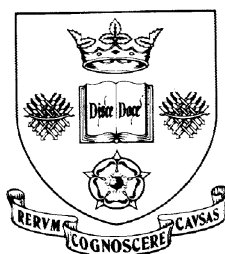


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# ECONOMIC CLASS AND THE DISTRIBUTION OF INCOME: A TIME-SERIES ANALYSIS OF THE UK ECONOMY, 1955-2010

Juan Carlos Cuestas<sup>1</sup>

Bruce Philp

## Abstract

This paper contributes to our understanding of the determinants and dynamics of a Marxian surplus-value rate using quarterly UK data, 1955-2010, and the Johansen (1988, 1991) cointegration and vector error correction model (VECM). A conceptual model is introduced to define surplus-value and its component parts, before elaborating on theoretical issues which are important in estimating the rate. In the empirical analysis we seek to explain distributive conflict, paying attention to three forces which are traditionally seen as drivers of power in distributional struggle: (i) political party; (ii) the size of the “reserve army” of the unemployed; (iii) working class militancy. Our results suggest a positive impact of unemployment on the rate of surplus-value, and that falling working class militancy tends to raise the rate. Political party also affects the rate of surplus-value with a negative impact on the rate emanating from movement to left-wing government. This analysis demonstrates the ongoing relevance of Marxian economics in providing an alternative, robust and significant explanation of distribution in the post-war UK economy.

**Keywords:** Income Distribution, Political Party, Heterodox Economics

**JEL Classifications:** D33, B51, C22

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## 1. Introduction

This paper is concerned with an issue of utmost importance for contemporary societies: the distribution of income between classes, defined by category of income.<sup>2</sup> Mainstream analyses of income distribution are usually constructed in methodological individualist terms, using rational-choice modelling, and focussing on the marginal products of labour and capital. In contrast it is a characteristic of various heterodox approaches — including post-Keynesian, institutionalist and Marxian economics — to focus on distribution in terms of economic classes (defined by income-source, i.e. wages, profit and rent), incorporating class power as an explicit driver of outcomes. In particular, Marxian economics regards surplus-value (to be defined presently) as an essential variable in the analysis of capitalism. And, in mature capitalism, we contend that such an approach remains highly relevant in examining distribution and conflict.

Although Marxian analyses have tended to look at the capitalist economy as a whole, there are Marxian microeconomic approaches to distribution. One set of such approaches — originating with Roemer (1980, 1982, 1988, 1994) — focuses on Marxian exploitation theory (which is concerned with labour time) using the language and techniques of general equilibrium and game theory. Roemer emphasises the differential ownership of productive assets as the primary normative inequity in capitalism, and the traditional Marxian formulation of exploitation, in terms of surplus labour-time, is secondary. This work has spawned a critical Marxian literature,

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<sup>2</sup> In this paper we have chosen to describe this as “economic class” since groups are defined and categorised by income flows. There are certainly social aspects to such class stratification, at least some of which are irreducible. Moreover some agents may, in a sense, belong to more than one class. This is discussed in section 2.

but there remains ongoing interest in Roemer's seminal work (Veneziani, 2007, Yoshihara, 2010).

In contrast to such a conceptual microeconomic treatment, the present paper adopts an empirical approach, using time-series econometrics and analysing distribution in macroeconomic terms. It is distinct from the aforementioned Marxian exploitation literature since it focuses on surplus-value rather than exploitation. This distinction is important because, *contra* Marx (1976, 671), the rate of exploitation can (and frequently does) diverge from the rate of surplus-value.<sup>3</sup> The empirical methods we propose to use do bear comparison to a second strand of Marxian research which has focussed on long-run trends in the rate of surplus-value (e.g. Weisskopf 1979, Moseley 1988, Shaikh & Tonak 1994). These approaches reaffirm that Marxian categories have an explanatory role to play in explaining the patterns we observe in real capitalist economies. And, it is this literature which the present paper contributes to by using the Johansen (1988, 1991) cointegration and vector error correction model (VECM) to examine the rate, and evolution of, surplus-value in the UK economy, driven as it is by changes in specific macroeconomic, social and political forces. This quantitative Marxist approach (see Dunne 1991) focuses on class-based income distribution emerging out of the production process.

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<sup>3</sup> Since the emergence of theories located in price systems inspired by Leontief, Sraffa and Arrow-Debreu, it has been possible to circumvent the problems of value which have plagued Marxian theory since the late nineteenth century. These approaches — described by some as “supply side Marxism” — focus on price in terms of the cost of labour and non-labour inputs, plus profit. In dynamic settings Marxist analyses have also explored effective demand and its role in crisis, examining the overlap between Marx, Keynes and Kalecki (see Trigg, 2006). Our “supply-side” approach concentrates on production.

