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The Labour Theory of Value, Risk and the Rate of Profit

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Abstract

The paper extends Marx's law of value to include the effects of risk. It shows how risk has its origins in the labour process and is transferred between labour and capital on an unequal basis and between capitals on a zero sum basis. An empirical test is then presented, which shows that the employment of labour increases risk from the point of view of the investing capitalist. The conclusion is that the employment of labour is a curate's egg from capital's point of view. On the one hand it is essential for the production of sustainable surplus value and therefore for competitive advantage and capital accumulation. On the other hand employment of labour renders such accumulation inherently risky and therefore commensurately more costly to the rational capitalist investor.

The Labour Theory of Value, Risk and the Rate of Profit

Introduction: The social origins of financial risk

Classical economics shows that labour is the source of value and that surplus arises from exploitation, or the capitalist's non-payment for some positive proportion of labour effort. In general, it can be shown that the accounting or money rate of profit is related to the underlying rate of surplus and can be positive only if the underlying surplus is also positive (Robinson, 1953). Where Marxist and Neo-Ricardian economists and critical accountants have addressed the issue of value they have concentrated only on value theory and rent (for example Steedman, 1977 and Cohen, 1981), neglecting risk. Similarly Bryer (1999a) suggests that labour values are the basis of objective asset valuations from the perspective of the balance sheet, but does not consider the pricing of risky assets in financial markets.

The principles governing financial accounting today follow from Marx's analysis of the circuits of industrial capital (Bryer, 1998, 1999a, 1999b), but again, these circuits are abstracted from the notion of risk in the associated cash flows. In Marx's analysis, risk is only partially present and in most cases Marx assumes certain cash flows. Bryer (1994) suggests that Marx's method can incorporate risk if the cash flows described are certainty equivalent and that Marx's notion of the equalisation of returns through the development of the insurance market is consistent with the market portfolio of modern financial theory. However the notion of certainty equivalent assumes a market mechanism that can carry out appropriate discounting. The contention of this paper is that risk is rooted in difficult to observe labour processes and does not in itself spring from the market mechanism in other than a zero sum fashion.

Tinker, (1999, p.655) meanwhile suggests that Marx's economic categories such as profit, wages and rents should be seen as socially relative phenomena. It follows that risk and the pricing of risk should also be seen in these terms. A recent study has extended both these perspectives to include consideration of risk (Toms, 2005), This paper extends the theoretical reconciliation of the labour theory of value to the capital asset pricing model in Toms (2005) and provides an empirical test of the social determinants of systematic risk.

Profit and risk: a theoretical model

The extension of Marx's framework to include risk is appealing for several reasons. First, financial risk itself cannot be manufactured or created out of nothing. Where markets in risk are created, for example derivatives markets, they are zero sum games (Telser, 1981). Mere gambling is socially unnecessary and does not promote economic development. Alternatively such markets can be justified in terms of social necessity where risk is a negative externality. For example, farmers may wish to hedge against exogenous climatic risk to their crops by selling forward, which they can do for a price. Once market relations are entered, risk becomes financial, with its aggregate level socially determined. The development of double-entry bookkeeping assisted its quantification (Bernstein, 1996, p.21). Risk is also approximately fixed in its aggregate, but with individual participants suffering disproportionate increases and others benefiting from corresponding weighted reductions. Changes in risk can thus be related to changes in society. For example capitalism and its institutions developed in part because powerful social groups were able to transfer risk onto weaker groups. Land-owning peasants displaced from the land and forced to sell their labour suffered a major increase in risk, trading secure for insecure employment. Capitalist employers on the other hand, were able to hedge their risk through providing work without security, notwithstanding lower wages.

