An Empirical Investigation Into The UK Profit Rate, 1949-2003

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Abstract

This paper argues for the importance of the Marxian concept of economic crisis and counteracting forces to the tendency of the rate of profit to fall in contemporary capitalism through empirical research on the UK economy. Mergers and acquisitions, government expenditure, capital goods export, capital goods imports (EU as the main partner of the UK trade) emerged from this investigation as influenced by the rate of profit. Mergers and acquisitions and government expenditure have not previously been considered as counteracting forces within the Marx's approach.

This study comprises the first use of VARs time series analysis with diagnostic tests, using Granger causality Wald tests, on an analysis of the UK economy using Marxian variables. There was an early attempt by Glyn and Sutcliffe (1972) discussing about the profit squeeze, and using different measures for the rate of profit, but this did not contain any substantial econometric analysis or estimating any counteracting forces. A major obstacle in any estimation of Marxian variables is data availability and a lack of clarity and consistency in HMSO publications, and the work in this study to present consistent data in these terms will be valuable for any future research in this area. In estimating the variables concerning the rate of profit variables in production industries and counteracting forces, I have used the money expression of value, or money terms in current prices.

The significance of government expenditure as a counteracting force to the tendency of the rate of profit to fall highlights the importance of unproductive capital in Marxian analysis of crisis. Government expenditure is mainly a form of unproductive capital, and therefore growth of government expenditure affects the productivity of the economy. Unproductive labour has been the focus of a lot of analysis and literature amongst the Marxist economists but not enough emphasise has been put on the role of unproductive capital.

The study supports the view that capitalist production is a dynamic process in which the tendency of the rate of profit to fall as a form of economic crisis could find some counteracting forces to offset this tendency for a short period of time and bring about a relative stability; however, this stability does not persist forever, and crisis prevails repeatedly. This demonstrates that Marxian theory provides important insights which can address both economic crisis and growth in its theory of 'the law of the tendency of the rate of profit to fall' and counteracting influences. If we forget this dialectical relationship in the Marxian theory, by over emphasising on one aspect of the argument or the other, the result is likely to be a dogmatic ideology in place of a scientific method of inquiry.

Introduction

The climax of the crisis in the new phase of capitalist development appeared in the form of WWI. As though the catastrophe of the world war was not enough to encourage the liberal economists to revisit and revise their theories, soon-after, they struggled to explain the 1930s Great Depression. Unemployment rose dramatically, real GNP fell, tariff barriers rose, world trade stagnated, stock markets crashed and the rate of profit fell deeper. The economic theories and liberal economists were bankrupt alongside the events of the real economy.

Keynesian macroeconomics reconciled neoclassical economics with the new reality. Keynes (1973) argued that the high unemployment in the UK and other industrialised countries was the result of a deficiency in the aggregate demand due to inadequate investment demand. He argued that once full employment prevailed, allocation would be efficient because of the market economy. Keynes was perfectly prepared for the market economy to solve the problem of resource allocation in microeconomic terms. But, from a macroeconomic perspective, the economy could not guarantee full employment without government intervention. Therefore, his economic policies reflected a combination of both laissez-faire and interventionist philosophy.

Keynesian economics were attacked by both orthodox (conservative) and Marxist (radical) economists. Conservatives argued that Keynes' interventionist ideas and his views on the 'socialisation of investment' with some of the implication of his philosophy for taxation and fiscal policy would bring him close to egalitarianism. On the other hand, Marxists rejected Keynes's economics and his policy remedies as the last attempt to save capitalism from imminent collapse.

Despite their differences, and although classical political economists, marginalists and Keynesians talk about business cycles, it seems to me that they have fundamentally nothing to offer about the slump which leads to the collapse of the system of capitalist production. According to their economic models, if a slump happens and brings about disequilibrium in the economy, either the invisible hand of the market or government intervention would bring about general equilibrium. By contrast economic crisis is central to Marxian conception of

capitalism, seeing crisis as fundamentally inherent part of a capitalist system of production that eventually leads to the collapse of the system of commodity production.

The omission from modern economics of a serious consideration of economic crisis is all the more difficult to justify because the phenomenon of crisis is persistent and repetitive on a growing scale. From the collapse of the gold standard and the Bretton Woods system, through the dollar crisis of the 1980s, the third world debt crisis, the Asian Economic Crisis, the Mexican, Russian and Argentine defaults through to the current global financial crisis, the immense disruptions to economic activity are not easily avoided. Yet modern economics tends to treat these as isolated exogenies.

It is because Marxian economics does treat these major events as inherent features of capitalism that this study explores Marx's theory of economic crisis in detail. In the first place, I consider the relevance of Marx's own writing on 'the law of the tendency of the rate of profit to fall' in light of subsequent criticisms. Then I test Marx's theory on the development of the UK economy since WWII, first considering manufacturing industries in terms of Marxian categories. After finding some inconsistencies within Marx's theory of the falling rate of profit with regard to the UK economy, I use an alternative approach by extending his theory to production industries in general, which gives more plausible results; that is, the rate of profit comes to a relative stability, especially after 1991. Next evidence of counteracting forces against 'the law of the tendency of the rate of profit to fall' is considered. The new counteracting forces are proposed in the light of the new era of monopoly capitalism: mergers & acquisitions, government expenditure and intervention, European integration and globalisation. These forces are estimated empirically and statistically tested against the UK rate of profit in production industries.

I. Productive and Unproductive labour in brief

As my main starting point has been to estimate Marxian variables in relation to the production sphere, I have mainly concentrated on this aspect of capitalist mode of production. This study tries to analyse the production sphere, which is fundamental to Marxian economics in terms of labour process and creation of surplus value. Marx (1864a) argues that productive labour is "consumed directly in the production process for the purpose of valorising capital." Then he criticises those who cannot distinguish between productive labour and unproductive workers:

> narrow-minded bourgeois, who ..., can confuse the question of what are productive labour and productive workers from the standpoint of capital with question of what productive labour is in general, and can therefore be satisfied with the tautological answer that all that labour is productive which produces, which results in a product, or any kind of use value, which has any result at all. Marx (1864a)

In my research, I have tried to use productive labour from the standpoint of the labour process, "of productive consumption of labour capacity" according to Marx (1864a), which is consumed directly in the capitalist production process. Having said that, although commercial wage-workers, who operate in the sphere of distribution, are wage-labourers and are exploited by the merchant capital, do not directly create surplus value, they are used to materialise the surplus value created in the production process in the sphere of production. Therefore, I excluded them in my estimate of the productive labour.

Although in my calculation, I could not find data for other productive labour; for example transportation of produced goods to warehouses ; as well as other productive labour extended from the sphere of production to the sphere of circulation. At the same time we have not had data for unproductive labour in the sphere of production, to be excluded from our calculation for example those workers who are engaged in packaging. Therefore, we could assume that unproductive labour in the production sphere would cancel out those productive workers in the circulation sphere. Although there might be some discrepancies, it could not have a

significant effect on our estimates of the profit rate. Therefore, in our empirical research manufacturing and in the first place production industries take the centre stage for our calculation of the productive labour.

II. Marxian profit rate categories, counteracting forces variables and national accounts

My mapping of the Marxian rate of profit categories to the national statistics data is as follow, if each line corresponds to a variable then we have:

Line 1 Wages of operative workers = v
Line 2 Gross domestic fixed capital formation = Constant capital
Line 3 Circulating capital (materials plus fuels)
Line 4 Net Output = New value= Gross Output - (materials plus fuels + amount paid for work given out) = Wages, salaries, rent, rates and taxes, advertising and other selling expenses and all other similar charges have to be met, as well as depreciation and profits.
Line 5 Total constant capital = (Line 2 + Line 3) = c
Line 6 Total surplus value = (Line 4 – Line 1) = s
Line 7 Organic composition of capital = (Line 5 ÷ Line 1) = c/v
Line 8 Rate of exploitation = (Line 6 ÷ Line 1) = s/v
Line 9 Rate of profit (Line 6/(Line 5 + Line 1)) = s/(c+v) = r

For explicit mapping of those empirical measures to the theoretical Marxian categories, see Appendix B: Table 1.

Having said that, even finding data for variable capital was not accessible from one source only. As there was discontinued after a while or not available at all. Therefore, I had to use different national accounts in order to find consistent data.

Because of the major restructuring of the UK economy during the period including the decline of manufacturing, the classical centre of production, I derived a second, alternative set of data, estimating the variables in production industries (manufacturing plus energy and water supply industries), from 1949 to 2003. Having said that, publication of Census of Production ceased in early 1990s as the UK national accounts moved towards the new European System of Accounts. Therefore, not all necessary and consistent data was available for manufacturing industries. But even if we could find the continuation of the same data, it would not have changed the main results and conclusion as we discussed above.

Data on counteracting forces were likewise collected from official statistics in the following manner. Mergers and Acquisitions in terms of their values (concentration ratio), which is in terms of the market value of mergers or their current prices. As well as estimating the effect of UK trade with the EU, total exports (globalisation) and government expenditure on the rate of profit of production industries.

I came across some problems with data availability for M&A (Values), as it only accessible from 1969 from the ONS publications. Furthermore, it does not explain the type of merger activity as to be horizontal, vertical, conglomerate or lateral integration. Therefore the sample size is not very big and it can affect our statistical results, especially using time series estimates. Having said that, I collected data for the bankruptcies of the UK companies from the Annual Abstract of Statistics from 1949 up to 2003. For making the data consistent with other available data for the other variables, I estimated them from 1970 to 2003.

Data for the UK total imports and exports to the world, capital goods trade as well as her import and export from or to the European Union, has been taken from the Annual Abstract of Statistics for the years 1949–2003. I have also extracted data from the Blue Book for the UK government expenditure for the same period of time.

I have used ONS publications, Annual Abstract of statistics, and the Blue Book for M&A (values or in money terms), UK import/export trade to EU and government expenditure respectively. There was not data available with regard to M&A (values), prior to 1970. Therefore, I had to estimate all those variables from 1970 rather than from 1949, that means less observations for our estimates, which would affect our results, especially when estimating time series variables the more observations we have the better it is.

Because the dependent variables of interest are ratios (ROP, OCC, ROE), I calculated the countertendency variables as ratios too. These are EU exports/total output, EU imports/total output, government expenditure/total output, sales of 100 largest companies/total output (as a proxy for M&A). Furthermore, I tested the effect of the inflation rate and total exports/output (as a proxy for globalisation).

III. Data Analysis

Annual estimates of the principle Marxian ratios of rate of profit (s/(c+v)), rate of exploitation (s/v) and organic composition of capital (c/v) were calculated from the data series collected. In order to find if there is a link between the derived estimates of the rate of profit and the organic composition of capital or rate of exploitation, I ran a regression against those variables in manufacturing and production industries, first testing for unit roots and stationarity of the variables with Autoregressive, first order (AR(1)) and Augmented Dickey-Fuller (ADF) tests.

The Augmented Dickey-Fuller test for stationarity of a time series, for example Y_t , starts with the estimation of a regression equation without a linear trend as follows:

$$\Delta Y_t = \propto_0 + \propto_1 Y_{t-1} + \sum_{j=1}^{p} \gamma_j \Delta Y_{t-j} + \varepsilon_t .$$

If we add a linear trend to the regression equation, we get:

$$\Delta Y_t = \propto_0 + \propto_1 Y_{t-1} + \propto_2 t + \sum_{j=1}^{p} \gamma_j \Delta Y_{t-j} + \varepsilon_t .$$

The series is said to have a unit root and is nonstationary if $\propto_1 = 0$. However, if the $H_0 = 0$ is rejected for one of the two equations, it can be said that the time series does not have a unit root and is stationary or is integrated of order zero. The other two parameters, namely $\propto_0$ and $\propto_2$ are to test for the presence of drift and trend components respectively. However, the Augmented Dickey-Fuller for unit root tests, it has been criticised by Maddala and Kim (1998: 45,145) as being a weak test and should not be used in practice, so I rely primarily on the Autoregressive test.

By definition if a series has time-invariant mean, variance and serial correlation, this is called a stationary series or is integrated of order of zero, I(0). However, if a nonstationary series becomes stationary after being differenced once, then the series is said to be integrated of order, i.e. I(1).

In addition if two series are both I(1) and a linear combination of them is stationary, then we would say that the two series are cointegrated. I carried out both DW and ADF tests for our multiple regression models, which was going to be used later in an econometric model. Although error correction models are closely related to the notion of cointegration, by doing

the above tests, they could indicate as to what models to be used for our estimates of variables in a long term.

I then extended the regression model to test for the effect of the counteracting forces thought likely to be present in the contemporary UK context.

I ran regression of the rate of profit, rate of exploitation and organic composition of capital on those simple secondary data to find out empirically if there is any significant effect on those indigenous variables. Although theoretically in a time series analysis of data we are concerned about the relative changes in data not the absolute changes, here for the sake of comparing the results and showing how different estimates could have different outcomes, which could affect our interpretation of the statistical estimates and therefore our economic theories. First of all I started with the first set of data as an absolute numbers and ran the following equations:

ROP = $b_0 + \boldsymbol{b_1}[M\&A]_t + \boldsymbol{b_2}[\boldsymbol{UK\ Export}]_t + \boldsymbol{b_3}[\boldsymbol{UK\ Import}]_t + \boldsymbol{b_4}[\boldsymbol{Gov.Exp}]_t + \boldsymbol{e_t}$

ROE = $b_0 + \boldsymbol{b_1}[M\&A]_t + \boldsymbol{b_2}[\boldsymbol{UK\ Export}]_t + \boldsymbol{b_3}[\boldsymbol{UK\ Import}]_t + \boldsymbol{b_4}[\boldsymbol{Gov.Exp}]_t + \boldsymbol{e_t}$

OCC = $b_0 + \boldsymbol{b_1}[M\&A]_t + \boldsymbol{b_2}[\boldsymbol{UK\ Export}]_t + \boldsymbol{b_3}[\boldsymbol{UK\ Import}]_t + \boldsymbol{b_4}[\boldsymbol{Gov.Exp}]_t + \boldsymbol{e_t}$

The regressions were tested for cointegration using the Durbin-Watson test by Ramanathan (1995: 454-5). In a general form we have a multiple regression model such as:

$Y_t = \beta_1 + \beta_2 X_{t2} + \beta_3 X_{t3} + \cdots + \beta_k X_{tk} + u_t$

$u_t = \rho u_{t-1} + \varepsilon_t \qquad -1 < \rho < 1$

In order to find out whether a dependent variable may be cointegrated with an independent variable, we need to test if two or more variables are cointegrated. Estimating the model by OLS and computing the residuals $\hat{u}_t$ *as*:

$Y_{t-} \hat{\beta}_{1-} \hat{\beta}_2 X_{t2} - \hat{\beta}_3 X_{t3} - \ldots - \hat{\beta}_k X_{tk}$.

Then Durbin-Watson statistic is:

$$d = \frac{\sum_{t=2}^{t=T} (\hat{u}_t - \hat{u}_{t-1})^2}{\sum_{t=1}^{t=T} \hat{u}_t^2}$$

Now from the estimated residuals we can obtain an estimate of the first-order serial correlation coefficient as follow:

$$\hat{\rho} = \frac{\sum_{t=2}^{t=T} \hat{u}_t \hat{u}_{t-1}}{\sum_{t=1}^{t=T} \hat{u}_t^2}$$

Therefore DW statistic d is roughly equal to 2(1 – $\hat{\rho}$), or d≈ 2(1 – $\hat{\rho}$). If ρ is 0, then d = 2. As a result, a DW statistic of approximately 2 means that there is no first-order serial correlation. If ρ is close to 1, it indicates a strong positive autocorrelation, and if ρ is close to -1, it shows a strong negative serial correlation.