The paper is structured as follows. We begin, in Section 2, by defining surplus-value in a Marxian sense, before considering a number of pertinent theoretical concerns. In particular the productive-unproductive labour distinction is rejected as an unnecessary artefact of classical economics (except insofar as public sector wages are not considered in the denominator of the surplus-value rate). Secondly, we recall Roemer's (1994) argument for treating the self-employed, conceptually, as exploitation-neutral. Using analogous logic we maintain that mixed income should be removed in estimating the rate of surplus-value. In Section 3 we calculate the quarterly surplus-value rate for the UK economy, 1955Q1 to 2010Q1, and consider the variables to be used to proxy the balance of class forces. Before concluding, the penultimate section uses the Johansen (1988, 1991) cointegration and vector error correction model to examine changes in the rate of surplus-value as a consequence of changes in the balance of class forces, including the extent of working class militancy (measured by aggregate working days lost to industrial disputes), the size of the reserve army of the unemployed and political party in power. In concluding we argue that macroeconomic variables, reflecting class power, are significant (and important) determinants of the rate of surplus-value, and that political party is also significant with the Conservative and Labour parties reflecting the class interests we traditionally associate with each.

## **2. Theoretical Underpinnings**

The notion of distributive struggle, formulated using Marx's concept of surplus-value, is central in Marxian analyses of capitalism. The rate can be decomposed in various ways, in each case encapsulating distribution between worker and capitalist. We can

identify two broad explanatory approaches which have been adopted with regards to the Marxian surplus-value rate:

1. Decompose the technical determinants (e.g. Gouverneur 1990);
2. Estimate statistical relationships between surplus-value and class struggle indicators.

In this section we will define the rate of surplus-value, relating the concept to prices, profit and wages.

In order to define surplus-value let us take a simplified economy (for elaboration and discussion in the context of exploitation see Roemer 1988, pp.42-46). For a given technology  $\{A, \mathbf{L}\}$  assume that  $A$  is an  $(n \times n)$  input-output coefficient matrix and  $\mathbf{L}$  is a  $(1 \times n)$  vector of *direct* labour inputs used to produce each of the  $n$  commodities. We shall assume the following:  $\mathbf{L}$  is measured by the number of employees working a given number of hours (the normal working week); the  $(n \times 1)$  vector reflecting (weekly) consumption by these workers (denoted  $\mathbf{b}$ ) is purchased at equilibrium prices; these prices are given by the  $(1 \times n)$  commodity price vector,  $\mathbf{p}$ .<sup>4</sup> Finally, we express the wage in money terms, written  $w = \mathbf{p}\mathbf{b}$

Given these definitions, and assuming that capitalists compete and only invest in lines of production that achieve the maximal profit rate, we may write the rate of profit from producing a unit of good  $i$  as follows:

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<sup>4</sup> The weekly time-frame suggested in this model could be substituted for months, quarters or yearly units, as long the unit of time which frames production and wages is the same. In the empirical analysis in section 3 the unit of time which defines our analysis is quarters.

$$r_i = \frac{p_i - (\mathbf{p}A_i + wL_i)}{\mathbf{p}A_i + wL_i} \quad (1)$$

Note,  $A_i$  is a column vector derived from the input-output matrix. Equation (1) is the rate of profit for good  $i$ , expressed as the price of one unit of good  $i$ , less the costs of producing it, divided by the same, i.e. the costs of the inputs (labour and raw materials). The equilibrium price vector is then derived as following:

$$\mathbf{p} = (1 + r)(\mathbf{p}A + w\mathbf{L}) \quad (2)$$

We shall assume that the rate of profit has a tendency to equalise as a consequence of classical dynamics (capitalists will always seek the highest rate of return); however, what the rate of profit does not give us is a ratio of the distribution of income in the capitalist production process, and it is this which Marx's rate of surplus-value provides. Essentially the rate of surplus-value for a unit of commodity  $i$ , denoted  $S_i$ , is the ratio of profits to wages paid in producing that unit of output.

Using logic analogous to that in equation (1), we may write the rate of surplus-value for a unit of a particular good  $i$  as follows:

$$S_i = \frac{p_i - (\mathbf{p}A_i + wL_i)}{wL_i} \quad (3)$$

Note, the rate of surplus-value is only going to be equal between sectors in particularly unusual circumstances. Logically, in calculating rates of return from

producing a commodity, capitalists are indifferent between profits which are a return to an outlay on raw materials ( $\mathbf{p}A_i$  in the case of good  $i$ ), or those generated by wage-labour ( $wL_i$ ). Since the rate of profit has a tendency to equalise divergence in the ratio of the former to the latter, between sectors, causes deviations in  $S$  across the capitalist economy. In this situation the rate of surplus-value will emerge as a vector reflecting differences in the ratio of  $\mathbf{p}A_i$  to  $wL_i$  (which is analogous to the organic composition of capital, in the absence of fixed capital, in Marx's system). On this basis, in formulating a rate of surplus-value in the capitalist macroeconomy, we derive the rate in aggregate ( $S$ ), reflecting class-based distribution in such activity.

