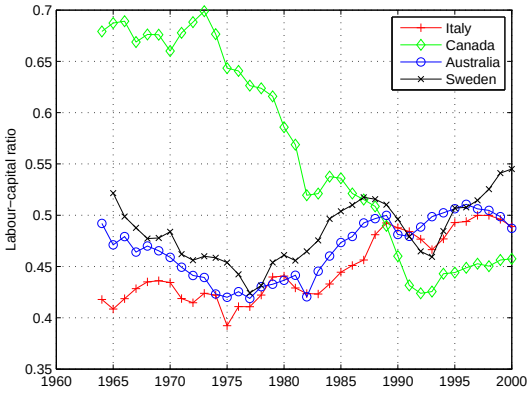

Figure 15: Ratio of labour to capital stock in terms of labour-value, n/k.

Figure 16 compares the labour-capital ratios of the rising giants. It is worth noting the levels of the curves. In 1965 both China and India start out at much higher labour-capital ratios, reflecting their level of industrialisation. This also means that the upper bound on E[R] is very high. In China capital accumulation has been so rapid that it has outpaced the growth of the workforce, narrowing the gap to the labour-capital ratio of the US.

4 Dynamics of the average profit rate

4.1 Theory

In this section we will use the ideas of Cottrell and Cockshott [5] to analyse the dynamics of E[R] which is constrained by factors of employment and capital accumulation.

Let us begin by taking the time-derivative of the labour-value estimator of the average profit rate $r'(t)$. For the moment will abstract from the distributional conflict over the net value added, assuming that ρ is constant. The justification for this is that ρ is strictly limited between 0 and 1, therefore the growth of this variable is bounded in time: it can be either a transient or an oscillatory factor. Then

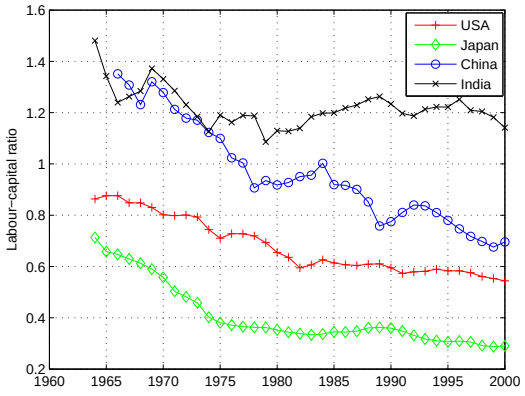

Figure 16: Ratio of labour to capital stock in terms of labour-value, n/k.

the relative growth of $r(t)$ becomes

$$\frac{r'(t)}{r(t)} = \frac{n'(t)}{n(t)} - \frac{k'(t)}{k(t)} \tag{4}$$

where $n'(t)$ is simply the net increase in the number of workers per unit of time and so $n'(t)/n(t)$ is the growth rate of the workforce g_n.[8]

We proceed to analyse $k'(t)$ more carefully. It is the net increase in the labour-value of the capital stock per unit of time. Let $\mathbf{i}$ denote the net flow of goods into the capital stock; after gross investment and goods used up in production or destroyed. Another factor is the reduction of the labour necessary to reproduce the current capital stock. We will assume that it is well approximated by the average growth rate of the productivity of labour g_ψ. Thus we can write

$$\begin{aligned} k'(t) &= \psi(\mathbf{i}) - g_\psi k(t) \\ &= i\Big(r(t)k(t)\Big) - (g_\psi + \delta_k)k(t) \end{aligned} \tag{5}$$

where $\psi(\mathbf{i})$ has been split into gross investments, expressed as a fraction i of the labour-value of the surplus product $r(t)k(t)$, and depreciation as a fraction δ_k of the capital stock $k(t)$.[9] Now we can insert eq. (5) into (4) and get

$$\frac{r'(t)}{r(t)} = g_n - ir(t) + g_\psi + \delta_k$$

In steady-state $r'(t) \equiv 0$, re-arranging the equation above one finds the average profit rate at equilibrium:

$$\bar{r} = \frac{g_n + g_\psi + \delta_k}{i} \tag{6}$$

Note that this holds for *any* valid distribution of the net product between profit and wages and since ρ is bounded no changes in it can make $\mathrm{E}[R]$ diverge from the equilibrium rate $\bar{r}$.