In addition, I did correlograms for AR(1) model for our variables to determine how correlated the error terms (u_t) are to the past errors (u_{t-1}, u_{t-2}, $\cdots$). We need to define our autocorrelation function as expressed by Ramanathan (1995: 624):

r(s) = Cor(u_t, u_{t-s}) = $\frac{Cov(u_t, u_{t-1})}{Var(u_t)} = \frac{E(u_t\ u_{t-s})}{E(u_t^2)}$

r(s) = ρ^s is the correlation coefficient between u_t and u_{t-s} for values of s from 0 to t-1. We need to take into account that r(s) is independent of t and if $|\rho| < 1$, then the variance of u_t will be finite.

The results from unit roots and cointegration tests as well as correlograms would allow us to choose models such as VARs for our econometrics estimates of our variables. A Vector Autoregression (VAR) is the extension of the autoregressive (AR) modelling in which there are several variables under study. An autoregressive model has only one dependent variable, whereas a VAR model has more than one dependent variable, therefore has more than one equation to estimate. Each dependent variable in each equation uses the lags of itself and all other variables under investigation as its explanatory variables, and possibly a deterministic trend. In general we have the following VAR(ρ) model with X, Y and Z variables:

$Y_t = \propto_1 + \delta_1 t + \emptyset_{11} Y_{t-1} + \cdots + \emptyset_{1p} Y_{t-p} + \beta_{11} X_{t-1} + \cdots + \beta_{1p} X_{t-p} + \delta_{11} Z_{t-1} + \cdots + \delta_{1p} Z_{t-p} + e_{1t}$;

$X_t = \propto_2 + \delta_2 t + \emptyset_{21} Y_{t-1} + \cdots + \emptyset_{2p} Y_{t-p} + \beta_{21} X_{t-1} + \cdots + \beta_{2p} X_{t-p} + \delta_{21} Z_{t-1} + \cdots + \delta_{2p} Z_{t-p} + e_{2t}$;

$Z_t = \propto_3 + \delta_3 t + \emptyset_{31} Y_{t-1} + \cdots + \emptyset_{3p} Y_{t-p} + \beta_{31} X_{t-1} + \cdots + \beta_{3p} X_{t-p} + \delta_{31} Z_{t-1} + \cdots + \delta_{3p} Z_{t-p} + e_{3t}$;

In VARs models each equation has p lags of all variables plus an intercept and a deterministic trend. In our study we have VAR(**ρ**) model with 11 variables, which can be obtained in a similar way as above. We have ROP (rate of profit), OCC (organic composition of capital), ROE (rate of exploitation), EXP (total export), IMP (total export), ExpToEU (export to EU), ImpFromEU (import from EU), CGExp (capital goods export), CGImp (capital goods import), M&Avalue (merger and acquisition in money terms), and Gov.Exp (government expenditure).

The next step is to use OLS to estimate the coefficients of variables in each equation. The P-values are used to specify as to whether any individual coefficient is significant or not. Finally, I carried out diagnostic tests, using Granger causality Wald tests for the two models.

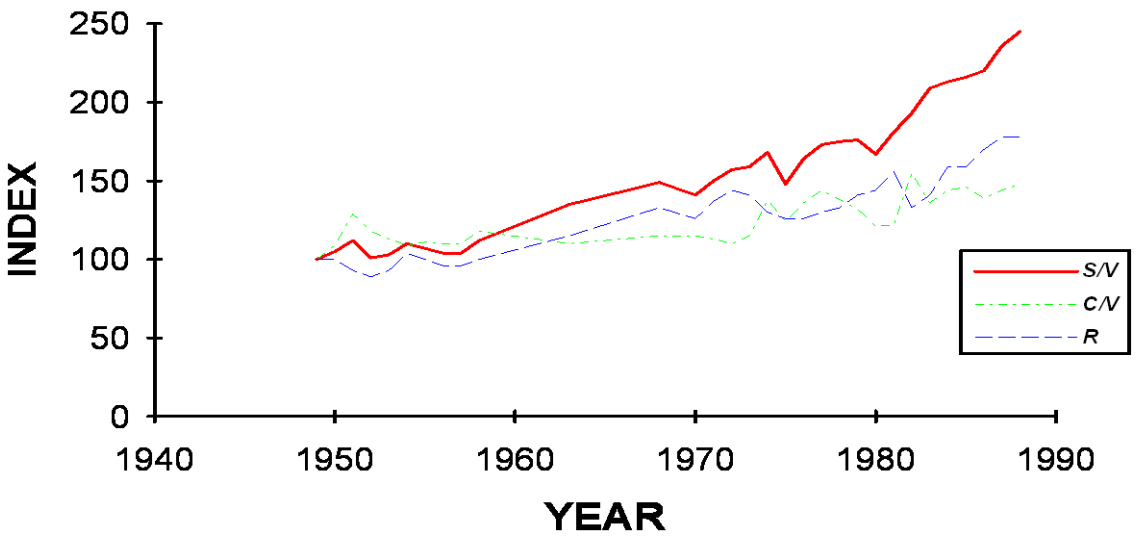
IV. Estimates of the falling rate of profit and counteracting forces in the UK

This section consists of two main parts; the first one presents the results of the empirical estimates that I have carried out for the Marxian profit rate in the context of the UK economy, using the officially published data. It also compares them with that one of Glyn and Sutcliff (1972). The second part analyses the econometrics models that I have used and the results found. Having said that, subdivision one specifically deals with the estimates of the UK profit rate; subdivision two discusses and compares the results with the previous empirical research for the UK mentioned above; subdivision three brings about the controversy surrounding the North Sea Oil and Gas industries, which could have influenced the outcome of our estimates of the profit rate for the UK. Subdivision four puts forward statistical results of AR(1) (Autoregressive(1)) and ADF (Augmented Dickey-Fuller) for unit roots and statioanrity tests; cointegration tests of the variables are revealed in subdivision five. In subdivision six, we discuss and express the results of econometrics estimates, using Vector Autoregressive models; VAR(1) and VAR(2). Afterwards, Granger causality Wald tests for the models are carried out and as a result, we obtain Granger causality circular flow of the rate of profit and counteracting forces, and at the end we conclude our results.

IV.1 Estimates of the ROP

The origin of profit lies in the process of production, according to Marx's theory. Therefore, the sphere of production of commodities is our starting point in order to analyze the mentioned 'law'. Here, we are initially concerned with the manufacturing industries, in order to be consistent with Marx's theory of productive labour, these constitute mainly orders III to XIX Standard Industrial Classification revised 1968, or divisions 2 to 4 SIC revised 1980. (See Appendix: Table1**)**. Figure 1 presents the results of the estimates of the Marxian variables on this basis: s/v, c/v and R = s/(c+v).

Fig. 1 Estimate of variables in manufacturing industries



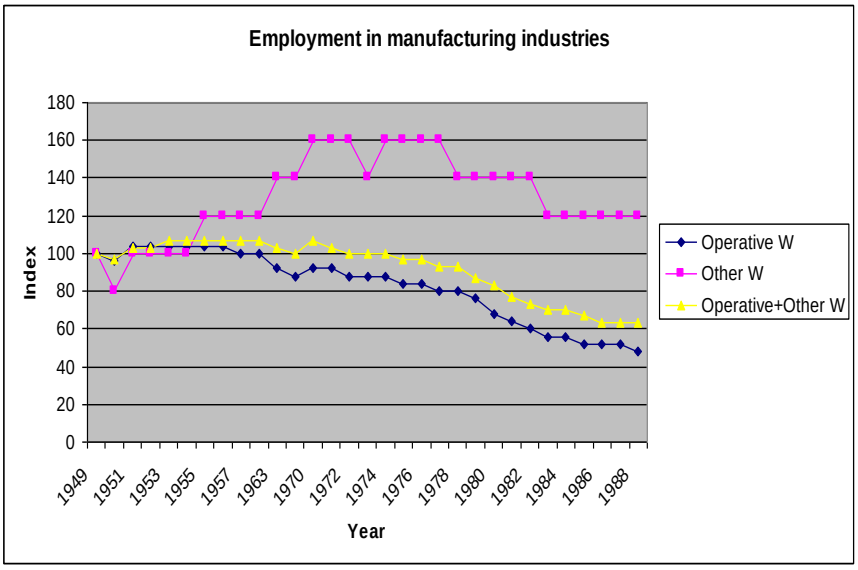
Source: Appendix: Table 1.

As it can been seen in Figure 1, as well, the estimates of the rate of surplus-value increased 145 per cent over this period, namely, it has increased from 1.27 in 1949 to 3.11 in 1988. The trend in the estimates of the organic composition of capital shows an increase of 48 per cent in the same period. This supports Marx's prediction of a rising tendency of the organic composition of capital through time. However, rate of profit (R) has risen against Marx's expectation.

One major component of the organic composition of capital is variable capital (v). In manufacturing industries, the percentage of Operative Workers (v) has decreased by 52%. Whereas the percentage of Other Workers (administrative, technical and clerical employees), or unproductive labour has increased by 20%. Overall, (Operative + other workers)/Total employment, has decreased by 37%. (See Appendix: Table 2)

So, we can obtain the following results, that through the period 1949 (using as an index year for employment) to 1988 the number of manual workers in manufacturing industries has dropped. This could be one reason for the increase in the organic composition of capital, apart from some increases in constant capital itself. It seems to be a contradiction in Marx's value theory and in the first place in his theory of productive and unproductive labour. That is to say; how is it possible that the number of productive labourers to be decreased by 52% in manufacturing industries, and at the same time the rate of surplus-value to be increased by 145%? If productive workers (manual labourers) alone create surplus-value, why capitalists do not employ more of them? Figure 2 shows the employment trend in manufacturing industries:

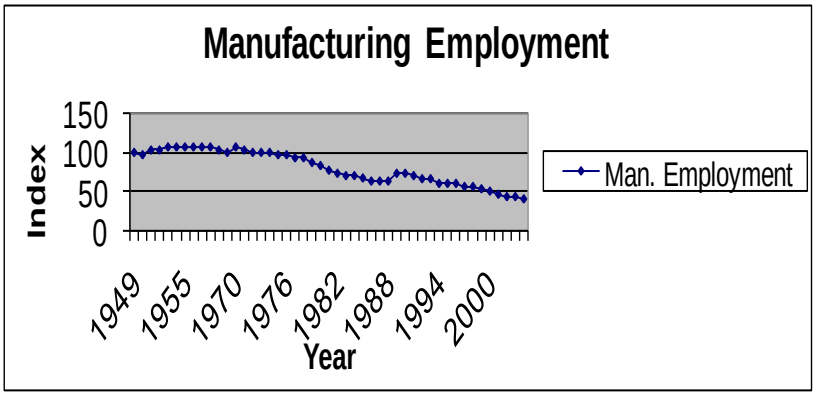
Fig. 2 Operative and other workers in manufacturing industries



Source: UK Census of Production.

Even putting all workers together, that is operative plus other workers in manufacturing industries, we find that from 1949 (using as an index year for employment) to 1988 worker's number has decreased to 63 percent of total employment in the U.K. (Appendix: Table 2) Moreover, when we extended the time scale up to 2004, the number of workers decreased even further, to 40 percent, which is shown below in Fig. 3.

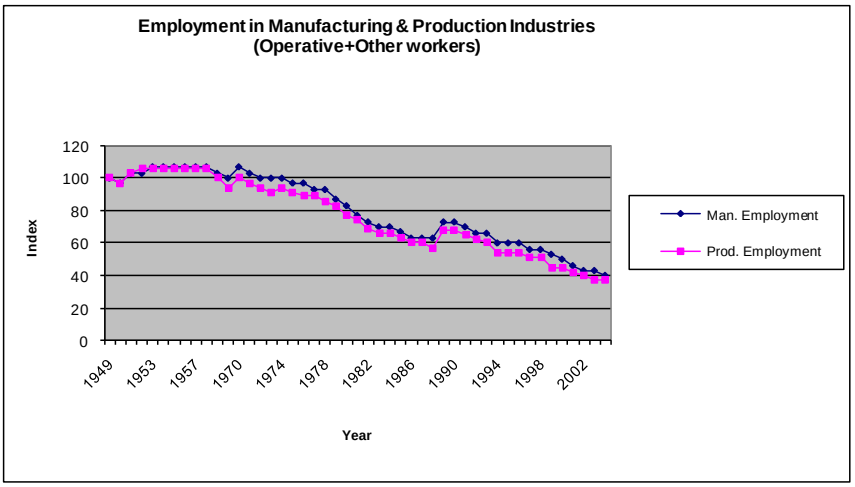
Fig. 3 Total operative and other workers in manufacturing



Sources: UK Census of Production, Annual Abstract of Statistics & Input-Output Tables.

Then we found that the number of workers in production industries decreased to 57 percent of total employment from 1949 (using as an index year for employment) to 1988, and also further decrease to 37 percent in 2004, which is almost similar to manufacturing industries. See Fig. 4 for the employment trend in production industries, (see also Appendix: Table 2) for the number of workers in manufacturing and production industries).

Fig. 4 Total operative and other workers in manufacturing & production industries

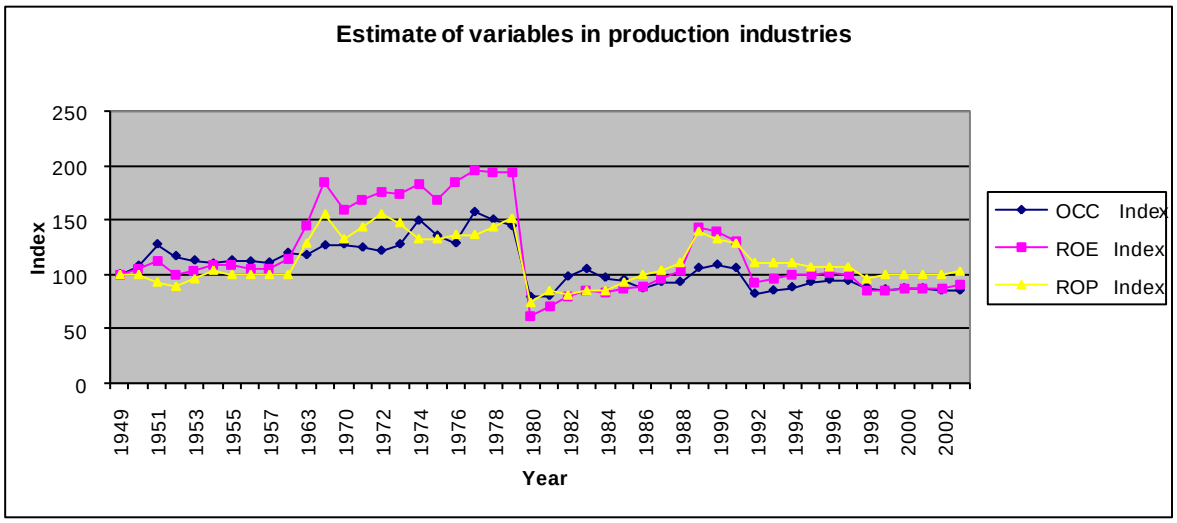


Sources: UK Census of Production, Annual Abstract of Statistics and Input-Output Tables.

Having discussed the decrease in the number of workers, and in the first place productive workers, one would wonder as to how the rate of profit could have been increased in manufacturing industries. This increase in the rate of profit with the magnitude of 78% seems to be inconsistent with Marx's theory. Although there is some short-run cyclical decline in the ROP, it tends to increase constantly in a long run.

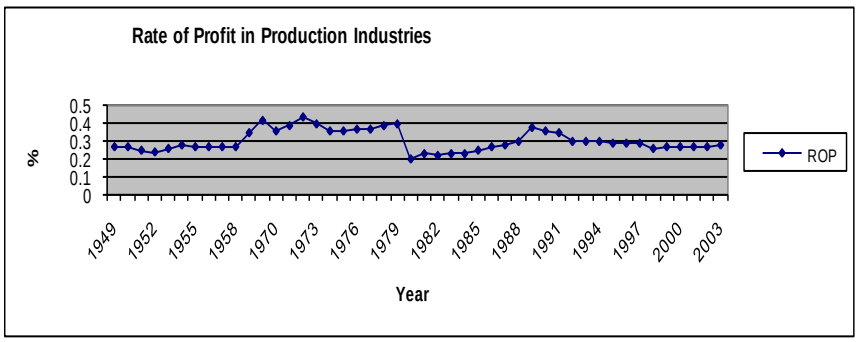
In my alternative approach, I found that the rate of profit is steadier than the one I found in the manufacturing industries. The profit rate in production industries mainly fluctuates around the index in 1949. For example in Fig. 5, you will find that the rate of profit for years 1999, 2000, 2001 and 2002 is the same as the rate in 1949, namely at 0.27% and in 2003 increases to 0.28%.