This aggregate rate is equal to the sum of profits to wages paid in the capitalist macroeconomy (i.e. we exclude public sector wages which are generally paid out of tax revenues), where the constituent element unit levels are multiplied by an activity vector ( $\mathbf{y}$ ). If  $y_i$  is the output level for commodity  $i$  we may write:

$$S = \frac{\sum_{i=1}^n y_i (p_i - (\mathbf{p}A_i + wL_i))}{\sum_{i=1}^n y_i wL_i} \quad (4)$$

That is the rate of surplus-value (measured in aggregate) is equal to the ratio of aggregate profits to wages paid in the capitalist economy.

There are two theoretical issues which warrant some consideration prior to our empirical analysis. First, in previous empirical estimates of the rate of surplus-value the distinction between productive and unproductive labour has been applied (e.g. Moseley 1988). Although frequently applied in Marxian work this categorisation of labour is not straightforward. Of the many definitions used (see Laibman, 1992), the



analytic definition — which defines labour as productive if it creates surplus-value — is perhaps the most widely applied in Marxian economics. It is also the relevant concept when estimating the rate of surplus-value. In this paper we treat public sector wages separately from private sector wages, examining the rate of surplus-value in terms of the latter only. However, we do not exclude the wages of certain private sector workers (e.g. accountants), considered unproductive by Marx, for the following reason: once a complex social division of labour has taken place it is arbitrary to ascribe the source of wages, or surplus-value creating activity, to individuals or particular subsets of the capitalist economy. Since capitalism is a *system* it is incorrect to define some employees working in the private sector as exploited, and others as not, when both groups may be receiving the same wage, with equivalent background and conditions. In this paper surplus-value is conceived of as a relationship between classes working within the capitalist subsystem.<sup>5</sup>

A second conceptual issue presents itself in examining a two-class model. The self-employed (or petit-bourgeoisie) are empirically relevant. The conceptual formation of class has been discussed at length by Roemer (1988, 1994). Using microeconomic theory, and assuming rational optimising agents, he shows that five classes can emerge in a capitalist economy (where exploitation is mediated via the labour market): (i) pure capitalist; (ii) small capitalist; (iii) petty bourgeois artisan; (iv) semi-proletarian; (v) proletarian. Capitalists are, in essence, employers: proletarians are employed. However, some agents — small capitalists, petty bourgeois artisans and

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<sup>5</sup> An alternative approach to income distribution is provided by the Gini coefficient (for example see Roemer, 2008). This conflates wage and non-wage income, though such a measure has the advantage of being sensitive to wage inequality. The distribution of wages is an important intra-class issue. However, the purpose of our paper is to examine the inter-class distribution between wage and non-wage income.

semi-proletarians — are wholly or partly self-employed. For example petty bourgeois artisans work entirely for themselves, hence they do not extract surplus-labour, or profit, from another. In this sense they are exploitation-neutral. Semi-proletarians are partly self-employed, but also sell some labour on the labour market. They are exploitation-neutral while engaged in self-employed activity, but are exploited while engaged in paid work for another. Hence, in empirically calculating  $S$ , self-employed activity (and remuneration) is removed using analogous logic, and we focus on wage and non-wage income derived from employment in the capitalist subsector of the economy. This is estimated using data derived from the *Office for National Statistics* website, and other earlier sources not available online.

### **3. Variables and Data**

If decomposed there are various factors which can influence the rate of surplus-value. Changes in the length of the working week (for a given weekly wage) will change the rate, as will increased productivity as a consequence of technical change. Changes in the real weekly wage will also influence the rate. Another important determinant of changes in  $S$  is change in the balance of class power, which impacts on it via the various elements in a decomposition. For example, when unemployment is high we can speculate that the rate of surplus-value will be high because employers can force workers to accept reduced wages and work longer hours. In this situation the *cause* of movement in  $S$  is an alteration in the balance of class forces, and changes in the real wage and working hours are the mechanism through which surplus-value is increased.

Although class relations may be obscured in capitalist economies today, there remain identifiable income streams associated with work and non-work (which is the basis

for defining class in this paper). Political and economic forces may also influence these income streams. It is the relationship between surplus-value and these forces which will be considered in the following section. In particular we will be interested in the following variables: (i) working class militancy; (ii) the “reserve army” of the unemployed; and, (iii) the political party in power. Prior to this econometric analysis we will consider the measurement, and data to be used, in calculating variables.

The data sources used for each of our variables is outlined in appendix 1. The period investigated is 1955Q1 to 2010Q1 and this was determined, strictly, by the availability of data. For the purpose of estimation we define  $S$  as the ratio of profit to wages, excluding the self-employed and public sector workers. Thus, calculated quarterly, the numerator is the sum of the gross operating surpluses of public non-financial institutions, private non-financial institutions and financial corporations (seasonally adjusted, SA). The denominator is the total compensation of employees for each quarter, multiplied by the proportion of workers in private sector employment. The aggregate income variables used were in millions (£), at current prices. Since the proportion of workers in private sector employment was only available quarterly from 1999Q1 we interpolated quarterly observations from annual data using the method proposed by Lisman and Sandee (1964).<sup>6</sup> On the basis of these measures  $S$  is calculated quarterly for the UK, as presented in Figure 1.