4.2 Empirical data

In this section we will see how the growth rate of the workforce employed by capitalist firms, g_n, average productivity growth, g_ψ, and gross investments, expressed as the fraction i, have determined $\bar{r}$ and thus the trajectory of $\mathrm{E}[R]$. g_ψ was estimated as the growth of net output per worker, i was taken as the fraction of net profits and g_n as the growth rate of total employment. In order to suppress cyclical variations, the variables were smoothed with a 5-year moving average using the current year and ± 2 years.

The equilibrium profit rate

Two examples will illustrate the factors governing the average profit rate in mature capitalist economies. Consider Figures 17 and 18. $\mathrm{E}[R]$ follows the equilibrium rate quite closely, lagging by approximately two years.

The additional curves illustrate the effect of a growing working population and productivity. The dashed curve depicts the equilibrium rate if there was zero growth of the workforce, $g_n = 0$. In the US, g_n contributed to raising the equilibrium rate by 2-3 percentage points, whereas employment in Japan has been stagnant. In 1965, g_ψ alone contributed to raise the equilibrium rate in Japan by more than 10 percentage points. But the long-term

[8] If we relax the assumption $\rho(t) \equiv \rho_0$ and let it vary in time, then $\frac{r'(t)}{r(t)} = \frac{\rho'(t)}{\rho(t)} + \frac{n'(t)}{n(t)} - \frac{k'(t)}{k(t)}$, but the relative growth, $\frac{\rho'(t)}{\rho(t)}$, is clearly either a transient or an oscillatory term.

[9] Since the surplus product excludes depreciation but gross investment includes it, the fraction i can exceed 1, but remains strictly positive.

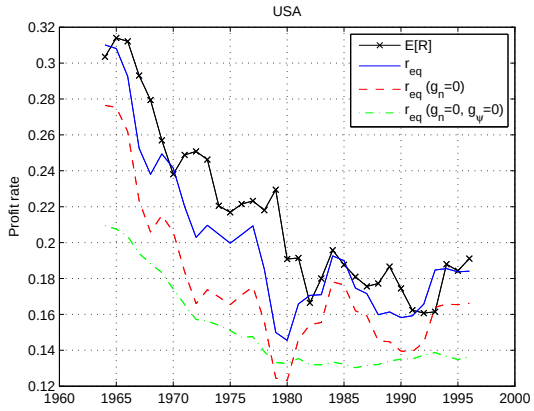

Figure 17: The average profit rate and the equilibrium rate in USA. The impact of growth of workforce and productivity is shown. Note that if $g_n = 0$ and $g_\psi = 0$ then there is zero growth of the net product.

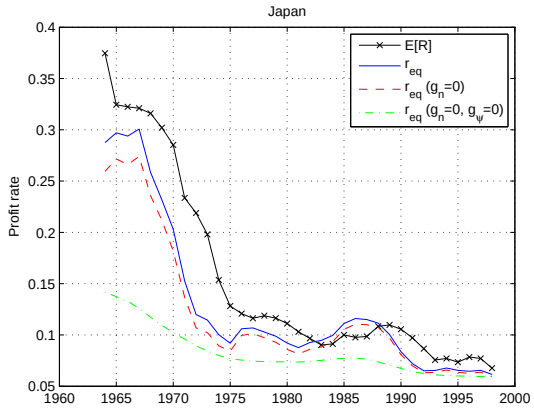

Figure 18: The average profit rate and the equilibrium rate in Japan. The growth of the workforce has negligible effect on the equilibrium rate.

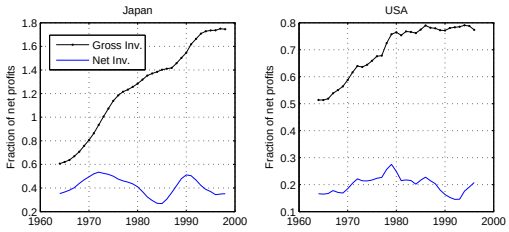

Figure 19: Gross and net investments as a fraction of net profits. The growing gap between the curves indicates that gross investments are increasingly going to cover depreciation, i.e. the part of the capital stock used up in production. Note the difference in the level of net investments in both countries.

effect of the slowdown of the rate of capital accumulation on g_ψ is evident.