Second, if it is accepted that the source of value lies in the production process and specifically with the actions of labour, then the creation of value through the expenditure of physical effort and even more so through mental effort, is imperfectly observable by the overseeing capitalist. Most management accounting techniques are intended to overcome this problem in one way or another. Imperfect observation is a source of risk to the employing capitalist arising directly from the source of production. Using Marx's categories, the ratio of surplus value to variable capital (S/V) contains information asymmetries within certain bounds of labour process control.

Third, recent trends such as the attempt to create a flexible workforce, supported by the writings of management theorists (eg Atkinson, 1984) and labour market reformers, have the appearance of an attack on the rights of workers. Armstrong (2001) describes fixed overhead bases within firms as employment 'shelters' (Freedman, 1984), used as a defensive reaction by employees against the threats of casualisation and unemployment. Associated growth of employment

insecurity using official statistics has been documented for the closing decades of the 20th century (DeGrip et al, 1997). Armstrong (2000, p.386) and Hopper and Armstrong (1991) argue the role of accounting controls is to extract more effort for a given wage bill, and in addition to throw the costs of economic fluctuations onto the workforce.

Attacks on fixed cost shelters are increasingly common, but their purpose is not entirely consistent with a theoretical framework based only on value in the absence of risk. According to a more limited framework based on value alone capitalism is motivated to maximise the absolute mass of profits, albeit with the corollary of a declining rate of profit. In such circumstances capitalists have the incentive to establish, not dismantle, fixed cost shelters, for example by investing in high fixed cost high-throughput production techniques. Only in conditions where total profits were expected to enter a phase of long run secular decline would the policy of dismantling cost shelters make sense. However, this problem disappears if value flows are stochastic and profit (qua rent plus surplus) can also be equated with risk transfer between social groups. Now the capitalist's incentive incorporates risk minimisation or risk adjusted value maximisation, seeking the maximum rate of profit, but with minimum variation in the profit rate. At the limit, such variation can be reduced to zero where labour and other costs are made to vary perfectly with the realised value of output. The transfer of risk from capital to labour in this sense is rational, consistent with Marx's underlying framework and explains why profit maximising capitalists may nonetheless avoid high fixed cost and high absolute profit opportunities.

There are several potentially interesting implications, explored next in more detail. The first is that the observed rate of profit will differ from the rate of profit computed from socially necessary values according to the risk associated with the underlying business cash flows. The difference consists of rent, accruing to the capitalist where the observed profit is greater, and to a third party where it is less. For example if a capitalist rents land at a fixed price, the risk to the landlord is zero, since his return is guaranteed. Meanwhile the risk is made proportionately higher for the capitalist as the rate of profit varies with changes in demand. In this case there is a rent transfer from the capitalist to the landlord. Where agreements vary, such that the capitalist can escape commitment to rental payments in the event of a downturn, eg by leasing arrangements, short notice withdrawal etc, the risk is transferred from the

capitalist to the landlord. In general, risk (β) faced by an individual capitalist i depends on the relative variability of the rate of profit (surplus, S) with the variability of aggregate S for the whole economy, m.

$$\beta_i = \frac{\Delta S_i/(S_i+V_j+C_i)}{\Delta S_m/(S_m+V_m+C_m)} \qquad (1a)$$

More precisely, assuming no other cost categories, it depends on the ratio of fixed rental (FR) to total rental cost (TR) relative to the aggregate ratio for all firms in the economy:

$$\beta_i = FR_i/TR_i \div FR_m/TR_m \qquad (1b)$$

For the individual capitalist, the expected money profit rate (S/M), where M = money capital (comprising $S + V + C$), is equated to the underlying cost structure as follows:

$$s_i/C_i = RF_m + (s_m/C_m - RF_m)\beta_i \qquad (2)$$

From the point of view of the individual capitalist, insofar as the cost structure is determined by the rental conditions imposed by landlord, j, whose income varies accordingly, risk is determined by:

$$\beta_i = \frac{s_i/C_i - sj/Cj + \{(s_m/C_m) - RF_m\}\beta_j}{(s_m/C_m) - RF_m} \qquad (3)$$