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<sup>6</sup> In order to assess whether this procedure was reasonable we calculated an interpolated series (from the annual data) for the period 1999-2010Q1 and compared it to the quarterly series available from the ONS website for those years. Deviations were very small. The deviation of the predicted from the actual quarterly surplus-value rate only exceeded 0.2 percentage points in one quarter. Specifically, in 2008Q4 the interpolated level of  $S$  was 56.07% whereas the actual surplus-value rate using the quarterly figure was 56.57%.

The first cause of variation in  $S$  which we consider is the extent of working class unity, which we suggest is a partial manifestation of class consciousness. The capitalist strategy of “divide and rule” can, for example, be countered by trade union activity intended to strengthen the position of the working class in the distributive struggle. Union militancy is notoriously difficult to measure. In order to measure working class unity and “militancy” we shall consider strike action (measured by the number of days lost due to industrial action,  $M$ ) as a proxy for this. Some studies use the number of industrial disputes (e.g. Arestis & Biefang-Frisancho Mariscal, 1998); we initially used this measure, but we derived no long-run relationship and we would also argue that it is important to give greater weight to disputes involving larger numbers of workers, especially since we are concerned with aggregate wages and aggregate surplus-value.

The second independent variable we investigate is the claimant count. Since this variable is not available in an uninterrupted seasonally adjusted form for the period in question we have used the X12 procedure, available in EViews 6, to derive an adjusted series. The relationship between distribution and unemployment — or the “reserve army” — is a hallmark of the Marxian analysis of capitalism. In order to estimate the association between unemployment and  $S$  we will use the claimant count,  $U$ , to measure the size of the reserve army of the unemployed.<sup>7</sup> We hypothesise that in periods when the number unemployed is growing the balance of class forces shifts toward capitalists, thereby facilitating a rising surplus-value rate.

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<sup>7</sup> We do not investigate the causes of unemployment, though we may speculate on some of them. Technical change was one factor which Marx considered, and a tendency toward monopoly another (1976, pp. 781-794). Post-Keynesian approaches have focussed on aggregate demand and the role of investment (e.g. Arestis & Sawyer, 2005, Smith & Zoega, 2009). Since our paper is focussed on the supply side of the economy we do not explore such issues.

The logic of this is that when unemployment is high employers are able to force wages down, increase hours for those in employment (perhaps while shedding workers), or introduce new production methods. In other words unemployment acts as a bulwark for employers against workers, impacting on the elements considered in decomposition approaches.

In examining the political economy of distributive conflict the political party (of government) is of interest because of the historical constituencies of the Labour and Conservative parties. In the UK political system the latter receive significant funding from employers, via private donations, while the former are largely funded by trade unions. Hence, traditionally, the Labour Party is seen as the party of workers and the Conservatives the party of employers. Of course, there are dissenting views on this from within Marxian social theory, where the State is seen as a regulator of social relations between capital and labour. The goal of the State, in these circumstances, is to ensure the continuance of capitalism. As such, the argument goes, we cannot necessarily assume that the Labour Party will support the working class any more than the Conservatives. Both may be seen as elements of bourgeois democracy, indistinguishable in terms of their effect on the working class. Indeed, it may even be the case that the Labour Party exerts more influence over workers than the Conservatives, and surplus-value rates may be higher under them than the latter. The relationship between  $S$  and political party therefore becomes crucial in evaluating these two competing perspectives. In order to examine this we introduce the independent variable  $P$ , defined 0 if the Conservatives are in power, and 1 if the Labour Party is in power. A negative coefficient for this variable implies that workers do better, in gross terms, under Labour in comparison to the Conservatives.

## 4. Econometric Methodology and Results

Given our theoretical model (outlined in section 2) and data sources (section 3), this section analyses the effect of  $M$ ,  $U$  and  $PARTY$  on the long-run behaviour of  $S$ .

The expected long-run relationships, discussed above, are as follows:

$$S = f(M, U, PARTY) \quad (5)$$

In order to perform our analysis we transform  $S$  and the first two independent variables into natural logarithms, i.e.  $lS$ ,  $lM$ , and  $lU$ , and then apply the Johansen (1988, 1991) cointegration and vector error correction model (VECM):

$$DX_t = \sum_{i=1}^{p-1} \Gamma_i DX_{t-i} + \alpha\beta' X_{t-1} + \alpha\delta_0 Dum_t + \mu_0 + \varepsilon_t \quad (6)$$

This has a constant restricted to lie in the cointegration space,  $X_t = \{lS_t, lU_t, lM_t, PARTY_t\}$ ,  $\mu_0 = \alpha\beta_0 + \alpha_{\perp}\gamma_0$ , such that  $\beta_0$  is an intercept in the cointegration relationships and  $\gamma_0$  is equal to zero. The coefficient  $\delta_0$  represents mean shifts in the variables which do not cancel out in the cointegration space. Mean shifts are captured by a set of dummy variables,  $Dum_t$ . Note that this variable is  $PARTY$ .