Fig. 5 Organic composition of capital, rate of exploitation and rate of profit in Production industries



As Figure 5 shows, the rate of exploitation falls by 10% from 1949 to 2003 and the organic composition of capital drops even further to 15% in 2003, compared to 1949 (See Appendix: Table 4). Figure 6 presents the percentage change of ROP in production industries more clearly and its oscillation separately from the OCC and ROE:

Fig. 6 Rate of profit in production industries



The trend in the rate of profit shows the main cyclical crisis in the UK economy after World War II. For example the rate of profit falls suddenly from 40 percent to 36 percent 1973-1974 where in the history of the UK economy has been recorded as the energy crisis, where the OPEC (The Organisation of the Petroleum Exporting Countries) members increased the price of oil per barrel. We witness a steep decrease in the profit rate from 0.40 in 1979 to 0.20 in 1980 when Steel strike begins in January and Tory government with Margaret Thatcher as prime minister took power just a few months before. The rate of profit increases slightly for the next year and falls again from 0.23 to 0.22 percent in 1982 during the Falklands war in March and also unemployment reaches 3 million by September (ONS 2005). In general the rate of profit was much lower during 1980 to 1985 than the one in 1949 at 0.27%. Only in 1986 did it reach the same level as in 1949. That would not come as a surprise as Steel workers and Miners were on strike, there were also high unemployment and the Falklands war.

The rate of profit improves a little in 1987, moving upwards up to 1990 and falls back again in 1991 when it decreases constantly until it goes below the index year in 1998. At this time the Sterling Exchange Rate Index hits its highest point since 1989, and the value of the pound sterling greater than its competitors, and UK exports became more expensive than her competitors. Exports fell from £232887m to £231034m 1997-1998. This supports Marx's argument that commodity exports work as counteracting force for the rate profit to fall.

In contrast with manufacturing industries, the rate of profit in production industries has reflected the UK economic crisis more comprehensively. The rate of profit in manufacturing

industries tends to increase through the time. But in production industries it oscillates mainly around the index year and reflects very well the business cycle in the form of boom and bust in the economy. This oscillation of the rate of profit moves to relative stability in the 1990s. One major contributing factor to this phenomenon may be the relative consolidation of European Union with their large protected internal market. Another element would be the easy access to "Eastern European" markets. In terms of the UK domestic market, monopoly capital which is expanding every day, through a large scale of mergers especially from 1990s may also play a crucial role in preventing the rate of profit to fall. I will discuss in the following chapter the mentioned counteracting tendencies of the rate of profit to fall. The appearance of other forms of crisis that their essence lies in the production sphere with its old disease of the tendency of the rate of profit fall will be tackled there.

This relative stability of the rate of profit, although unlikely last forever, is very significant in relation to Marxian falling rate of profit. It shows that the falling tendency of the rate of profit, not only did not decrease, but also has become relatively stable in the UK economy. This period of stability is rather longer than expected, that is, from 1991 to 2003. This is significant in terms of Marx's tendency of the rate of profit to fall, suggesting a new era of capital accumulation and capital development. This new phase of capital development is characterised with the domination of big firms with monopoly power that have gone beyond the competitive capital epoch, in which a uniform rate of profit could be materialised across the sectors of the economy.

This relative stability of the rate of profit might seem not to be consistent with the assumptions and theories of traditional Marxists based on competitive capital, but yet it does not show that we are at the equilibrium level and all markets are clear in a Walrasian and Keynesian model of full employment. It is likely that this relative stability is only a tendency of the rate of profit due to the characteristics of the UK economy, especially after the formation and consolidation of the European Union.

IV.2 Comparison with previous results.

Here, I would like to compare my estimate of the rate of profit with that one of Glyn and

	Glyn & Sutcliff Profit Shares (%) Company Profits Net of SA & CC*	**Glyn & Sutcliff Profit Rate (%) Before Tax, Excluding SA****	**Current Profit rate (%) Production Industries**
1950	23.4	15.6	27
1951	25.4	17.0	25
1952	25.7	16.9	24
1953	25.8	16.6	26
1954	25.5	16.6	28
1955	24.9	16.0	27
1956	22.6	14.8	27
1957	22.4	14.1	27
1958	21.8	14.0	27
1963	20.9	12.5	35

Sutcliffe (1972).

Table 1 Comparing Glyn & Sutcliffe Profit Shares and Rates with the current estimates

*CC is capital consumption
**SA is Stock appreciation

1968	16.6	11.6	42
1970	12.1	9.7	36

Glyn and Sutcliffe calculate their rate of profit on net assets of companies in manufacturing, construction, communications and distribution. They calculate their profit shares as follow: P/Y, where P is profit of the industry and Y is income. Rate of profit is P/K, where K is the capital stock invested. Therefore share of profit = rate of profit x K/Y (the capital/output ratio). They employ two different calculations for the rate of profit, i.e. before and post-tax profit. The latter one is Net distribution plus Retained earnings plus Minority interest divided by Net assets at end year. They were choosing the largest three or four firms in each industry to calculate the rate of profit. Although they did it for the sake of "data were readily available" (Glyn and Sutcliffe 1972: 249) for those industries, it seems to be a wrong method of gathering data which do not comply with our theories and would highly influence the outcome of calculation of the rate of profit.

Glyn & Sutcliffe calculate the profit and wages at the national level. That is to assume that all capital is a productive capital and all wage labourers are productive labour too. Next the relation of these profits to national income determines the share of profits and those profits to capital invested gives us the rate of profit. To them profit can be generated in all spheres of production, distribution and exchange. With the same token all wage labourers in the spheres of production, distribution and exchange are producers of surplus value. Whereas in my calculation of profit rate, capital invested in production industries is a productive capital and the workers employed in the production process are the sources of surplus value (unpaid labour or profit). Consequently the rate of profit is influenced by productive labour and capital in the sphere of production.

Glyn & Sutcliffe's method of calculating the profit rate and shares was different with my approach to calculate the rate of profit in the UK production industries. They were using conventional profit calculation rather than Marxian approach. Secondly, although their profit shares estimate was roughly near to my results of calculating the rate of profit, for the early 1950s, but from the mid-50 to the end my estimate of the rate of profit was fluctuating around the index year, namely 27 per cent, whereas their profit shares and rate of profit calculations showed a decrease of 7 and 11 per cent respectively by the end of the decade. Their after tax profit rate, excluding stock appreciation, gives a very small percentage for example for 1950, it is 5.7 per cent. It eventually ends up with 5.2, 4.7 and 4.1 for 1968, 1969 and 1970

respectively. The way the profit rate was heading since 1950, the capitalist economy would have been in negative territory for ever.

During 1960s my rate of profit estimate shows an upward trend, it reaches 33% increase from the index year by 1970. But the trend in their estimates shows a continuous downward trend. Their shares of profit and profit rate reduce by 48 and 38 per cent respectively by 1970. Both rates were falling dramatically; therefore one would have thought that British capitalism would have seized to exist within a few decades. Their approach did not into account the dynamism of capitalism for employing counteracting forces of the falling rate of profit.

Glyn and Sutcliffe argued about the causes of the profit squeeze as follow: "since 1950 wage increase has been an important cause of the declining profit share because of their effect on the U.K. capital's competitive position." (Glyn and Sutcliffe 1972: 60) A few pages after the international competition were also added to the main causes of the profit decline. (1972: 70) So profit squeeze occurs as a result of wage increase and international competition which pushes down the prices of the commodities. However it is contradiction in terms when Glyn (2006) in his estimates of manufacturing gross profit in EU countries, talks about "the rise in imported material costs...exacerbated the distributional struggle." (p. 7)

Once again spheres of distribution and exchange have occupied the centre stage in analysing the profit squeeze, rather than the production sphere to be their starting point. That is to see the appearance rather than the essence of capitalist commodity production. That is mainly observing and analysing the effect rather than the cause of the problems of a capitalist society, which is the production sphere. I prefer to sum up the main argument of the profit squeeze approach by a direct quotation from Marx:

> ...you have seen that a struggle for a rise of wages follow only in the track of previous changes...in one word, as reaction of labour against the previous action of capital. By treating the struggle for a rise of wages independently of all these circumstances, by looking only upon the change of wages, and overlooking all the other changes from which they emanate, you proceed from a false premise in order to arrive at false conclusions. (1996: 113)

Glyn (2006: viii-ix) "Taking the story through from 1970s to the present day necessarily involves a widening of the perspective. Distributional conflict between capital and labour in

the rich economies is for now not the most problematic element in their functioning." Glyn (2006) is mainly focusing on the rising profitability in the financial sector now. He also talks about the expansion of manufacturing capacity by the low wage producers, or globalisation has been blamed for undermining competitive position of traditional industries in the advanced countries. Furthermore, he argues that the effect of the new technology has undermined the position of less qualified workers in the advanced countries. Overall, he abandoned his views on the profit squeeze and instead has concentrated on the foregone problems in the UK economy. If we want to present a Marxian approach to the problem of economic crisis our starting point of analysis should be the production industries, as I have tried to focus in this paper and then we can expand our analysis to the other spheres in the society, i.e. spheres of distribution, exchange and consumption, which constitute the capitalist mode of production. Our production sphere includes manufacturing plus energy and water supply industries.

IV.3 North Sea Oil and Gas industry

North Sea Oil and Gas industry did not seem to play any roles in a slight recovery of the rate of profit in late 1970s in the UK economy, according to Glyn (2006: 145-6) : "The 1980s saw very rapid recovery in the rationalization under Mrs Thatcher … aided by the boost to profits from North Sea Oil." Whereas in my estimates of the rate of profit, the influence of the North Sea Oil and Gas industry just started as early as 1976, immediately after the first flow of British oil ashore in the Argyle field in 1975 by the Hamilton Brothers (an American company), then it followed by the BP (British Petroleum) in the Forties field.

If we look at a short history of the UK North Sea Oil and Gas, we will see that it goes back to late 1965, when gas discovered in the West Sole field by the BP jack-up drilling rig Sea Gem. But the discovery of oil was no sooner than in November 1970 in the Forties field "(240m tones of oil) and then in July 1971 the Brent field was found (229m tonnes of oil)" (Atkinson and Hall 1984: 29) Table 2 shows the rate of exploration and success factors by the same authors:

Table 2 Exploration and Success Factors for the UK sector of the North Sea

	Exploration wells drilled	**Significant oil and gas finds**	**Success factors**
1964	1	0	0

1965	10	1	0.1
1966	20	4	0.3
1967	42	3	0.07
1968	31	3	0.09
1969	44	6	0.13
1970	22	4	0.18
1971	24	5	0.20
1972	33	6	0.18
1973	42	8	0.19
1974	67	15	0.22
1975	79	27	0.34
1976	58	14	0.24
1977	67	8	0.12
1978	37	3	0.08
1979	33	8	0.24
1980	32	2	0.06
1981	47	12	0.24

Source: Development of the oil and gas resources of the United Kingdom 1982.

North Sea Oil contributed to the UK economy first of all by increasing national income through oil and gas output adding to the GDP (Gross Domestic Product). Secondly its contribution through the balance of payments; either in exports or in displacement of imports. Thirdly government could obtain a great deal of tax revenue either from oil production or direct revenue and employment. The following table provides us with the North Sea contribution to the UK GDP. (Atkinson and Hall 1984: 23)

Table 3 North Sea Gas Production and Value

	70	71	72	73	74	75	76	77	78	79	80
Recorded contribution of oil and gas to GDP £m	24	18	57	40	11	-7	596	2079	2771	5680	8762
Adjusted GDP oil & gas contribution £m	106	149.2	240.2	223.7	222.1	321.4	1039.2	2874.5	3721.8	6528	9841.9

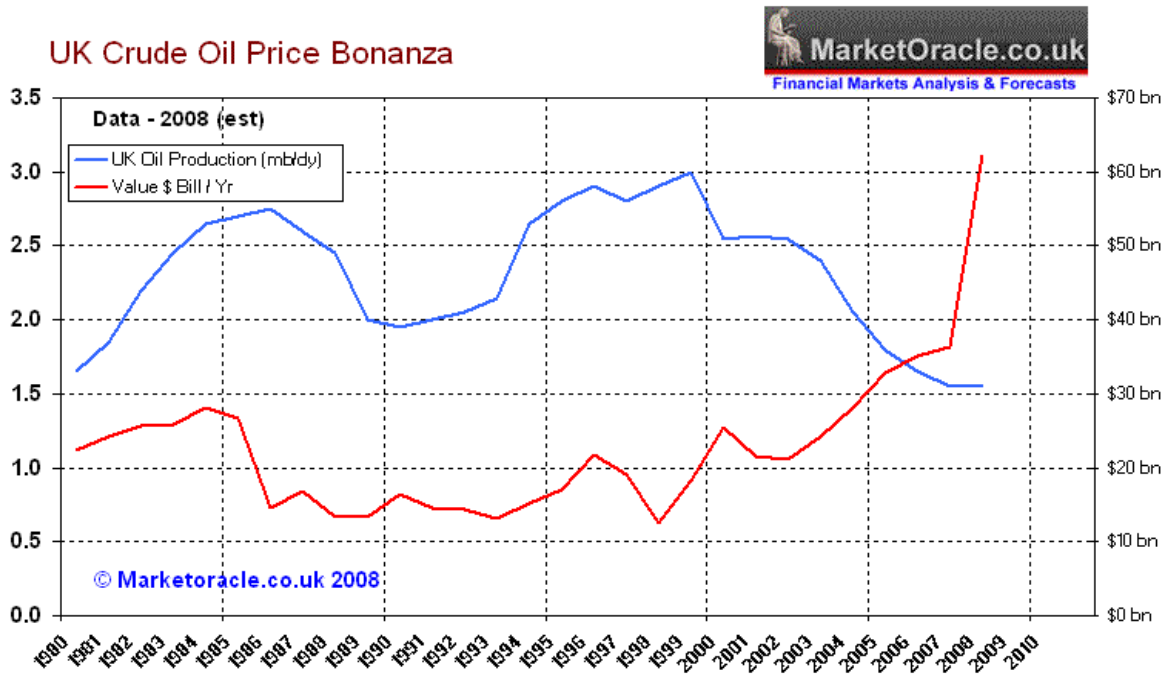
Source: Digest of UK Energy Statistics; authors' calculations; Development of the Oil and Gas Resources of the United Kingdom 1982.

Then the same authors (p.35) give us adjusted GDP contribution as % of GDP for years: 1973, 1974, 1975, 1976, 1977, 1978, 1979 and 1980 as 0.3, 0.3, 0.3, 0.8, 2.0, 2.3, 3.4 and 4.4 respectively. Especially from 1975 to 1976 there is a big jump in GDP contribution almost three times more than in 1975 which is reflected in our estimates of the rate of profit. This upward trend of the rate of profit, although very slowly, goes up to 1979 when the balance of political power and consequently economic policies changed from the labour government to

the conservative ones in terms of the North Sea Oil revenue and its expenditure. Having said that it constitute only a small fraction of the UK's GDP and cannot be a dominant economic force, therefore it can influence the economy up to a certain point, especially taking into account the cost of the oil platforms, hundreds miles of pipelines and most importantly as an environment to work in. With reference to latter one, we had the loss of thirteen lives on Boxing Day 1965 as the Sea Gem capsized and also 167 men died by the Piper Alfa disaster in 1988. This race for oil and gas overshadows the safety and working conditions of the working class for the sake of profit.