If the working population is stagnant it is essentially the combination of i and g_ψ that determines the trajectory of E[R]. As Figure 19 shows the evolution of i has not been favourable in the US and Japan: gross investments are increasingly going to replacement of relatively short-lived capital equipment rather than the expansion of the capital stock [1].

This illustrates the contradictory effects of capital accumulation on profitability. When firms reinvest their retained profits in their capital stock in order to raise efficiency and beat competitors, they contribute to raise g_ψ but also i which have opposite effects on the distribution of profit rates, as we know from eq. (6).

Figures 20 and 21 show that the trajectory of E[R] in the leading capitalist economies from the mid-1960s to the end of the millennium can be explained by the evolution of the equilibrium rate $\bar{r}$. By this period g_n had little or negligible effect on $\bar{r}$, rather it was upheld by g_ψ. But a slowdown of productivity growth while the fraction of investments was high or rising, lowered the equilibrium rate with depressing effects on capital accumulation, GDP growth and employment indicated in the previous section.

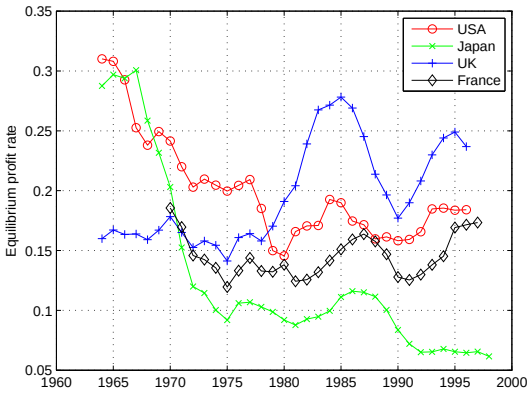

Figure 20: Equilibrium rate $\bar{r}$. The boost in the UK during the 1980s came from a rise in productivity growth following the wearing down of the manufacturing sector, which lowered gross investments.

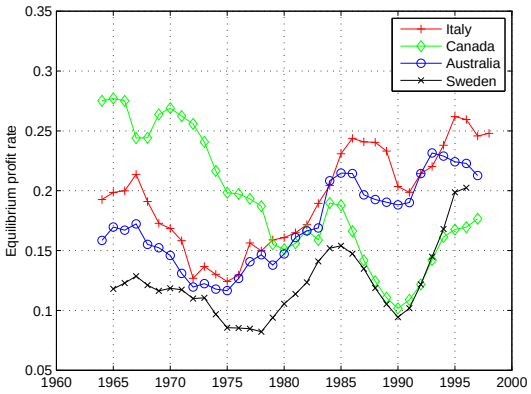

Figure 21: Equilibrium rate $\bar{r}$.

Long-run trends

The equilibrium rate

$$\bar{r} = \frac{g_n + g_\psi + \delta_k}{i}$$

predicts trends in the distribution of profit rates and hints some general patterns of development of capitalist economies.

Once large reserves of cheap labour-power are opened up to employment in capitalist firms, the growth of the workforce can sustain a distribution with high rates of profit. The profits retained by firms, after interest payments and dividends, are invested in fixed capital with the aim of increasing productivity. Under rapid capital accumulation the demand for labour will rise even faster.

But the workforce cannot grow at a higher rate than the population for long. Moreover, the size of the population stabilizes as health and sanitation conditions are improved and the economy industrialises; which raises the child survival rate but also the net cost of rearing children. Sooner or later the reserves of labour-power begin to deplete: the demand for labour begins to exceed supply in various sectors; real wages rise and the bargaining position of workers improve, with political consequences that follow. The downward trend of the growth of the workforce in advanced and industrialising economies can be seen in Figure 22 and Table 1. In several advanced capitalist countries this trend is exacerbated by ageing or declining populations.

At this point it is a high growth of productivity that sustains the distribution of profit rates at high levels. Figure 23 illustrates the trends in this variable. But if the growth of the capital stock outpaces the growth of the workforce, the distribution of profit rates is depressed. This contradictory combination of investments and productivity growth is captured in the equilibrium rate. Either capital accumulation slows down or the distribution is further depressed until a significant fraction is unable to meet interest payments and dividends, producing a restructuring crisis with unpredictable outcome. In either case the rate of capital accumulation by firms under a class of rentiers—i.e. the productive expansion of a capitalist economy—reaches its limits.