We selected the number of lags for our VECM according to the Schwarz information criterion (from a maximum of 8). This was in order to control for autocorrelation and delays in the transmission process. Based on this criterion we used 8 lags, which is intuitively reasonable given the distributional effects of a change in political party, or the impact of wage bargaining, may experience long delays. The baseline model was checked for signs of misspecification — i.e. normality, autocorrelation and heteroskedasticity — and results are reported in Tables 1 and 2. The hypothesis of normality of the residuals was rejected. However, because the normality problem

arises from an excess of kurtosis, the estimators by maximum likelihood are robust (Gonzalo, 1994).

Table 3 presents Johansen's stationarity tests. The null hypothesis is rejected at the 5% significance level for  $r = 1$ . The choice of the cointegrating rank was made by looking at the trace test and roots of the companion matrix, which are reported in Tables 4 and 5. In this system we only have one cointegrating vector, although shocks have long lasting effects. The graph of the cointegrating relationship is reported in Figure 2, which mimics a white noise process.

Next, we test for weak exogeneity of the variables and the results point to the non-rejection of such a hypothesis for the variables  $DIM$ ,  $DIU$  and  $DPARTY$  ( $\chi^2(3) = 8.972$ , p-value = 0.03). This means that the error correction term will only appear in one equation, i.e.  $DIS$ . This result accords with our initial hypothesis, which explains  $S$  as a function of the rest of the variables. Thus, the identified cointegrating vector is:

$$l\hat{S}_t = -0.909 - 0.055 IM_t + 0.081 IU_t - 0.088 PARTY_t \quad (7)$$

(-3.258)
(-3.026)
(2.587)
(-1.794)

where the t-statistics appear in parentheses.

In order to test for the stability of the cointegrating vector and the adjustment parameter we display the graphical representations of the Hansen & Johansen (1999) tests in Figure 3. According to these tests the cointegration vector and loading parameters are stable.<sup>8</sup> We have also reported the impulse response function in Figure

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<sup>8</sup> Following Hansen & Johansen (1999) the  $R$  representation of the test is more relevant since it keeps the dynamics fixed during the recursive estimation. Given that the representation of the test is below 1 during most of the sample period we conclude that the parameters are stable. For the alpha matrix the test appears to be stable only

4, where it is noticeable that shocks have long lasting effects on surplus-value. This implies that, after a shock, the variable needs long periods to return to the equilibrium.

The results of this regression are interesting, indicating that the variables selected are indeed relevant in explaining the movements in the surplus-value rate. The first variable, working class union militancy ( $M$ ), is negatively related to surplus-value. We can interpret this as indicating that prolonged and deep strikes over the period in question diminish the rate of surplus-value, increasing wages relative to corporate profits. As workers are more militant then days lost to strike action increase, shifting the balance of class forces toward workers, causing  $S$  to fall.

The parameter on the second independent variable, unemployment (measured by claimant count), is also as expected. As the size of the “reserve” army of the unemployed increases this shifts the balance of class forces towards capitalists, causing  $S$  to rise. While our analysis does not demonstrate the mechanism through which this is mediated, we anticipate that this would be working through the impact on workers’ wage demands, pressure for cuts in hours, and the ability of workers to resist the adoption of new labour-saving techniques.

The coefficient for *PARTY* is also interesting, supporting as it does the hypothesis that workers benefit in the macroeconomic distributive struggle when the Labour Party are in power. This undermines the claim of some Marxists that both parties can be considered aspects of bourgeois democracy, suggesting that policy reform, to the advantage of workers, is possible. There are further reasons to suppose that this result

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after some initial years. However, given that this test is a recursive one, instabilities at the beginning of the period do not imply the existence of structural breaks.



may actually understate the benefit to workers from Labour governments. For example Labour has historically adopted more progressive tax regimes, both on corporate profits and worker benefits (such as working family tax credits). This notwithstanding, the result of our analysis over this extensive period suggests that workers benefit in the distributive conflict in gross terms.

#### **4. Conclusion**

The contributions of this paper are as follows: (i) it estimates the rate of surplus-value for the UK economy, 1955Q1-2010Q1; (ii) we show how the rate of surplus-value is related to various forces which, taken together, proxy the “class struggle”; (iii) contemporary econometrics is used to demonstrate the empirical validity of a Marxian model of contemporary capitalism; and, (iv) it has shown that mainstream quantitative methods can be applied to the Marxian case.

More specifically, our results suggest that working class militancy (measured by days lost to industrial action) has a profound negative impact on the rate of surplus-value, as Marxian economists would expect. Secondly, the traditional argument concerning the “reserve army” of the unemployed — which links rising levels of unemployment to increasing surplus-value — accords well with the historical record. Finally, when we examine the empirical relationship between UK political parties and surplus-value we generated a result consistent with the traditional view of Labour and Conservative policy. In moving from left-wing Labour to right-wing Conservative administrations surplus-value tends to rise, thereby suggesting that the traditional view of political party behaviour is borne out

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**Table 1: Univariate misspecification tests**

<b>Test</b>	<b><i>DIS</i></b>	<b><i>DIM</i></b>	<b><i>DIU</i></b>	<b><i>DPARTY</i></b>
ARCH	0.086	0.897	0.038	0.998
J-B	0.002	0.000	0.000	0.000
Skewness	-0.265	-0.168	0.543	-0.019
Kurtosis	4.232	4.828	13.445	33.274

Note: ARCH stands for Autoregressive Conditional Heteroskedasticity. J-B is the Jarque-Bera test for normality. For these two tests the p-values have been reported.