In other words the β risk co-efficients of the two social groups are in a linear and inverse relationship.[1]

In the neo-classical literature, transfers of risk between market participants have been modelled extensively, but risk transfers within and as part of the labour process have been ignored, both by the neo-classical literature and the Marxists,

[1] For simplicity, a single capital turnover is assumed throughout.

thereby preventing useful extensions to the CAPM.[2] Significantly, the Marxists, including accounting researchers have also ignored these social dimensions of risk transfer. Intuitively this suggests that value and risk need to be equated in classical economics, value theory and accounting theory just as they are linked by the neo-classical capital asset pricing model.

To accommodate risk arising from the labour process, assume that at the limit, the transfer of labour effort into the labour process is observable only by the individual worker. This follows logically, but is more obviously true where the labour process is mental as opposed to physical.[3] If the output is physical this is more directly observable by supervisors. It is also more obviously true where production is team-based and there is an uncertain and potentially unascertainable number of permutations of team membership, each of which is likely to result in sub-optimal team performance to some degree (Lippman and Rumelt, 2003). In general, without perfect oversight, labour can earn rents or the capitalist can spend money on supervisory and other costs. In aggregate, the costs might be expected to be equal and amount to a zero sum game, although their aggregate level will vary across sector or across firms within sectors insofar as the labour processes differ.

The final assumption to be relaxed in the model is the assumption of the single period capital turnover and the implied automatic realisation of all invested capital. Where these conditions do not hold, further elements of risk are introduced through finance and realisation lags (Foley, 1986, p.68). In these cases the effects of fixed elements of variable and constant capital result in accentuated risk and higher required rates of return for the capitals involved.

On the surface, the formulations above look like an extension of the CAPM approach. In contrast the main problem for the CAPM approach is that its inputs come from market prices, mostly without reference to the underlying determinants of profit. If the argument is that risk is leveraged from the underlying cost structure, as an

[2] Some of this research has examined the valuation of human capital using a financial markets perspective (Richard, 1975; Svensson and Werner, 1993; Koo, 1998, Quin (2002). Quin's HCAPM sheds light on the empirical evidence of the effects of human capital on securities' expected returns reported by Campbell (1996).

[3] Even where the effort is mental, the labour process is still potentially subject to de-skilling, although constant revolutionising of the production process may prevent de-skilling for a time, as argued by Braverman (1975).

extension of financial leverage per the Modigliani and Miller (1958) formulation, then there are clearly some weaknesses for the conventional method of accommodating systematic and residual determinants of risk in individual companies. To identify discount rates, the starting point of the 'conventional' method is to identify a quoted company already engaged in the proposed line of business. Next, share price data is used to estimate the quoted firm's beta. To strip out the effects of borrowing in the quoted firm's capital structure, the 'equity' beta is then adjusted through an un-gearing process. The resulting 'asset' beta is then re-geared, to reflect the proposed financing of the project in the firm conducting the investment (Watson and Head, p.254). There are several problems with this approach. First, the estimate of the quoted firm's beta depends on historical share price variation (usually over a five year period), during which period there are distorting events and random shocks. These past data are not necessarily suitable for forecasting the future. Second, other factors, such as firm size and potential financial distress also impact on aggregate systematic risk. Empirical research shows that equity beta does not substantially explain the cross section of stock market returns, whereas these alternative factors might (Fama and French, 1996). Third, from an internal management point of view, accountants rely on expensive financial databases or other forms of costly data collation. Their purpose though is to obtain a proxy for risks, which in substantial part are more perfectly observable within the firm through analysis of cost structure and underlying contracts. Capital market analysis may imply a beta of one value, whereas the assumptions derived from the business planning process rely on budgetary assumptions about cost behaviour, which may imply a beta of a quite different value. In other words, management accountants understand cost behaviour for budgeting purposes, but do not factor it into risk adjustment in their NPV analysis. Fourth, at no point in the conventional procedure is the value of the asset beta checked with reference to underlying fundamentals. Although the operating leverage method is referred to in some finance texts, it is not used extensively and has not been developed to include aggregate or cost-category based betas, for example to measure systematic risk arising from the employment of labour.