However, if we extend the North Sea Oil production and prices from 1980 up to 2008 we find that although the production of crude oil has got a downward trend after 1999, the prices have got an upward trend, which has been shown in the following graph extracted from 'Britain's North Sea Crude Oil Revenue Bonanza' (Walayat 2008: 2):

Fig. 7 North Sea crude oil revenue



Walayat (2008) argues that there has been a great benefit from the North Sea Oil and Gas ($1trillion), but all have been spent by the successive governments "into black holes such as the NHS where money meant for healthcare is pocketed by managers, doctors and GP's, hence a tripling in budgets has resulted in barely a 30% increase in output." (p.3) Atkinson and Hall 1984: 12) discuss that nearly 10% of the government budget is coming from the North Sea Oil revenue. They also suggest that government should use the revenues for financing new expenditures, either on investment projects or on the public sector improvements as well as reducing taxes, rather than financing the budget deficit and what is known as PSBR (Public Sector Borrowing Requirement).

In conclusion, we can see again as to how the revenue from the North Sea Oil and Gas industry has been used as unproductive capital when it is used for unproductive activities by the government.

V. Statistical estimates

To determine whether there is any evidence of the counteracting forces offsetting the tendency of the rate of profit to fall, I undertook a time series analysis. I first ran AR(1) and

ADF to test for unit roots and stationarity. Table 4 shows the results:

Table 4 AR(1) and ADF unit root tests

AR(1)			**ADF**					
			With Trend			**With Drift**		
Variables	**Coefficient**	**t-statistic**	**Critical value 5%**	**10%**	**t-statistic**	**Critical value 5%**	**10%**	**t-statistic**
ROP	**.76**	**6.50**	**-3.56**	**-3.22**	**-2.37**	**-1.69**	**-1.30**	**-2.11**
OCC	**.78**	**7.06**	**-3.56**	**-3.22**	**-2.19**	**-1.69**	**-1.30**	**-1.95**
ROE	**.81**	**7.76**	**-3.56**	**-3.22**	**-2.40**	**-1.69**	**-1.30**	**-1.84**
M&A	**.46**	**2.90**	**-3.56**	**-3.22**	**-4.98**	**-1.69**	**-1.30**	**-3.40**
Gov.Exp	**.90**	**47.26**	**-3.56**	**-3.22**	**3.50**	**-1.69**	**-1.30**	**3.84**
Exp to EU	**.96**	**44.91**	**-3.56**	**-3.22**	**-5.30**	**-1.69**	**-1.30**	**0.74**
Imp from EU	**.97**	**62.11**	**-3.56**	**-3.22**	**-2.36**	**-1.69**	**-1.30**	**1.20**
EU Exp/TPro	**.19**	**0.37**	**-3.56**	**-3.24**	**-49.7**	**-1.75**	**-1.34**	**-7.59**

EUImp/Tpro	**1.03**	**16.71**	**-3.60**	**-3.24**	**-2.22**	**-1.75**	**-1.34**	**-1.58**
Gov.Exp/Tpro	**.79**	**6.24**	**-3.60**	**-3.24**	**-2.03**	**-1.75**	**-1.34**	**-0.62**
TotalExp/Tpro	**.97**	**10.58**	**-3.60**	**-3.24**	**-1.44**	**-1.75**	**-1.34**	**-1.15**
ConRatio	**.97**	**10.66**	**-3.60**	**-3.24**	**-2.85**	**-1.75**	**-1.34**	**-1.08**
RPI(InflationRate)	**.50**	**2.32**	**-3.60**	**-3.24**	**-2.49**	**-1.75**	**-1.34**	**-2.12**
Total Exp	**.96**	**72.38**	**-3.53**	**-3.19**	**-1.27**	**-1.64**	**-1.30**	**1.76**
Total Imp	**.95**	**87.18**	**-3.53**	**-3.19**	**-0.41**	**-1.68**	**-1.30**	**3.29**
CapitalGExp	**.97**	**54.68**	**-3.53**	**-3.19**	**-1.32**	**-1.68**	**-1.30**	**0.69**
CapitalGImp	**.96**	**51.54**	**-3.53**	**-3.19**	**-1.06**	**-1.68**	**-1.30**	**1.16**

The ADF test indicates stationary for merger and acquisition, export to EU and export to EU/total production. But the rest of the variables are nonstationary. But as previously discussed, the Augmented Dickey-Fuller for unit root tests, it has been criticised by Maddala and Kim(1998: 45,145) as being a weak test and should not be used in practice.

However, we have the AR(1) model as below:

$Y_t = \propto + \emptyset\, Y_{t-1} + e_t,$ for t = 2, ... , T

It reveals that all variables are stationary except for the EUIMP/total production, as the coefficient of the variable is 1.03. According to our statistical theory if the coefficient value of a variable is $0<\rho<1$, then Y is stationary, but if $\emptyset = 1$ or $|\emptyset|>1$ and Y is nonstationary. If Y has a unit root then the series will express trend behaviour, especially if $\alpha \neq 0$. Then ΔY will be stationary, it is often referred to as difference stationary series. In other words if we subtract Y_{t-1} from both sides of the equation in an AR(1) model, we obtain:

$\Delta Y_t = \propto + \rho Y_{t-1} + e_t,$

Where $\rho = \emptyset - 1$ and the stationary condition for this model will be $-2 <\rho<0$. If $\emptyset = 1$ and $\alpha = 0$, then our model changes to a random walk model such as:

$Y_t = Y_{t-1} + e_t$.

As $\emptyset = 1$ (or, equivalently, $\rho = 0$), Y has a unit root and is therefore nonstationary.

As I had different observations due to limitation of the available data, I conducted three different statistical tests as follow:

Table 5 Regressing ROP on external variables

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.5610603
R Square	0.3147886
Adjusted R Square	0.2364788
Standard Error	0.0504176
Observations	40

ANOVA

	df	*SS*	*MS*	*F*	*Significance*
Regression	4	0.040872155	0.010218	4.019782	0.008718
Residual	35	0.088967845	0.002542		
Total	39	0.12984			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	0.5156473	0.060652213	8.501706	4.95E-10	0.392517	0.638778
Euexp	0.2166838	0.168986534	1.282255	0.208182	-0.12638	0.559745
Euimp	1.0184561	0.396786723	2.566759	0.0147	0.212936	1.823976
Government expenditure	0.0095726	0.347662601	0.027534	0.97819	-0.69622	0.715365
Total exports	-1.630588	0.470428593	-3.46617	0.001415	-2.58561	-0.67557

Next I tried to run a multiple regression with regard to ROP using all independent variables, although with less observations (only 23) due to limitation of data availability. I found the following results:

Table 6 Regressing ROP on EUexp/TP, EUimp/TP, Gov.Exp/TP, Total exports/TP Concentration Ratio and Inflation Rate

Regressing ROP on external variables

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.812726
R Square	0.660524
Adjusted R Square	0.53322
Standard Error	0.04601
Observations	23

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*

Regression	6	0.065903	0.010984	5.188569	0.003879
Residual	16	0.033871	0.002117		
Total	22	0.099774			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	0.553025	0.106748	5.180669	9.11E-05	0.32673	0.77932
Euexp/TP	0.075126	0.159498	0.471015	0.643988	-0.263	0.413248
Euimp/TP	1.322442	0.43683	3.027357	0.008009	0.396403	2.248481
Gov.Exp/TP	-0.09825	0.789753	-0.12441	0.902543	-1.77245	1.575951
Totalexports/TP	-2.29571	0.758325	-3.02734	0.008009	-3.90328	-0.68813
ConRatio	0.328656	0.150543	2.183128	0.04427	0.009518	0.647793
InflRate	0.000583	0.001831	0.31847	0.754248	-0.0033	0.004464

In order to compare the results with the previous estimates, the most important estimates are summarised as follow:

Table 7 Summary of Regressing ROP on EUexp/TP, EUimp/TP, Gov.Exp/TP, Total exports/TP, Concentration Ratio and Inflation Rate

	Observations	Coefficients	Multiple R %	R squared%	R bar-squared %	Standard error %	F – Test
EU exports/TP	23	0.075					
EU imports/TP	23	1.322					
Government Expenditure/TP	23	-0.098					
Total exports/TP	23	-2.295	81	66	53	4	5.18
Concentration Ratio	23	0.328					
Inflation ratio	23	0.000					

By adding another two variables to the ROP regression as independent variables, we can see that although the R squared goes up to 66% from 31% and F – test also increases to 5.18 from 4.01, the coefficient of the government expenditure/total output becomes negative (-0.09). In addition total export/total output decreases from -1.63 to -2.29, and also zero coefficients for

the rate of inflation suggests that it has no positive effect on the rate of profit. These new values of the coefficients suggest that the government spending and total export (to EU plus the rest of the world) as a proxy for globalisation could not have a significant effect on the rate of profit. Therefore I abandoned counteracting tendency ratios and continued with the rest of counteracting variables for the cointegration tests and estimation of VARs models.

V.1 Cointegration test

As shown in Table 7.8, our Durbin-Watson statistic d is 2.004277 which is ≈ 2. Therefore, we conclude that ρ = 0 and there is no first-order correlation I(1) and the series is integrated of order zero or as I(0). It is a stationary time series and is time invariant. That is Var(u_t) and Var(u_{t-s}) are the same for the values of s>0.

Table 8 Durbin-Watson Test

```
. regress rop occ roe exp imp exptoeu impfromeu cgexp cgimp mavalue govexp

      Source |       SS       df       MS              Number of obs =      34
-------------+------------------------------           F( 10,    23) =   90.96
       Model |  .123377455    10  .012337745           Prob > F      =  0.0000
    Residual |  .003119601    23  .000135635           R-squared     =  0.9753
-------------+------------------------------           Adj R-squared =  0.9646
       Total |  .126497056    33  .003833244           Root MSE      =  .01165

------------------------------------------------------------------------------
         rop |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         occ |  -.0678887   .0116308    -5.84   0.000    -.0919489   -.0438285
         roe |   .2174307   .0171403    12.69   0.000     .1819734     .252888
         exp |   1.01e-06   7.65e-07     1.33   0.198    -5.69e-07    2.60e-06
         imp |  -1.87e-06   9.50e-07    -1.97   0.061    -3.83e-06    9.73e-08
     exptoeu |   1.34e-07   7.13e-07     0.19   0.853    -1.34e-06    1.61e-06
   impfromeu |   9.08e-07   7.45e-07     1.22   0.235    -6.34e-07    2.45e-06
       cgexp |  -3.04e-06   2.15e-06    -1.42   0.170    -7.49e-06    1.40e-06
       cgimp |   4.36e-06   2.29e-06     1.90   0.070    -3.84e-07    9.11e-06
     mavalue |  -1.61e-07   2.07e-07    -0.78   0.444    -5.90e-07    2.67e-07
      govexp |   7.99e-08   2.70e-07     0.30   0.770    -4.79e-07    6.39e-07
       _cons |   .2350788   .0223723    10.51   0.000     .1887981    .2813595
------------------------------------------------------------------------------

. estat dwatson

Durbin-Watson d-statistic( 11,    34) =  2.004277

. dfuller rop, trend lags(0)

Dickey-Fuller test for unit root                   Number of obs   =        33

                               ---------- Interpolated Dickey-Fuller ---------
                  Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)             -2.371            -4.306            -3.568            -3.221
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.3953

. dfuller rop, drift lags(0)

Dickey-Fuller test for unit root                   Number of obs   =        33

                               ---------- Z(t) has t-distribution ----------
                  Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)             -2.117            -2.453            -1.696            -1.309
------------------------------------------------------------------------------
p-value for Z(t) = 0.0212

.
```

Although Augmented Dickey-Fuller test is not our main concern (refer to the criticism of the DF and ADF tests by Madalla and Kim 1998), it reveals that it is significant at 5% when only a drift included rather than with a trend. The value of t-statistic is -2.11 which is more than -1.69 at 5% critical value.

However as mentioned in our methodology the AR(1) model is stationary if the autoregressive coefficient (ρ) does not go beyond 1 in absolute value, as the following correlograms exhibit this condition:

Fig. 8 Correlogram for ROP

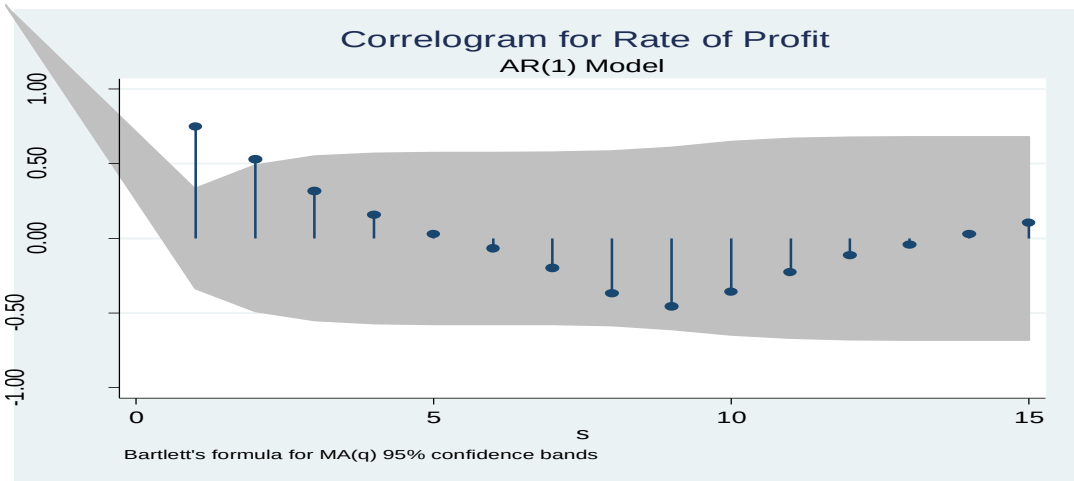


Fig. 9 Correlogram for OCC

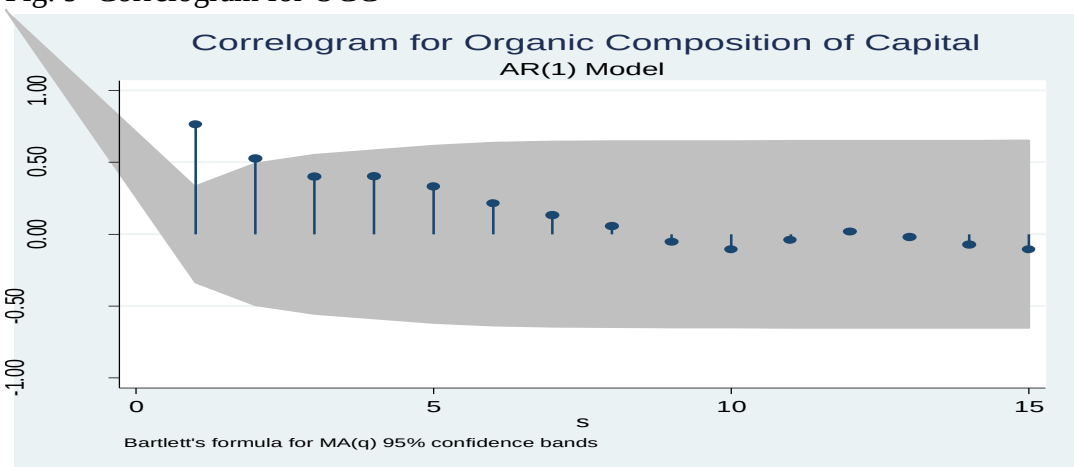


Fig. 10 Correlogram for ROE

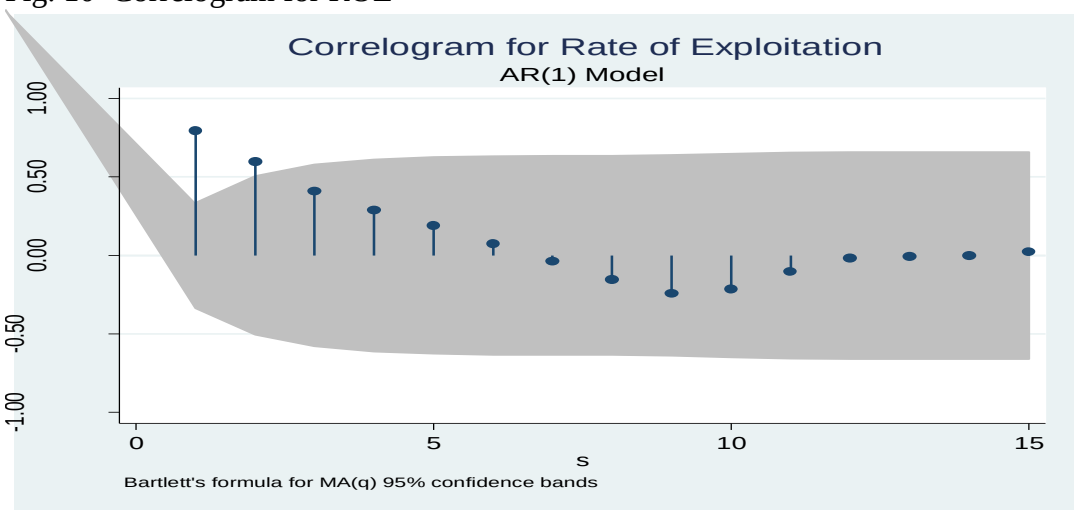


Fig. 11 Correlogram for M&A

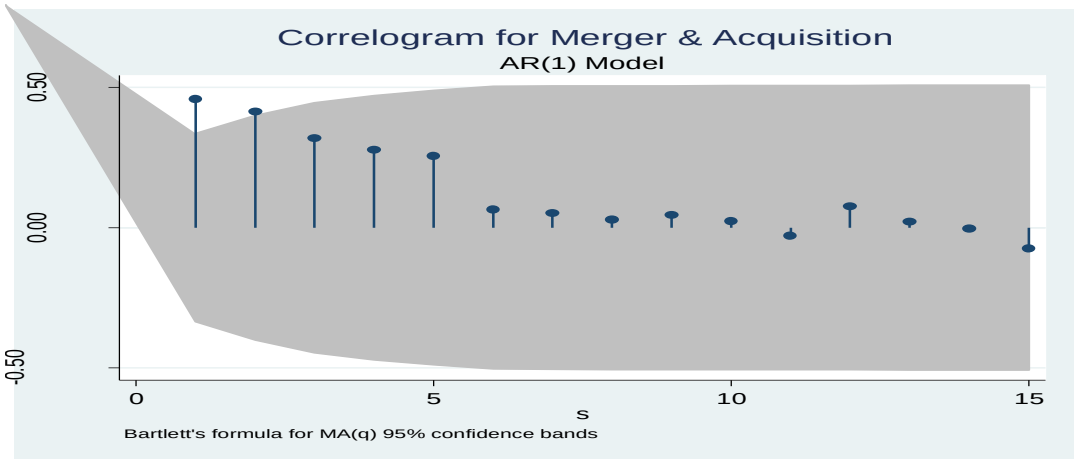


Fig. 12 Correlogram for Gov.Exp

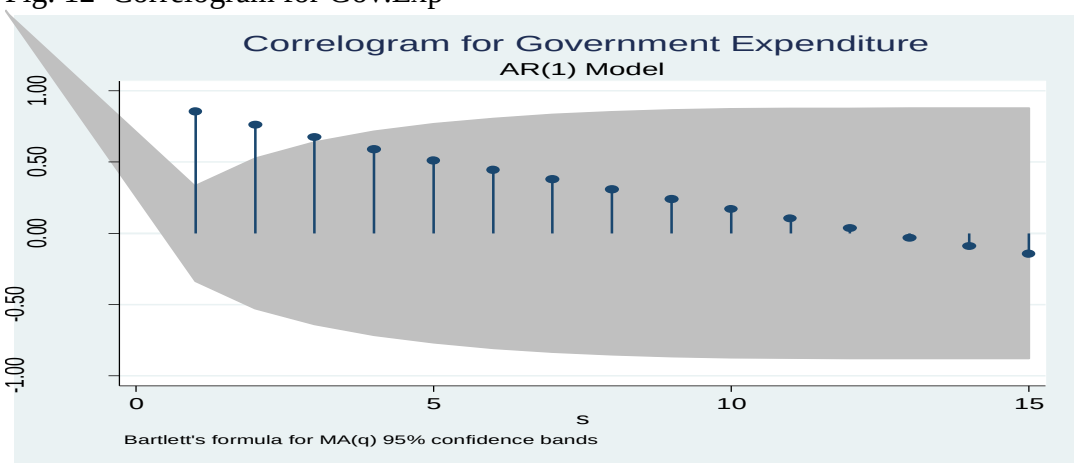


Fig. 13 Correlogram for Exp to EU

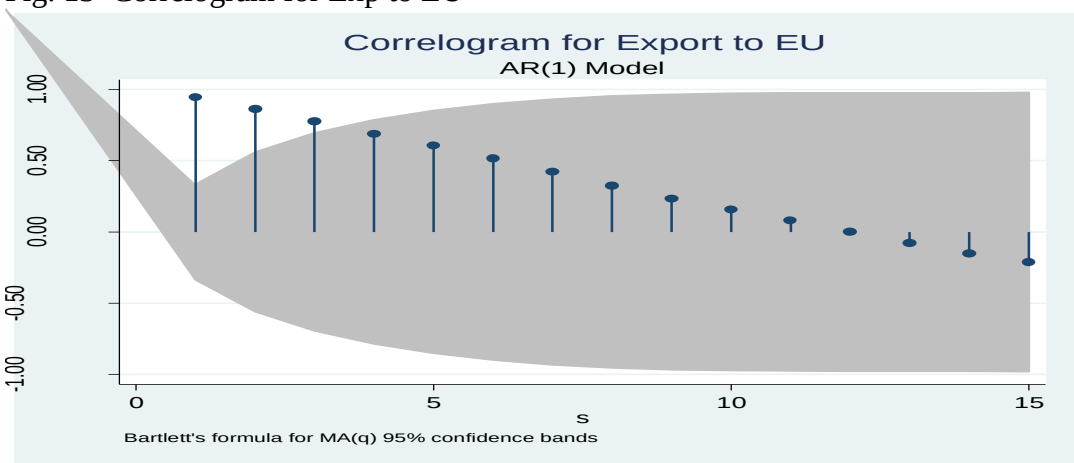


Fig. 14 Correlogram for Impfrom EU

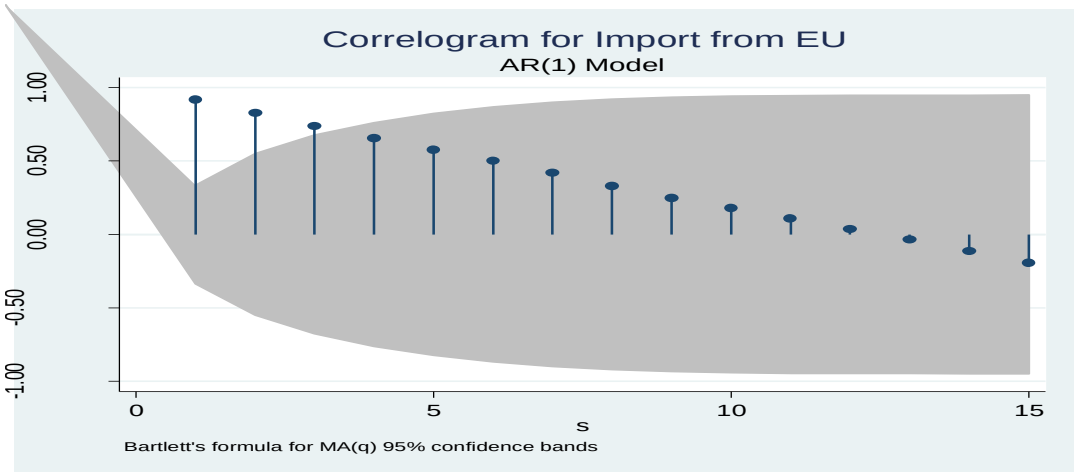


Fig. 15 Correlogram for TotalExp

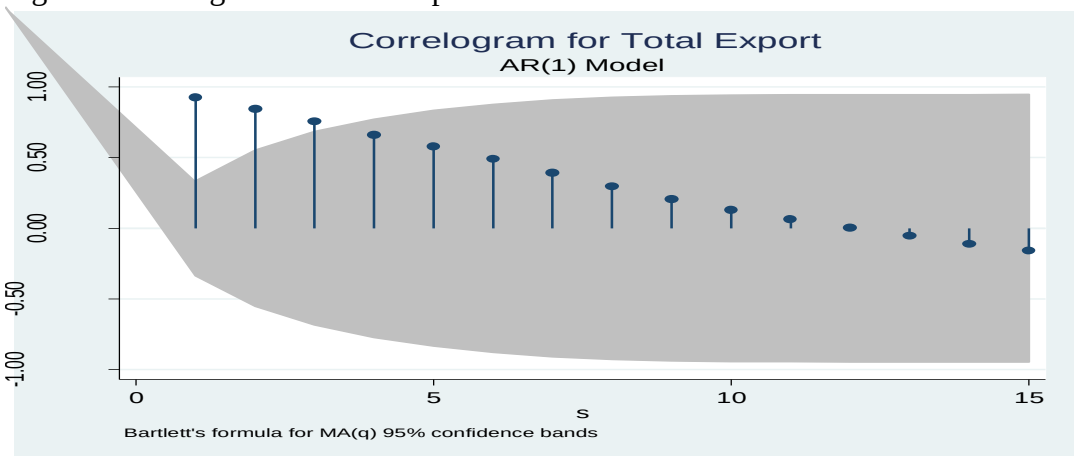


Fig. 16 Correlogram for TotalImp

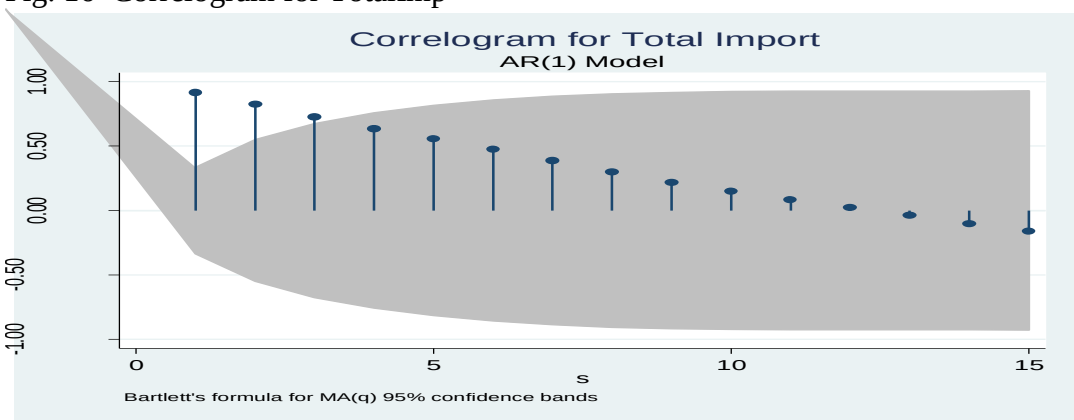


Fig. 17 Correlogram for CGExp

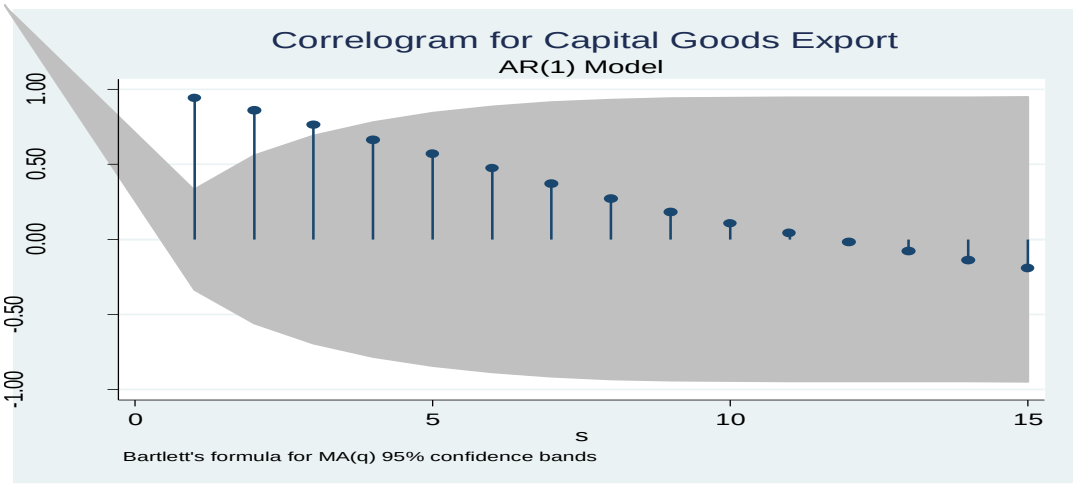
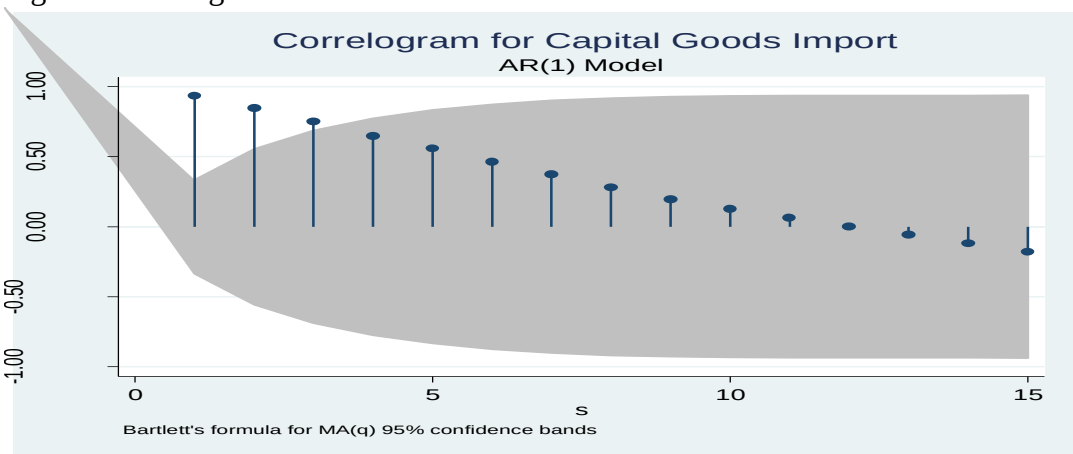


Fig. 18 Correlogram for CGIMP



V.2 Vector Autoregressive models

The results for VAR(1) and VAR(2) models have been summarised in Tables 9 through 7.12:

Table 9 Vector Auroregressions (1)

```
. var rop occ roe exp imp exptoeu impfromeu cgexp cgimp mavalue govexp, lags(1/1)

Vector autoregression

Sample:  1971 - 2003                          No. of obs      =        33
Log likelihood = -2266.061                    AIC             =   145.337
FPE            =  5.35e+49                    HQIC            =  147.3512
Det(Sigma_ml)  =  1.22e+46                    SBIC            =  151.3231

Equation           Parms      RMSE     R-sq      chi2     P>chi2
----------------------------------------------------------------
rop                   12    .042661   0.6915   73.97401   0.0000
occ                   12    .473459   0.7373   92.59778   0.0000
roe                   12    .313586   0.7490    98.4744   0.0000
exp                   12    6785.56   0.9919    4019.08   0.0000
imp                   12    6325.44   0.9950   6618.123   0.0000
exptoeu               12    3489.04   0.9934   5001.547   0.0000
impfromeu             12    3751.22   0.9938   5248.289   0.0000
cgexp                 12    2817.77   0.9885   2842.719   0.0000
cgimp                 12    3118.48   0.9882   2765.336   0.0000
mavalue               12    17186.5   0.5159   35.17116   0.0002
govexp                12    6059.37   0.9944   5862.022   0.0000
----------------------------------------------------------------
```