**Table 2: Multivariate misspecification tests**

Autocorrelation:	Ljung-Box	$\chi^2(720) = 772.0 (0.471)$
	LM(1)	$\chi^2(16) = 20.33 (0.205)$
	LM(2)	$\chi^2(16) = 16.64 (0.409)$
Normality		$\chi^2(6) = 1173 (0.000)$
ARCH:	LM(1)	$\chi^2(100) = 140.6 (0.005)$
	LM(2)	$\chi^2(200) = 192.4 (0.637)$

Note: p-values in parentheses

**Table 3: Johansen's stationarity test**

<b>r</b>	<b>DF</b>	<b>IS</b>	<b>IM</b>	<b>IU</b>	<b>PARTY</b>
1	2	0.006	0.009	0.005	0.002
2	1	0.384	0.139	0.333	0.089
3	1	0.584	0.101	0.138	0.492

Note: Restricted constant and weakly exogenous variables included in the cointegration relations. P-values are reported.

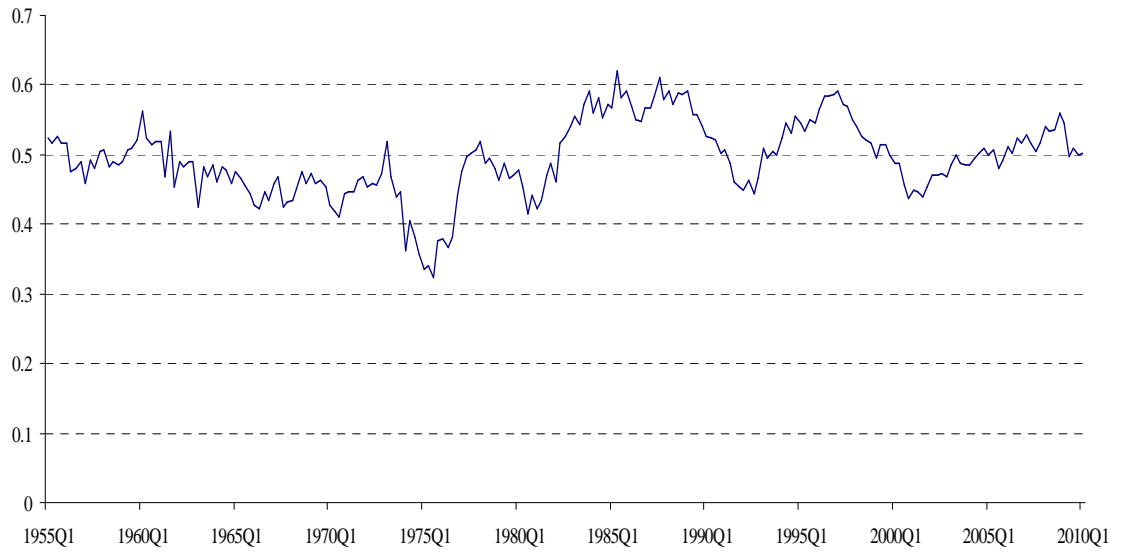
**Table 4: Trace test for the cointegration rank**

<b>r</b>	<b>Eigenvalue</b>	<b>Trace</b>	<b>p-value</b>
0	0.107	51.650	0.080
1	0.060	27.490	0.268
2	0.041	14.216	0.281
3	0.025	5.342	0.257

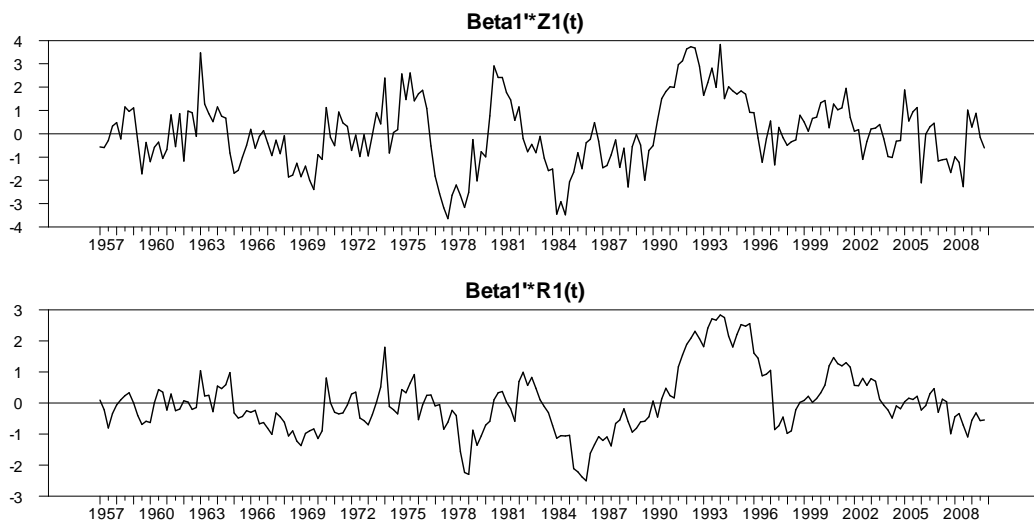
**Table 5: Companion matrix roots (modulus)**