These are important causes of inaccuracies at the individual firm's level. On average, however, there might still be a relationship between fundamental cost behaviour and share price reaction. A crucial point, however, which allows the above objections to stand, is that the causality assumed here is from accounting

fundamentals to stock market response. The traditional method begins with the stock market and works backwards, but in incomplete fashion.

An empirical test

From the above discussion several likely empirical relationships can be inferred. Because risk to the capitalist is a function of the underlying cost structure of the firm, which in turn reflects the contractual arrangements between capitalists, other capitalists, workers and landlords, the fixity or variability of these arrangements affects the distribution of profits and risk between the social groups. More specifically, it follows from the above discussion that the risk from the point of view of an equity-holding capitalist will be a function of the level of aggregate fixed cost. These costs can be grouped into those associated with the financing of the firm, proxied by financial leverage and residual fixed costs proxied by the operating leverage. To examine the effect specifically of labour cost and its degree of fixity, a labour beta can be calculated using (2) above as a proxy. It is possible to extend the approach to consider all categories of cost, but as labour is the most common category across industry sectors and the key theoretical variable of interest, the empirical research was limited to this category only. In differences in risk might be expected as a function of differences in the organic composition of capital. This is best proxied by grouping firms according to industry norms. To test the influence of these factors on observable risk, proxied by market equity betas, data was gathered for each proxy in the following model:

$$\beta = a_0 + + a_1 BLAB + a_2 DOL + + a_3 DFL + a_4 LtoS + a_5 G + a_6 MC + a_{7,1} D_1 + a_{7,2} D_2 + \ldots + a_{7,n-1} D_{n-1} + e \qquad (4)$$

where β for each company in the sample is obtained from *Datastream*. D_1, D_2, …, D_{n-1} the industry dummy variables, n the number of industries in the sample.

BLAB is a proxy for labour risk arising from specifically the fixed costs of labour. It is calculated as follows:

$$BLAB_i = S_i/(S_i+V_i) \,/\, (S_m/(S_m + V_m) \qquad (7)$$

Where S_i and V_i are respectively the surplus defined as sales minus labour cost and the labour cost of firm *i.* S_m *and* V_m represent corresponding averages for the market as a whole. The components of both were obtained from *Datastream* using five-year averages.

The use of the Degree of Operating Leverage (DOL) to explain beta has been the subject of a limited number of indecisive studies (Lev, 1974, Brenner and Smidt, 1978; Gahlon and Gentry, 1982; Mandelker and Rhee, 1984, Li and Henderson, 1991, Lord, 1996), none of which use recent UK data. When estimating leverage effects, most of these studies rely on regression methods. However there are a number of disadvantages associated with this approach. For both of the regression techniques, the underlying assumption is that leverage does not change during the estimation period. Moreover a sufficient estimation period is required, which is expected to be longer than the beta estimation period of 5 years commonly used in practice. In the tests conducted below, following Lord (1996), DOL is used to proxy for the presence of fixed cost, as follows:

$$DOL = \%\Delta X \,/\, \%\Delta S \qquad (5)$$

Where %ΔX and %ΔS are the percentage changes in earnings before interest and tax and in sales respectively, both of which are obtained from *Datastream*. For each firm the ratio is calculated for each of the five years 1999-2003 inclusively and then averaged. The Degree of Financial Leverage (DFL) calculated in similar fashion as the percentage change in profit after interest associated with a percentage change in profit before tax, or mathematically,

$$DFL = \%\Delta Y/\%\Delta X \qquad (6)$$

and where Y is the profit after-interest and X is the profit before interest.