Table 10 Results of estimates for VAR(1) model

	Dependent Variable ROP		**Dependent Variable OCC**		**Dependent Variable ROE**		**Dependent Variable EXP**		**Dependent Variable IMP**		**Dependent Variable Exp. To EU**	
	Coef.	**P-Val**	**Coef.**	**P-Val**	**Coef.**	**P-Val**	**Coef.**	**P-Val**	**Coef.**	**P-Val**	**Coef.**	**P-Val**
Intercept	0.23	0.1	0.0	4.93	1.61	0.1	15062	0.5	9267	0.7	(-6061)	0.6
ROP	0.4	0.4	(-8.07)	0.2	(-1.3)	0.7	(-478)	0.6	(-9112)	0.9	23627	0.6
OCC	0.01	0.7	(-0.35)	0.5	(-0.05)	0.8	(-3413)	0.6	2413	0.7	(-118)	0.9
ROE	(-0.20)	0.8	0.1	2.04	(0.66)	0.5	11368	0.6	(-4123)	0.8	(-1040)	0.9
EXP	(-0.00)	0.1	(-0.00)	0.5	(-0.00)	(-0.00)	1.14	.002	0.23	0.4	0.51	0.007
IMP	(-0.00)	0.6	(-0.00)	0.6	(-0.00)	0.7	(-0.75)	0.1	(-0.10)	0.8	(-0.49)	0.04
ExpToEU	(0.00)	0.6	(-0.00)	0.3	(-0.00)	0.7	(-0.32)	0.3	(-0.53)	0.09	0.02	0.8
ImpFromEU	(0.00)	0.1	0.00	0.3	(0.00)	0.1	0.43	0.2	0.53	0.1	0.57	0.003
CGExp	(0.00)	0.5	0.5	0.00	0.00	0.3	0.32	0.7	0.54	0.5	0.16	0.7
CGImp	(0.00)	0.6	0.6	0.00	0.00	0.8	0.59	0.6	1.21	0.2	0.24	0.6
M&Avalue	(0.00)	0.9	(-0.00)	0.8	(0.00)	0.9	(-0.03)	0.7	0.01	0.8	0.01	0.7
Gov.Expend	(-0.00)	0.3	(-0.00)	0.7	(-0.00)	0.5	0.35	0.05	0.40	0.01	0.13	0.1

(Continued) Table 10 Results of estimates for VAR(1) model

	Dependent Variable ImpEU		Dependent Variable CGExp		Dependent Variable CGImp		Dependent Variable M&A		Dependent Variable GovExp	
	Coef.	**P-Val**	**Coef.**	**P-Val**	**Coef.**	**P-Val**	**Coef.**	**P-Val**	**Coef.**	**P-Val**
Intercept	142	0.9	5458	0.6	(-4697)	0.6	11847	0.8	629	0.9
ROP	23947	0.6	(-10265)	0.8	37839	0.4	28204	0.9	(-43580)	0.6
OCC	1355	0.7	(-2270)	0.5	2776	0.4	5959	0.7	1503	0.8
ROE	(-6501)	0.6	4993	0.5	(-10524)	0.3	(-21113)	0.7	4773	0.8
EXP	0.12	0.5	0.31	004	(-0.01)	0.9	(-0.25)	0.7	(-0.71)	0.03
IMP	0.01	0.9	(-0.41)	0.03	(-0.15)	0.4	(-0.39)	0.7	0.78	0.06
ExpToEU	(-0.11)	0.5	(-0.05)	0.6	(-0.06)	0.69	(-0.12)	0.8	(-0.24)	0.4
ImpFromEU	0.87	0.00	0.21	0.17	0.20	0.2	0.44	0.6	(-0.36)	0.2
CGExp	(-0.25)	0.6	0.79	.06	0.96	0.04	2.22	0.4	(-0.34)	0.7
CGImp	0.16	0.7	0.33	0.4	0.27	0.6	0.56	0.8	0.30	0.7
M&Avalue	0.04	0.4	0.01	0.8	0.007	0.8	(-0.18)	0.4	(-0.10)	0.2
Gov.Expend	0.02	0.8	0.01	0.8	0.02	0.7	(-0.25)	0.5	1.28	0.00

Note: Critical value for P-Value is 0.05, any values more than that is not significant.

Table 11 Vector Autoregressions (2)

```
. var rop occ roe exp imp exptoeu impfromeu cgexp cgimp mavalue govexp, lags(1/2)

Vector autoregression

Sample:  1972 - 2003                          No. of obs      =        32
Log likelihood = -756.0423                    AIC             =  63.06514
FPE            =  4.09e+15                    HQIC            =  66.90639
Det(Sigma_ml)  =   9211799                    SBIC            =  74.65362

Equation           Parms      RMSE     R-sq      chi2     P>chi2
----------------------------------------------------------------
rop                   23    .041839   0.8653   205.6193   0.0000
occ                   23    .488981   0.8766   227.3726   0.0000
roe                   23    .322076   0.8814   237.8485   0.0000
exp                   23    3170.21   0.9992   39468.61   0.0000
imp                   23    4819.99   0.9987   24438.49   0.0000
exptoeu               23    1695.59   0.9993   45565.48   0.0000
impfromeu             23    3436.06   0.9976   13389.89   0.0000
cgexp                 23    1695.93   0.9981   17128.08   0.0000
cgimp                 23    2080.86   0.9976   13584.81   0.0000
mavalue               23    7828.04   0.9564    701.691   0.0000
govexp                23    3067.69   0.9993   49062.22   0.0000
----------------------------------------------------------------
```

(continued) Table 12 Results of estimates for VAR(2) model

	Dependent Variable IMPfrEU		Dependent Variable CGEXP		Dependent Variable CGIMP		Dependent Variable M&A		Dependent Variable GOVExp	
	Coef.	**P-Val**	**Coef.**	**P-Val**	**Coef.**	**P-Val**	**Coef.**	**P-Val**	**Coef.**	**P-Val**
Intercept	21736	0.1	17764	0.02	25520	0.01	257657	0.00	(-50215)	0.001
ROP L1.	(-38255)	0.4	(-29340)	0.1	(-31656)	0.2	(-446696)	0.0	109825	0.007
ROP L2.	(-63562)	0.1	(-568)	0.006	(-7786)	0.002	(-602556)	0.0	102910	0.005
OCC L1.	(-3792)	0.2	(-4065)	0.01	(-2684)	0.1	(-41997)	0.0	8052	0.009
OCC L2.	(-4848)	0.1	(-3909)	0.02	(-3717)	0.08	(-44893)	0.0	1516	0.6
ROE L1.	14101	0.1	12027	0.01	8580	0.1	130374	0.0	(-25533)	0.006
ROE L2.	13945	0.1	13314	0.004	15124	0.008	140238	0.0	(-14994)	0.07
EXP L1.	0.30	0.5	0.13	0.5	0.08	0.7	5.31	0.0	(-0.69)	0.1
EXP L2.	0.74	0.01	0.76	0.00	0.83	0.00	4.11	0.00	(-0.72)	0.006
IMP L1.	(-0.77)	0.1	(-0.15)	0.5	(-0.40)	0.2	(-6.01)	0.00	1.39	0.006
IMP L2.	(-0.23)	0.3	(-1.00)	0.00	(-1.06)	0.00	(-5.72)	0.00	1.19	0.00
ExptoEU L1.	(-0.83)	0.1	(-0.42)	0.1	(-0.59)	0.1	(-4.71)	0.001	(-0.50)	0.3
ExptoEU L2.	(-0.21)	0.2	(-0.06)	0.4	(-0.21)	0.03	(-0.98)	0.01	0.31	0.03
ImpfrEU L1.	1.01	0.009	0.01	0.9	0.25	0.2	3.02	0.001	(-0.08)	0.7
ImpFrEU L2.	0.10	0.5	0.43	0.00	0.48	0.00	1.16	0.006	(-0.84)	0.00
CGEXP L1.	0.76	0.1	1.47	0.00	1.25	0.00	(-2.50)	0.06	(-0.73)	0.1
CGEXP L2.	(-2.86)	0.00	(-1.70)	0.00	(-2.02)	0.00	(-12.63	0.00	2.82	0.00
CGIMP L1.	1.38	0.06	0.67	0.07	0.75	0.1	9.46	0.00	(-1.46)	0.03
CGIMP L2.	1.37	0.03	1.40	0.00	2.57	0.00	18.69	0.00	(-2.48)	0.00
M&Aalue L1.	0.03	0.4	(-0.06)	0.005	0.00	0.9	(-0.53)	0.00	(-0.02)	0.5
M&Avalue L2.	0.04	0.2	(-0.08)	0.00	(-0.10)	0.00	(-0.79)	0.00	(-0.15)	0.00
GovExp L1.	0.45	0.2	0.50	0.008	0.25	0.2	4.28	0.00	1.19	0.001
GovExp L2.	(-0.08)	0.8	(-0.36)	0.05	(-0.01)	0.9	(-4.04)	0.00	(-0.26)	0.4

Note: Critical value for P-Value is 0.05, any values more than that is not significant.

If the coefficients are to be significant, their P-values should be less than 0.05. In VAR(1) model, we cannot find many significant P-values. There is only a significant relationship between the rate of profit and organic composition of capital. On a descriptive statistics level, we find that in the same model the R^2 for the rate of profit, organic composition of capital, rate of exploitation, export, import, export to EU, import from EU, capital goods export, capital goods import, mergers and acquisition and government expenditure are 0.69, 0.73, 0.74, 0.99, 0.99, 0.99, 0.99 0.98, 0.98, 0.51 and 0.99 respectively. However in our VAR(2) model the R^2 has improved to 0.86, 0.87, 0.88, 0.99, 0.99, 0.99, 0.99, 0.99, 0.99, 0.95 and 0.99 for the rate of profit, organic composition of capital, rate of exploitation,

export, import, export to EU, import from EU, capital goods export, capital goods import, mergers and acquisition and government expenditure respectively. VAR(2) model also gives us a better estimate of variables with respect to P-values of variables in the equations. The significant relationship between the rate of profit and other variables has been summarised in Table 13.

Table 13 The effect of lagged ROP on other variables

	ROP	OCC	ROE	EXP	IMP	CGEXP	CGIMP	Gov.Exp	Gov.Exp
P-Value ROP	0.03 Lag2	0.002 Lag1	0.04 Lag1	0.05 Lag2	0.04 Lag2	0.006 Lag2	0.002 Lag2	0.007 Lag1	0.005 Lag2

Export to EU, import from EU and mergers and acquisition did not have significant influence on the rate of profit at this stage of the enquiry. But the values of the rate of profit have been affected by a two-year time lag of the rate of profit itself, export, import, capital goods export, capital goods import and government expenditure and also one year time lag of organic composition of capital, rate of exploitation and government expenditure (as before) have influenced the current values of the rate of profit.

Finally, I carried out diagnostic tests, using Granger causality Wald tests for the two models. The main results are summarised in the following tables:

Table 14 Granger causality Wald tests for VAR(1)

	Equation ROP $\chi 2$		**Equation OCC** $\chi 2$		**Equation ROE** $\chi 2$		**Equation EXP** $\chi 2$
occ	0.07216	**rop**	1.3975	**rop**	0.08819	**rop**	0.23911
roe	0.03092	**roe**	1.6914	**occ**	0.01807	**occ**	0.15999
exp	1.9813	**exp**	0.29673	**exp**	1.7523	**roe**	0.25401
imp	0.17373	**imp**	0.22237	**imp**	0.10035	**imp**	2.4764
exptoeu	0.19719	**exptoeu**	0.95003	**exptoeu**	0.08391	**exptoeu**	0.96021
impfromeu	2.6596	**impfromeu**	0.89602	**impfromeu**	1.7828	**impfromeu**	1.2767
cgexp	0.39392	**cgexp**	0.44557	**cgexp**	0.91758	**cgexp**	0.0998
cgimp	0.15114	**cgimp**	0.1947	**cgimp**	0.05277	**cgimp**	0.26279
mavalue	0.0009	**mavalue**	0.04007	**mavalue**	0.00107	**mavalue**	0.1416
govexp	0.74929	**govexp**	0.14475	**govexp**	0.32318	**govexp**	3.7636

	Equation IMP χ^2		Equation ExptoEU χ^2		Equation ImpfrEU χ^2		Equation CGEXP χ^2
rop	0.00998	**rop**	0.22058	**rop**	0.19602	**rop**	0.06384
occ	0.092	**occ**	0.00073	**occ**	0.08249	**occ**	0.41053
roe	0.03846	**roe**	0.00805	**roe**	0.27184	**roe**	0.28421
exp	0.48218	**exp**	7.2451	**exp**	0.36301	**exp**	4.1562
exptoeu	2.8809	**imp**	4.0989	**imp**	0.00208	**imp**	4.4184
impfromeu	2.2558	**impfromeu**	8.7278	**exptoeu**	0.40761	**exptoeu**	0.15219
cgexp	0.313	**cgexp**	0.09039	**cgexp**	0.19642	**impfromeu**	1.8668
cgimp	1.2713	**cgimp**	0.17104	**cgimp**	0.06884	**cgimp**	0.50075
mavalue	0.04196	**mavalue**	0.10464	**mavalue**	0.68691	**mavalue**	0.06352
govexp	5.7565	**govexp**	1.9836	**govexp**	0.05537	**govexp**	0.04917

	Equation CGIMP χ^2		Equation M&A χ^2		Equation GovExp χ^2
rop	0.70818	**rop**	0.01295	**rop**	0.24881
occ	0.50097	**occ**	0.076	**occ**	0.0389
roe	1.0308	**roe**	0.13659	**roe**	0.05615
exp	0.00415	**exp**	0.07547	**exp**	4.7327
imp	0.47597	**imp**	0.10778	**imp**	3.3966
exptoeu	0.15156	**exptoeu**	0.02311	**exptoeu**	0.65463
impfromeu	1.426	**impfromeu**	0.2093	**impfromeu**	1.1399
cgexp	4.0191	**cgexp**	0.70925	**cgexp**	0.13786
mavalue	0.02725	**cgimp**	0.03766	**cgimp**	0.08732
govexp	0.07879	**govexp**	0.30164	**mavalue**	1.5515

Table **15** Granger causality Wald tests for VAR(2)

	Equation ROP χ^2		Equation OCC χ^2		Equation ROE χ^2		Equation EXP χ^2
occ	0.36458	**rop**	9.6044	**rop**	5.8119	**rop**	3.6089
roe	0.99448	**roe**	4.5856	**occ**	1.8042	**occ**	2.944
exp	13.883	**exp**	13.008	**exp**	18.034	**roe**	5.0034
imp	12.264	**imp**	9.8774	**imp**	15.203	**imp**	103.32
exptoeu	0.73461	**exptoeu**	11.128	**exptoeu**	6.0098	**exptoeu**	3.7831
impfromeu	4.0915	**impfromeu**	4.925	**impfromeu**	5.4986	**impfromeu**	6.7574
cgexp	1.5497	**cgexp**	3.7888	**cgexp**	3.6892	**cgexp**	46.467
cgimp	0.80663	**cgimp**	0.53219	**cgimp**	0.65198	**cgimp**	17.834
mavalue	1.0612	**mavalue**	0.02739	**mavalue**	0.38635	**mavalue**	66.378
govexp	15.964	**govexp**	17.285	**govexp**	22.85	**govexp**	51.318

	Equation IMP $\chi 2$		Equation ExptoEU $\chi 2$		Equation ImpfrEU $\chi 2$		Equation CGEXP $\chi 2$
rop	5.2399	**rop**	2.4528	**rop**	3.2101	**rop**	9.8624
occ	1.0205	**occ**	7.0109	**occ**	2.5099	**occ**	8.663
roe	3.7246	**roe**	11.318	**roe**	3.5729	**roe**	12.154
exp	14.178	**exp**	72.621	**exp**	7.0745	**exp**	28.976
exptoeu	11.594	**imp**	72.741	**imp**	2.9621	**imp**	67.193
impfromeu	10.408	**impfromeu**	32.131	**exptoeu**	4.0796	**exptoeu**	2.7916
cgexp	15.632	**cgexp**	136.77	**cgexp**	20.679	**impfromeu**	24.377
cgimp	18.06	**cgimp**	36.17	**cgimp**	4.9332	**cgimp**	22.808
mavalue	5.9572	**mavalue**	45.165	**mavalue**	1.8231	**mavalue**	28.832
govexp	30.143	**govexp**	58.943	**govexp**	7.949	**govexp**	9.6944

	Equation CGIMP $\chi 2$		Equation M&A $\chi 2$		Equation GovEXP $\chi 2$
rop	11.36	**rop**	62.531	**rop**	15.937
occ	3.8121	**occ**	48.146	**occ**	6.849
roe	8.0498	**roe**	64.756	**roe**	9.6748
exp	22.311	**exp**	63.964	**exp**	10.686
imp	51.967	**imp**	130.19	**imp**	38.633
exptoeu	8.4535	**exptoeu**	20.949	**exptoeu**	4.6035
impfromeu	23.861	**impfromeu**	26.785	**impfromeu**	29.058
cgexp	37.32	**cgexp**	78.844	**cgexp**	25.198
mavalue	22.774	**cgimp**	185.78	**cgimp**	20.336
govexp	8.9288	**govexp**	23.795	**mavalue**	20.281

Here χ^2 is our measure of significance in the Granger causality Wald tests. χ^2 With one degree of freedom at 0.05 is 3.84, and χ^2 with two degrees of freedom at 0.05 is 5.99. Therefore, our χ^2 estimates should not be less than 3.84 for the VAR(1) and 5.99 for the VAR(2) models. Once again the VAR(1) model is not as good as the VAR(2) one. In the former one, we have only 7 coefficients with significant values, whereas in the latter model, we have 72 significant coefficients. It has been proven again that VAR(2), which has got a good explanatory power, is a better model.