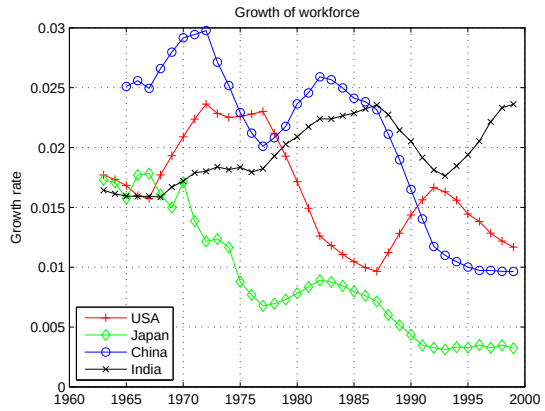

Figure 22: Growth rate of workforce. The US owes much of its growth to a high level of net immigration. By contrast Japan is one of the most restrictive developed countries. The Indian population growth has remained high, but in China a stabilising population in conjunction with rapid capital accumulation has resulted in a downward trend on the growth of the workforce.

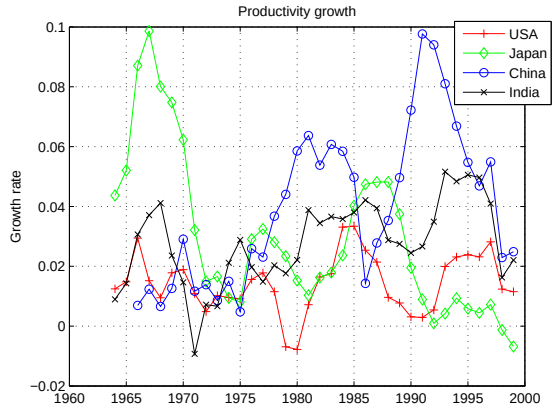

Figure 23: Growth of productivity. The long-run trends are mirrored in the trend of rates of capital accumulation (Figure 8).

Table 1: Estimated annual growth rate of population g_p, workforce g_n and productivity g_ψ in %, during the period 1997-2007. Note that in each region capitalism exists to a varying degree. In the advanced economies and East Asia, the growth of the workforce is now constrained by declining population growth. There is still a sharp contrast between East and South Asia. Source: ILO [10].

	g_p	g_n	g_ψ
Developed Economies and European Union	0.7	0.7	1.6
Eastern Europe (non-EU) and CIS	0.7	0.6	4.1
East Asia	1.3	1.0	6.4
South-East Asia and Pacific	1.9	2.5	1.4
South Asia	2.2	2.4	3.6
Latin America and the Caribbean	1.8	2.4	0.6
Middle East	3.0	4.9	-0.2
North Africa	2.4	3.3	1.4
Sub-saharan Africa	2.6	3.0	1.1

5 Conclusion

We have investigated the movement of the mean value of the distribution of profit rates and its effects on the development of capitalist economies. This value is determined by the share of the net product going as profit and the labour-capital ratio. The latter rises or falls depending on whether the workforce grows faster or slower than the total capital stock (in terms of labour-value).

Focusing on this aspect a dynamic equilibrium profit rate was derived that acts as an attractor for the average profit rate, predicting its long-run trend. Given data on technical change, investment decisions and demography it sets the conditions in quantitative terms for when there is tendency for the average profit rate to rise or fall, irrespective of the division of the value added between profits and wages. The predictions of the theory are more precise than most of the literature on the average profit rate. Future work ought to test these predictions using more disaggregated data exclusively for the capitalist sector and also investigate the evolution of the dispersion of the distribution of profit

rates in relation to its mean value.

The equilibrium profit rate also predicts some long-run macroeconomic trends as demographic factors in industrialised economies eventually bring down the growth of the workforce to very low or even negative levels. Then reinvestment of profits, which is the source of the tremendous dynamism of capitalism, can no longer be sustained at high levels.

If China and India manage to overcome rising costs of raw materials, environmental degradation and the volatility of the world financial system, the massive capitalist economies in Asia are predicted to follow the trajectory outlined above.

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