In addition to the fixity of labour cost measured by BLAB, it is also useful to consider labour intensity, measured by the labour cost to sales (LtoS) ratio. It is

computed by the ratio of annual total employment costs to annual sales. Notwithstanding the empirical research concerned with finding the determinants of beta, the inclusion of BLAB and LtoS are unique to this study.

Growth rates, size, and industry membership are control variables and joint proxies for the organic composition of capital. Equity growth rates (G) are calculated as follows:

$$G = E_t / E_{t-1} \qquad (8)$$

Where G is the growth rate and E is the equity capital (share capital and reserves item in the balance sheet). According to the predictions of the standard CAPM and dividend growth model formulations, growth is an important determinant of equity beta.[4] Size is measured by market capitalisation (MC), which is the product of the market price and the total number of shares outstanding. All the above measures are simple five-year averages for the years 1999-2003 inclusive. There are significant effects of industry group on beta even after controlling for the underlying firm's balance sheet characteristics (Rosenberg and Guy, 1976), and some sectors are more or less insulated from general economic events (Rosenberg and Rudd, 1982). To capture these effects, the sample were grouped into industry sectors most likely to pick up these effects, for example cyclical and non-cyclical (CYC and NCYC), general industries, basic, utilities and resources (GENIN, BASIC, UTIL, RESOR) and information technology (ITECH). Taken together the control variables coupled with DFL provide a parallel test of the conventional view of the CAPM determinants of beta.

Table 1 shows descriptive statistics for the variables used. The DOL, LtoS, G and MC variables were log transformed to approximate more closely to normality, but as table 1 shows remained significantly non-normal. In view of the kurtosis in these variables, sensitivity tests using non-parametric quantile (median) regression were

[4] $\beta = DY + G/(Rm - Rf)$ where DY is dividend yield.

favoured over outlier deletion. Heteroscedasticity consistent standard errors were used in all appropriate regressions. Results are summarised in table 2.

Table 1 about here

Table 2 about here

Model 1 shows the results for the full model including all the industry variables.[5] All non-industry co-efficients are significant except the log-transformed DOL variable and the DFL variable. By definition, the DOL variable overlaps the BLAB variable. However, DOL remained insignificant when the BLAB variable was dropped from the model, suggesting noisy interactions in the non-labour elements of fixed cost. Models (2) and (3) show progressively parsimonious models, excluding first the lnDFL, lnG and the insignificant industry variables, then DOL, which was consistently insignificant in all models tested. Of the industry variables only utilities, non-cyclical and information technology were consistently significant. In the former two cases the relationship was negative, suggesting membership of these industries was likely to reduce beta. LtoS was significant in all models tested suggesting a positive relationship between labour intensity and beta. Growth and size control variables were also consistently and positively significant.

Models (4) and (5) show the significance of BLAB in isolation from the other variables. Model (5) is a non-parametric specification to test for the sensitivity of outliers in the non-normally distributed BLAB variable. The consistent positive significance of the BLAB variable relative to the more generally defined DOL and the complementary significance of LtoS suggests strong support for the hypothesis of socially determined risk. Fixed labour cost combined with labour intensity, accounts for a considerable degree of variation in corporate beta. In contrast more general fixed cost, proxied by DOL, and DFL does not explain risk. This result should not be in the least surprising, given the definition of the BLAB variable and the specification of the model. However, the empirical proof is worthwhile, because conventional financial

[5] 'Basic Industries' (n=31) was the industry category chosen for exclusion.

analysis ignores these relationships. Finance texts are full of calculations on how to adjust the equity beta to control for the presence of fixed interest charges. However, there is nothing on how to deal with fixed labour cost, or indeed any other fixed costs, notwithstanding their obvious impact on the variability of equity cash flow.