As we are mainly concerned about the rate of profit variable, we want to see what variables influence or are the Granger cause of rate of profit. We could not see the same clarity in a multiple regression as the degree of causality could have been misleading when an important variable might not be present. Furthermore, there are a lot of regressions and it is not obvious

to observe which variable is the cause of the other one. For instance when you run a regression of Y = rate of profit on X = rate of exploitation, it is not possible to say that only increase in the rate of exploitation causes increase in the rate of profit, namely X causes Y. However, one may argue that Y causes X, since increase in the rate of profit will encourage capitalists to invest in the means of production, that is to say to purchase more efficient machinery, which reduces the waste of raw materials and minimises the cost. In return the volume of relative surplus value increases. Therefore the causality could run in both directions.

However, Our VAR(2) provides a framework for the notion of Granger causality by stating that, for example if the past values of rate of profit can help to explain the rate of exploitation. Then rate of profit Granger causes rate of exploitation, or in other words the past values of rate of profit have explanatory power for current and future values of the rate of exploitation. Having mentioned that, if Granger causality holds, it does not necessarily mean that X causes Y. In our example, it at least helps to understand that rate of profit might be causing rate of exploitation.

Here we do find evidence that export, import and government expenditure Granger cause rate of profit. Indicating that last year's export, import and government expenditure have strong explanatory power for the rate of profit. We also find that the rate of profit Granger causes organic composition of capital, capital goods export, capital goods import, merger and acquisition, government expenditure and almost the rate of exploitation (χ^2 is very close to the critical value). Granger causality Wald tests for VAR (2) exhibits that there are very strong Granger causality occurrence between the variables. This also means that these variables in our econometrics model are cointegrated. Past values of some variables significantly affect the present or future of the dependent variable in an equation in one way or another. Especially, export to EU, capital goods export, capital goods import, merger and acquisition and government expenditure have been influenced by almost the past values of all other variables. We can therefore predict that the future of these variables are affected by the past values of rate of profit, organic composition of capital, rate of exploitation, import, export, import from EU. They can also influence each other while they are in an explanatory variable position in an equation.

We have summarised the results of Granger causality in the following two figures and afterwards the cause and effect of the rate of profit and counteracting forces have been summarised in a circular flow.

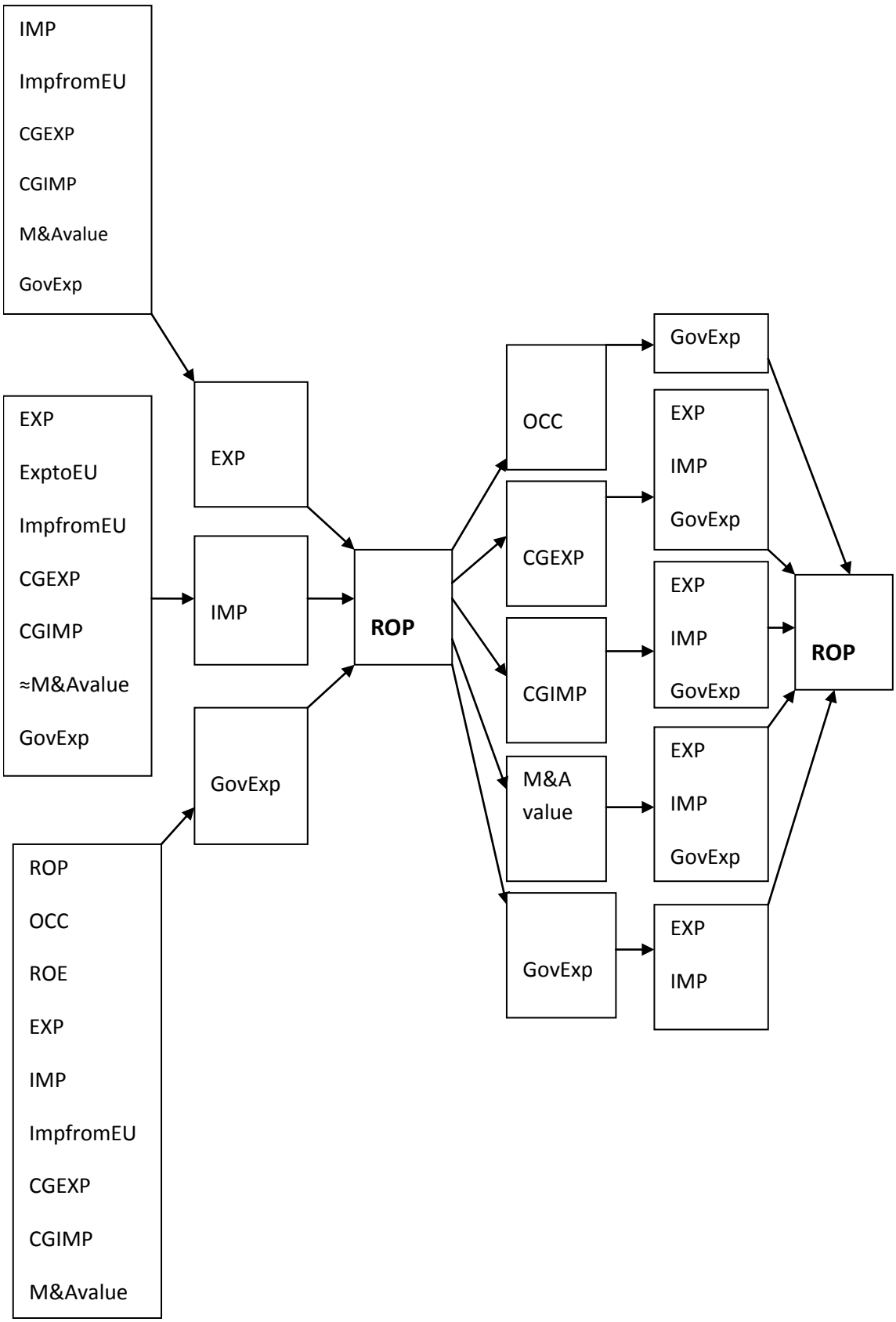


Fig 19	Granger causality of the rate of profit in relation to other variables

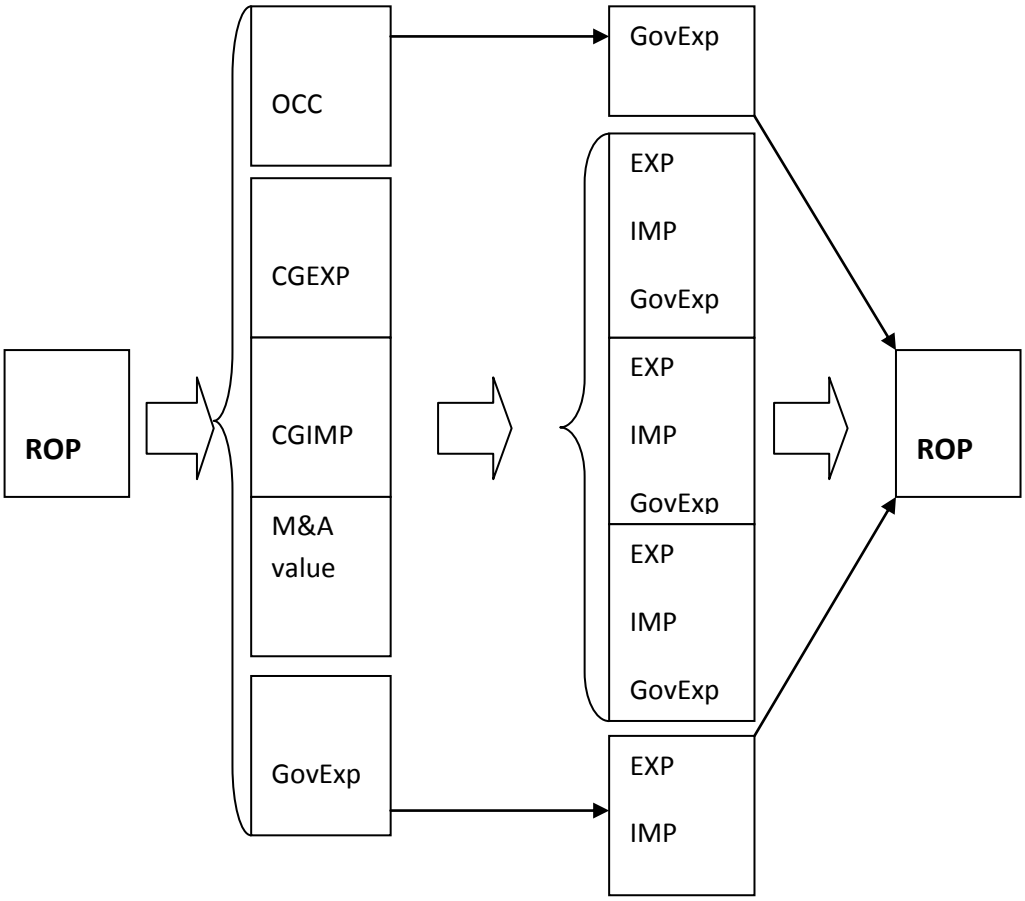


Fig. 20 Granger causality of the rate of profit and counteracting forces

From the above we can obtain the following circular flow of Granger causality.

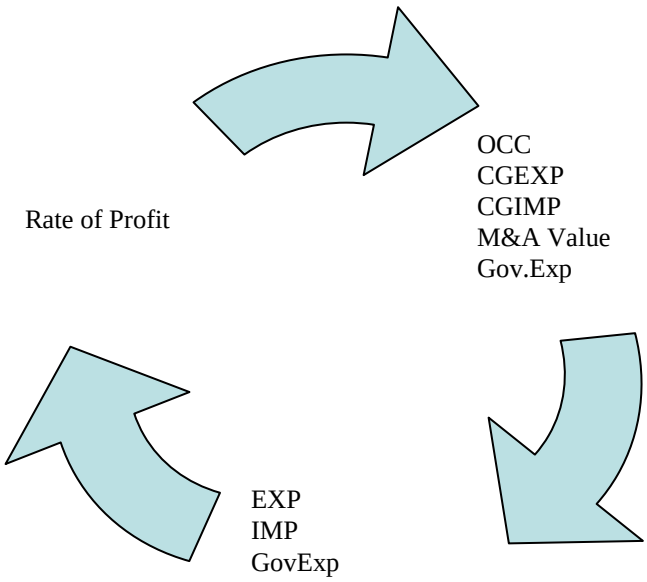


Fig. 21 Granger causality circular flow of the rate of profit and counteracting forces.

We can conclude the Granger causality by saying that if OCC, CGEXP, CGIMP, M&A Value are influenced by the rate of profit and if those variables influence EXP, IMP and GovExp which are granger cause of rate of profit, then OCC, CGEXP, CGIMP, M&A Value also influence the rate of profit. Having said that the government expenditure is the granger cause and the effect of rate of profit amongst the counteracting forces for the rate of profit to fall.

VI. Conclusion

We found that the empirical research shows that the rate of profit has been relatively stabilised especially after 1991 up to 2003, when the European Union consolidation, which influenced more than before the UK export to EU and import from those countries. In addition to other counteracting forces, such as capital goods export, capital goods import, mergers and acquisitions and government expenditure.

This paper contributed to the existing knowledge of Marxian economics, especially with regards to the counteracting factors of the profit rate. These new elements; mergers and acquisitions and government expenditure (plus capital goods export, capital goods imports – EU as the main partner of the UK) were influenced by the profit rate variable in the UK, exhibiting dynamism of capitalism in the new era, both in terms of economic growth and crisis. This research is the first attempt made to use VARs time series analysis with Granger causality diagnostic tests conducted for measuring Marxian categories of the rate of profit in the UK economy. It also revealed that Marxian economics is a dynamic theory which can explain uneven development of capitalism in the new epoch, as well as exposing incapability of orthodox and neoliberal theories in tackling the obstacles of the new phase of capitalist development.

VI.1 Marx's relevance to 21st century political economy

One of the most important contributions to understanding capitalist development and its limits comes from Marx. In his method, which is from abstract to the concrete or from general to specific, he analysed capitalism as a system of production, distribution, exchange and consumption in a market place. The market is where the exchange takes place, in forms of money and price. Goods and services produced in the economy are exchanged as commodities. A commodity has the two characteristics of having use-value and exchange-value. Use-value is created by the concrete labour and exchange-value by the abstract labour. Capitalist production occurs not directly for the sake of use-value but for its exchange-value. This exchange-value is the labour-time, which is socially necessary in a perfect competitive market to produce commodities. Marx defines it as the number of hours necessary to produce a commodity under the normal condition of production, with the average degree of skills, technique of production and intensity dominant at the time.

Although the 'golden age' of capitalism' had come to an end in early 1970s by going through a deep recession in the form of energy crisis in industrialised countries between 1974 and 1976, the emergence of the East Asia's "Tiger economies", and opening up the Eastern European markets gave hope for economic prosperity in the long term. But the uneven development of capitalism, the recent examples China and India, and economic crisis can be better explained by Marxian economic theories. Marx's insight says that capitalism creates

economic growth, development and crisis. We cannot see only one aspect of it and forget about the other. We cannot only argue about the progressive side of it without taking into account the negative side and fundamentally the destructive side of this system of production. That means we cannot forget about the economic crisis as a coherent part of a capitalist economy.