<b>r=4</b>	<b>r=3</b>	<b>r=2</b>	<b>r=1</b>
0.981	1.00	1.00	1.00
0.981	0.983	1.00	1.00
0.924	0.929	0.983	1.00
0.924	0.929	0.926	0.921
0.898	0.893	0.859	0.921
0.868	0.893	0.852	0.845

**Figure 1: Marxian Surplus-Value in the UK: 1955-2010Q1**

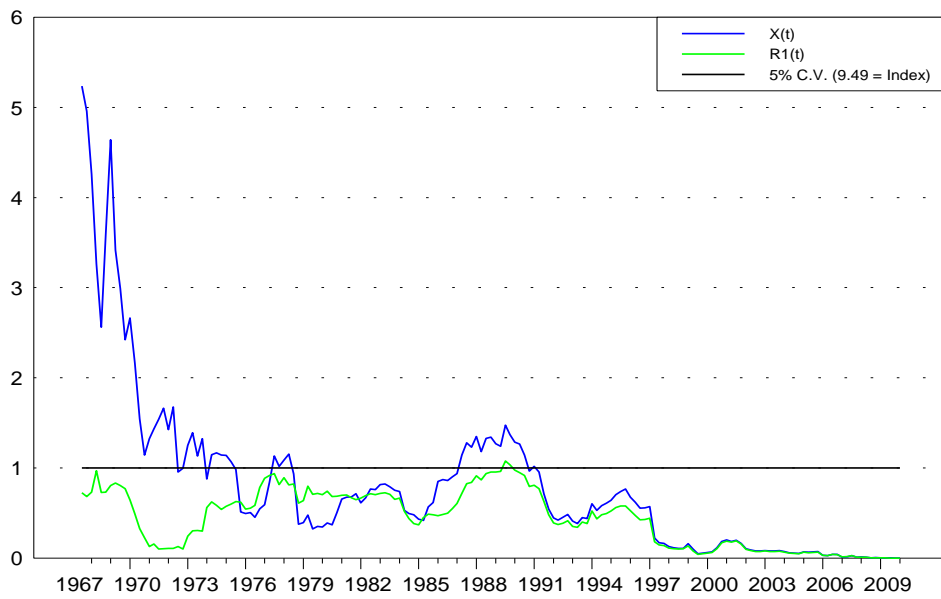


**Figure 2: Cointegrating relationship**

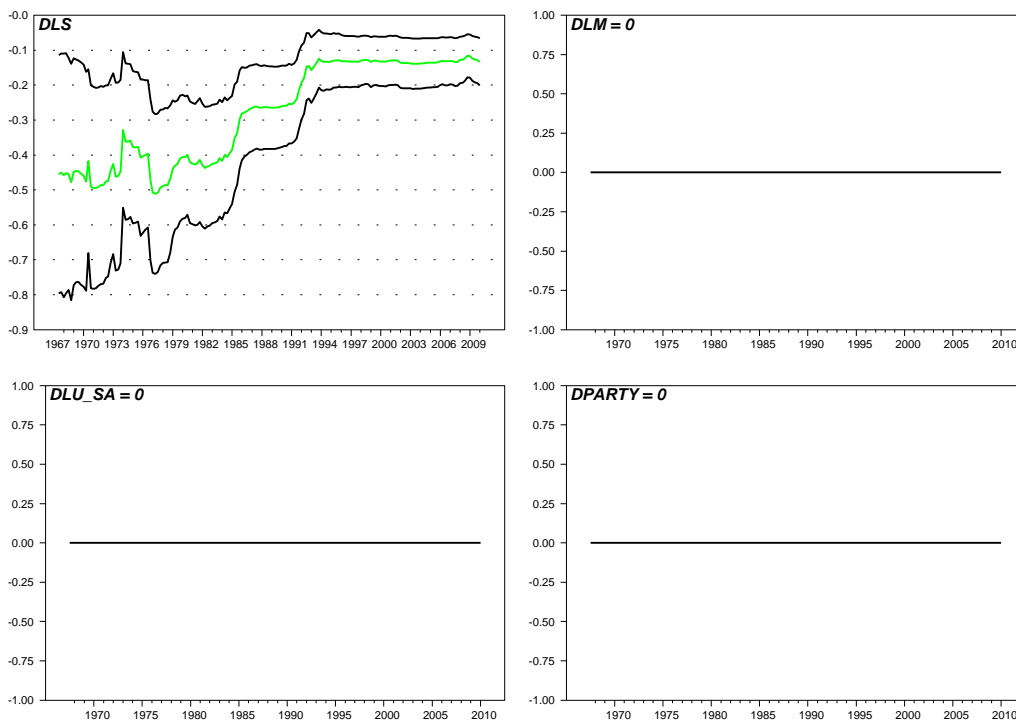


**Figure 3: Test for beta and alpha constancy**

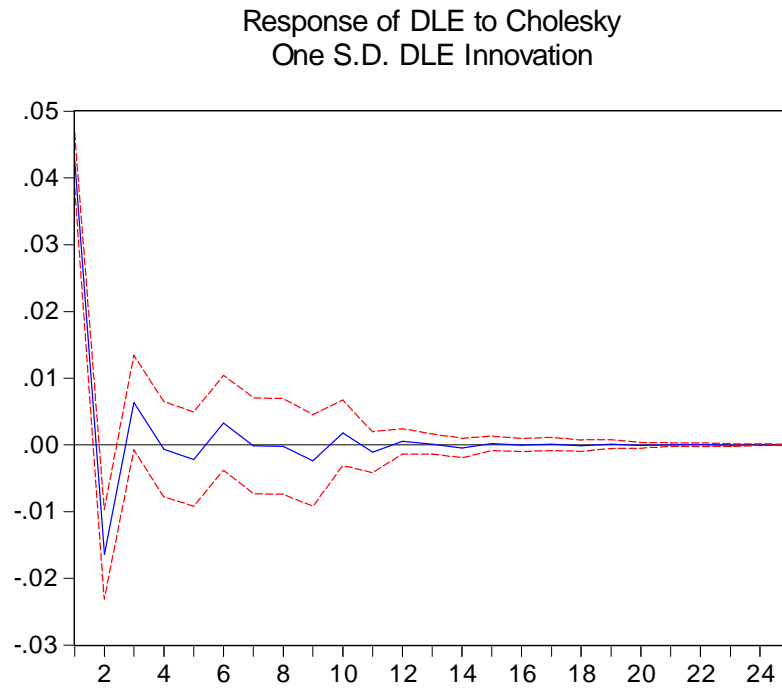
**Test of Beta(t) = 'Known Beta'**



**Alpha 1 (R1-model)**



**Figure 4: Impulse-response analysis**





## Appendix 1: Surplus-Value Statistics Quarterly UK

Abbreviation	Definition	Source
NHCZ	Total Gross Operating Surplus: Financial Corporations (SA)	Blue Book
CAER	Total Gross Operating Surplus: NFCos: Private (SA)	Blue Book
CAEQ	Total Gross Operating Surplus: NFCos: Public (SA)	Blue Book
DTWM	Total compensation of employees (SA)	Blue Book
DB37	Private sector employment as a proportion of the total.  From 1992Q2 this data was available quarterly. Quarterly observations for the previous period were interpolated using the method proposed by Lisman & Sandee (1964).	<b>1955-1968</b> Department of Employment and Productivity (1971) <i>British Labour Statistics Historical Abstract 1886-1968</i> . London: HMSO.  <b>1969-1991</b> <i>Economic Trends</i> 268, February 1976. London: HMSO <i>Economic Trends</i> 434, December 1989 London: HMSO <i>Economic Trends</i> 458, December 1991 London: HMSO <i>Social Trends</i> 13, 1983. London: HMSO <i>Social