However, a capitalist system is a production orientated, not consumption one. In a free market economy capitalists compete against each other to produce more commodities with less exchange-value embodied in each unit of commodity produced in order to be able to increase their profit. This could be done by introducing before than other competitors a new technology in the production process (innovation). When other rivals use the same technology, their profit falls back to the same normal profits as other producers. Actually capitalists are forced by the pressure of competition to reinvest and accumulate capital, in order to survive. This use of machinery or the application of science to production causes the proportion of constant capital (c) to variable capital (v), or organic composition of capital (c/v) to increase throughout the time, which leads to concentration and centralisation of capital. Therefore, their profit, or surplus-value extracted from the productive labour employed by the capital, to be reduced due to this increases in the organic composition of capital. Marx related his theory of a rising the organic composition of capital to his “law” of the falling tendency of the rate of profit. However Marx emphasises that this is only a tendency of the rate of profit to fall. He puts forward counteracting tendencies that hinder the fall in the rate of profit. But Marx was mainly concerned about counteracting tendencies in a domestic market. These counteracting forces could be developed mainly in an external market, especially in the era of monopoly capital when big corporate can benefit from lower organic composition of capital, cheap labour, land and raw materials in a underdeveloped country through unequal exchange, as it has been discussed by Marxist political economists.

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Appendix: Data Tables

Table 1 – Estimate of variables in manufacturing industries[1]

	Line 1	Line 2	Line 3	Line 4
	(£m)	(£m)	(£m)	(£m)
Year	**wages and salaries of operative workers**	**Gross domestic fixed capital formation**	**Purchases of materials & fuels**	**Net output**
1949	1743.758	397	5963.883	3964.674
1950	1768.599	466	6522.264	4151.324
1951	2074.881	542	9198.876	5044.521
1952	2253.713	573	9157.584	5157.398
1953	2408.891	561	9351.796	5583.478
1954	2609.264	593	9746.296	6266.331
1955	2878.635	734	10872.064	6820.494
1956	3089.436	854	11514.257	7179.197
1957	3239.312	947	12026.764	7535.04
1958	3219.283	922	12935	7848
1963	3986	1200	14807	10820
1968	5280	1592	20571	15289
1970	6624.4	2130	25656.9	18531.2
1971	7083.1	2187	26871.7	20623.7
1972	7572	2044	28425.5	22785.1
1973	8787.8	2437	34510.4	26600
1974	10547.2	3145	49820.6	33047.8
1975	12683	3449	53760	36948
1976	14412.9	3891	67625.9	44434.2
1977	15863	4717	78581.3	50862.4
1978	17622.8	5611	83000.5	56834.2
1979	19749.5	6490	88173	64143.5
1980	21930.6	6445	90151.7	68474.7
1981	21372.2	5315	90144.2	70614.5
1982	21672.8	5183	117590.1	74817.5
1983	22109.1	5859	125877.6	80804
1984	23650.6	7382	117334.7	87809.7
1985	25168.2	8735	125626.7	94385.1
1986	26400.6	8831	124742.4	100229.1
1987	27795.8	9950	135893.2	111301.6
1988	30117.8	11431	151355.6	123868.8

Table 1 - Continued
Estimate of variables in manufacturing industries

		Line 5	Line 6
	(£m)	(£m)	(£m)
Year	**v**	**c**	**s**
1949	1743.758	6360.883	2220.916
1950	1768.599	6988.264	2382.725
1951	2074.881	9740.876	2969.64
1952	2253.713	9730.584	2903.685
1953	2408.891	9912.796	3174.587
1954	2609.264	10339.296	3657.067
1955	2878.635	11606.064	3941.859
1956	3089.436	12368.257	4089.761
1957	3239.312	12973.764	4295.728
1958	3219.283	13857	4628.717
1963	3986	16007	6834
1968	5280	22163	10009
1970	6624.4	27786.9	11906.8
1971	7083.1	29058.7	13540.6
1972	7572	30469.5	15213.1
1973	8787.8	36947.4	17812.2
1974	10547.2	52965.6	22500.6
1975	12683	57209	24265
1976	14412.9	71516.9	30021.3
1977	15863	83298.3	34999.4
1978	17622.8	88611.5	39211.4
1979	19749.5	94663	44394
1980	21930.6	96596.7	46544.1
1981	21372.2	95459.2	49242.3
1982	21672.8	122773.1	53144.7
1983	22109.1	131736.6	58694.9
1984	23650.6	124716.7	64159.1
1985	25168.2	134361.7	69216.9
1986	26400.6	133573.4	73828.5
1987	27795.8	145843.2	83505.8
1988	30117.8	162786.6	93751

Table 1 - Continued
Estimate of variables in manufacturing industries

	Line 7	Line 8	Line 9
Year	**c/v**	**s/v**	**s/(c+v)**
1949	3.64	1.27	0.27
1950	3.95	1.34	0.27
1951	4.69	1.43	0.25
1952	4.31	1.28	0.24
1953	4.11	1.31	0.25
1954	3.96	1.4	0.28
1955	4.03	1.36	0.27
1956	4	1.32	0.26
1957	4	1.32	0.26
1958	4.3	1.43	0.27
1963	4.01	1.71	0.31
1968	4.19	1.89	0.36
1970	4.19	1.79	0.34
1971	4.1	1.91	0.37
1972	4.02	2	0.39
1973	4.2	2.02	0.38
1974	5.02	2.13	0.36
1975	4.51	1.88	0.34
1976	4.96	2.08	0.34
1977	5.25	2.2	0.35
1978	5.02	2.22	0.36
1979	4.79	2.24	0.38
1980	4.4	2.12	0.39
1981	4.46	2.3	0.42
1982	5.66	2.45	0.36
1983	5.95	2.65	0.38
1984	5.26	2.71	0.43
1985	5.33	2.75	0.43
1986	5.05	2.79	0.46
1987	5.24	3	0.48
1988	5.4	3.11	0.48

Sources: See section 6.4 of the text on data sources and methods.

1. Census of production does not provide data for 1959-1962, 1964-1967 and 1969.

Table 2 - Employment in manufacturing industries

Percentage of Employment in Manufacturing Industries

Year	Operative Workers / Total Employment	Index	Other Workers / Total Emp.	Index	Operative W+ Other W / Total Employment	Index
1949	0.25	100	0.05	100	0.3	100
1950	0.24	96	0.04	80	0.29	97
1951	0.26	104	0.05	100	0.31	103
1952	0.26	104	0.05	100	0.31	103
1953	0.26	104	0.05	100	0.32	107
1954	0.26	104	0.05	100	0.32	107
1955	0.26	104	0.06	120	0.032	107
1956	0.26	104	0.06	120	0.32	107
1957	0.25	100	0.06	120	0.32	107
1958	0.25	100	0.06	120	0.32	107
1963	0.23	92	0.07	140	0.31	103
1968	0.22	88	0.07	140	0.3	100
1970	0.23	92	0.08	160	0.32	107
1971	0.23	92	0.08	160	0.31	103
1972	0.22	88	0.08	160	0.3	100
1973	0.22	88	0.07	140	0.3	100
1974	0.22	88	0.08	160	0.3	100
1975	0.21	84	0.08	160	0.29	97
1976	0.21	84	0.08	160	0.29	97
1977	0.2	80	0.08	160	0.28	93
1978	0.2	80	0.07	140	0.28	93
1979	0.19	76	0.07	140	0.26	87
1980	0.17	68	0.07	140	0.25	83
1981	0.16	64	0.07	140	0.23	77
1982	0.15	60	0.07	140	0.22	73
1983	0.14	56	0.06	120	0.21	70
1984	0.14	56	0.06	120	0.21	70
1985	0.13	52	0.06	120	0.2	67
1986	0.13	52	0.06	120	0.19	63
1987	0.13	52	0.06	120	0.19	63
1988	0.12	48	0.06	120	0.19	63

Table 2 continued

Employment in production industries

Year	Total Employment In the UK	Operative Workers / Total Employment	Index	Other Workers / Total Employment	Index
1949	23052(000)	0.3	100	0.05	100
1950	23229	0.28	93	0.05	100
1951	23588	0.3	100	0.06	120
1952	23519	0.3	100	0.05	120
1953	23636	0.3	100	0.06	120
1954	23987	0.3	100	0.06	120
1955	24280	0.3	100	0.06	120
1956	24458	0.3	100	0.07	140
1957	24491	0.3	100	0.07	140
1958	24221	0.29	97	0.07	140
1963	25248	0.27	90	0.08	160
1968	25303	0.25	83	0.08	160
1970	24753	0.26	87	0.09	180
1971	24398	0.25	83	0.09	180
1972	24391	0.24	80	0.08	160
1973	24971	0.24	80	0.08	160
1974	25060	0.24	80	0.08	160
1975	24932	0.23	77	0.08	160
1976	24766	0.23	77	0.08	160
1977	24874	0.22	73	0.08	160
1978	25014	0.22	73	0.08	160
1979	25393	0.2	67	0.08	160
1980	25327	0.19	63	0.08	160
1981	24346	0.18	60	0.08	160
1982	23908	0.16	53	0.07	140
1983	23610	0.16	53	0.07	140
1984	24060	0.15	50	0.07	140
1985	24360	0.15	50	0.07	140
1986	24335	0.14	47	0.06	120
1987	24763	0.14	47	0.06	120
1988	25577	0.13	43	0.06	120

1. Production industries constitute divisions 1 to 4 SIC, revised 1980. These are energy and water supply industries plus manufacturing industries.
2. Total employment includes civil employment, HM forces and

Table 2 continued

Employment in production industries

Year	Operative + Other Workers / Total Employment	Index
1949	0.35	100
1950	0.34	97
1951	0.36	103
1952	0.37	106
1953	0.37	106
1954	0.37	106
1955	0.37	106
1956	0.37	106
1957	0.37	106
1958	0.37	106
1963	0.35	100
1968	0.33	94
1970	0.35	100
1971	0.34	97
1972	0.33	94
1973	0.32	91
1974	0.33	94
1975	0.32	91
1976	0.31	89
1977	0.31	89
1978	0.3	86
1979	0.29	83
1980	0.27	77
1981	0.26	74
1982	0.24	69
1983	0.23	66
1984	0.23	66
1985	0.22	63
1986	0.21	60
1987	0.21	60
1988	0.2	57

Sources: Total employment has been taken from the Annual Abstract of Statistics.
Operatives and other workers

Table 3 – Index of Employment in Manufacturing & Production Industries

Year	Manufacturing Industries Index	Production Industries Index
1949	100	100
1950	97	97
1951	103	103
1952	103	106
1953	107	106
1954	107	106
1955	107	106
1956	107	106
1957	107	106
1958	107	106
1963	103	100
1968	100	94
1970	107	100
1971	103	97
1972	100	94
1973	100	91
1974	100	94
1975	97	91
1976	97	89
1977	93	89
1978	93	86
1979	87	83
1980	83	77
1981	77	74
1982	73	69
1983	70	66
1984	70	66
1985	67	63
1986	63	60
1987	63	60
1988	63	57
1989	73	68
1990	73	68
1991	70	65
1992	66	62
1993	66	60
1994	60	54
1995	60	54
1996	60	54
1997	56	51
1998	56	51
1999	53	45
2000	50	45
2001	46	42
2002	43	40

2003	43	37
2004	40	37

Source: Annual Abstract of Statistics from 1989 to 2004.

Table 4 - Estimate of variables in Production Industries

	OCC	ROE	ROP
1949	3.232834598	1.182756392	0.279424193
1950	3.491636833	1.246829032	0.277589012
1951	4.123669806	1.322841658	0.258182457
1952	3.795764179	1.183997133	0.246883935
1953	3.645454397	1.221607403	0.262968334
1954	3.559283232	1.299847641	0.285099121
1955	3.644180367	1.280132464	0.27564228
1956	3.61201486	1.250599958	0.271161303
1957	3.60682215	1.250484719	0.271441935
1958	3.874863707	1.35954341	0.278888496
1963	3.826668728	1.714270048	0.355166295
1968	4.118251898	2.189475368	0.427777962
1970	4.125527035	1.884237705	0.367618333
1971	4.052802307	1.999845532	0.395789388
1972	3.941594694	2.087643747	0.422463572
1973	4.120652997	2.056743105	0.401656411
1974	4.845615262	2.161727458	0.369803239
1975	4.39145339	1.992536206	0.369573112
1976	4.816782796	2.188887914	0.376305596
1977	5.109894749	2.314104795	0.37874708
1978	4.88305235	2.307757777	0.392272181
1979	4.688511378	2.309641314	0.40601858
1980	2.540698322	0.728263104	0.205683466
1981	2.592260522	0.838674703	0.233467116
1982	3.188315971	0.930240852	0.22210379
1983	3.339352255	1.014442454	0.233777392
1984	3.134435929	0.98400832	0.23800304
1985	3.071419892	1.038212119	0.255000011
1986	2.801167701	1.058313619	0.278418029
1987	2.997384693	1.149958987	0.287677838
1988	3.029955665	1.225237644	0.304032537
1989	3.443825697	1.690602981	0.380438635
1990	3.513012678	1.649615396	0.365524211
1991	3.418201581	1.554936792	0.351938852
1992	2.652629229	1.104042187	0.302259583
1993	2.741854978	1.149111309	0.307096698
1994	2.852328196	1.179065481	0.306065688
1995	2.991853757	1.174803165	0.294300151
1996	3.067021513	1.206454854	0.296643342
1997	3.043368157	1.188956585	0.294051033
1998	2.846754961	1.028512342	0.267371422
1999	2.774228077	1.020578867	0.270407311
2000	2.815532583	1.049351045	0.275020858
2001	2.804095906	1.045017527	0.274708512
2002	2.745324954	1.033542816	0.275955446
2003	2.730204653	1.061856726	0.284664469

Table 4 Continued
Index of Estimate of variables in Production Industries

Year	OCC	Index	ROE	Index	ROP	Index
1949	3.23	100	1.18	100	0.27	100
1950	3.49	108	1.24	105	0.27	100
1951	4.12	128	1.32	112	0.25	93
1952	3.79	117	1.18	100	0.24	89
1953	3.64	113	1.22	103	0.26	96
1954	3.55	110	1.29	109	0.28	104
1955	3.64	113	1.28	109	0.27	100
1956	3.61	112	1.25	106	0.27	100
1957	3.6	111	1.25	106	0.27	100
1958	3.87	120	1.35	114	0.27	100
1963	3.82	118	1.71	145	0.35	129
1968	4.11	127	2.18	185	0.42	156
1970	4.12	128	1.88	159	0.36	133
1971	4.05	125	1.99	168	0.39	144
1972	3.94	122	2.08	176	0.44	156
1973	4.12	128	2.05	174	0.4	148
1974	4.84	150	2.16	183	0.36	133
1975	4.39	136	1.99	169	0.36	133
1976	4.18	129	2.18	185	0.37	137
1977	5.1	158	2.31	196	0.37	137
1978	4.88	151	2.3	195	0.39	144
1979	4.68	145	2.3	195	0.4	152
1980	2.54	79	0.72	61	0.2	74
1981	2.59	80	0.83	70	0.23	85
1982	3.18	98	0.93	79	0.22	81
1983	3.39	105	1.01	86	0.23	85
1984	3.13	97	0.98	83	0.23	85
1985	3.07	95	1.03	87	0.25	93
1986	2.8	87	1.05	89	0.27	100
1987	2.99	93	1.14	97	0.28	104
1988	3.02	93	1.22	103	0.3	111
1989	3.44	106	1.69	143	0.38	140
1990	3.51	109	1.64	139	0.36	133
1991	3.41	106	1.55	131	0.35	129
1992	2.65	82	1.1	93	0.3	111
1993	2.74	85	1.14	97	0.3	111
1994	2.85	88	1.17	99	0.3	111
1995	2.99	93	1.17	99	0.29	107
1996	3.06	95	1.2	102	0.29	107
1997	3.04	94	1.18	100	0.29	107
1998	2.84	88	1.02	86	0.26	96
1999	2.77	86	1.02	86	0.27	100
2000	2.81	87	1.04	88	0.27	100
2001	2.8	87	1.04	88	0.27	100
2002	2.74	85	1.03	87	0.27	100
2003	2.73	85	1.06	90	0.28	103

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