Trends</i> 14, 1984. London: HMSO <i>Social Trends</i> 20, 1990. London: HMSO  <b>1992-2010</b> ONS Website: <a href="http://www.statistics.gov.uk/statbase/ts-datasets.asp">http://www.statistics.gov.uk/statbase/ts-datasets.asp</a> (Accessed 10/01/2011) Derived
Surplus-Value ( <i>S</i> )	$(NHCZ+CAER+CAEQ)/(DTWM.DB37)$	
<i>PARTY</i>	Political party in government for all or most of the quarter.	House of Commons Library, Social and General Statistics Section, Election Statistics: UK 1918-2007 (Edmund Tetteh)
<i>M</i> (BBFW)	Aggregate strike days, quarterly, derived from monthly data.	ONS Website: <a href="http://www.statistics.gov.uk/statbase/ts-datasets.asp">http://www.statistics.gov.uk/statbase/ts-datasets.asp</a>

U (BCJA)

Claimant count (UK) – thousands (NSA)

Because of industrial action by employment staff the figure in December 1974 was not collected, so the 1974, Q4 figure is the average of the October and November claimant count.

November 1976 was the same, thus 1976, Q4, was a two-month average.

Due to industrial action the January 1975 and December 1976 are estimates.

**1955-1968**

Department of Employment and Productivity (1971) *British Labour Statistics Historical Abstract 1886-1968*. London: HMSO.

**1969**

*Employment and Productivity Gazette*. London: HMSO.

**1970-1978**

*Department of Employment Gazette*. London: HMSO.

**1979-1983**

*Employment Gazette*. London: HMSO.

**1984-2009**

<http://www.statistics.gov.uk/statbase/ts-datasets.asp>

(Accessed 12<sup>th</sup> August, 2009)