The significant and positive relationship between information technology stocks and beta is to be expected given the 'dot-com' boom, which took place during the years of the survey. However, the interpretation here is different *vis-a-vis* prior studies. Consistent with the argument in earlier sections, risk arises from social interactions and the organic composition of capital in this sector differs as a function of its physical capital, knowledge base and asymmetric information between promoters and equity investors.

Conclusions

Market analysts tend not to rely on ratios incorporating labour values. However the conventional approaches are misplaced, as the variability of labour cost provides a great deal of explanation of the variability of share prices. The relationship is not surprising, since as has been shown, as labour is the source of value and profit, the variance of profit naturally depends on the variance of labour. Therefore the employment of labour is a risky proposition from the point of view of the capitalist. Rational capitalist behaviour accordingly comprises the employment of labour and concomitant attempts to offload associated risk.

Analysis of risk in this fashion, with reference to accounting fundamentals promotes accounting in a research agenda hitherto dominated by financial economics and addresses research questions that have not been addressed satisfactorily by conventional methods. (For example the value of a share can be ascertained by accounting fundamentals instead of regressions of noisy and historic stock market data). It has been suggested that a problem for the UK economy is that the influence of stock market-based finance promotes short-termism in firm investment behaviour. In particular, this promotes the use of artificially high investment hurdle rates and attenuates the level of investment. So far this research agenda has been addressed by economists (see Mayer, 1997, for a review) and the issue has been the subject of

considerable recent debate (Hutton, 1996). The accounting-based empirically driven survey proposed here will add new dimensions to the issue and to the research evidence. Risk management will remain high on the agenda. The EU's Modernisation Directive (2003/51/EC), to be implemented in member states in 2005 requires directors to give attention to the major risks and uncertainties faced by their businesses.

From the point of view of capital and capital theory, labour-based systematic risk acts as a constraint on the development of the productive forces. Such risk can be reduced in the extreme case through total alienation in the labour process, so that workers are de-skilled and substitutable (Marx, 1976, p.788), combined with total transparency and flexibility so that they are remunerated using piece rates and can be fired with no notice. However, if Marx's argument is developed so that labour's contribution extends beyond the mere physical and mechanical, under circumstances of total transparency and flexibility they can add no further value through innovation and creativity in the labour process beyond that currently contained, thereby preventing the development of the productive forces. This is a fundamental contradiction of capitalism.

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Table 1: Descriptive statistics

Panel A: Variable descriptors

Variable	mean	sd	skewness	kurtosis	swilk pval
beta	0.911	0.353	0.204	2.942	0.391
blab2	0.848	2.485	1.224	8.143	0.000
lndol	1.084	1.518	0.531	3.643	0.003
lndfl	0.141	0.537	0.768	6.932	0.000
lnltos	-1.677	0.582	-0.391	2.609	0.017
lngrow	0.153	0.204	0.970	5.826	0.000
lnsize	6.034	1.335	0.589	2.689	0.000
basic	0.188				
cyc	0.513				
genin	0.094				
itech	0.044				
ncyc	0.106				
resor	0.025				
util	0.031				

Panel B: Correlation matrix

	beta	blab	lndol	lndfl	lnltos	lngrow	lnsize
beta	1						
blab	0.1698	1					
lndol	0.0982	0.0671	1				
lndfl	-0.0117	-0.0277	-0.0773	1			
lnltos	0.2281	0.2162	0.0906	-0.1197	1		
lngrow	0.0725	0.0597	-0.297	0.0455	0.0588	1	
lnsize	0.2061	-0.0668	-0.0218	0.0644	-0.1071	-0.1199	1

Notes:
[1] Shapiro-wilk test of normality. P-value indicates probability that the variable is non-normally distributed.

Table 2: Determinants of equity beta

Dependent variable = beta

	Model				
	(1)	*(2)*	*(3)*	*(4)*	*(5)*
Independent variable					
Blab	0.020	0.021	0.025	0.024	0.028
	(2.09)**	(2.23)**	(2.59)***	(2.21)**	(2.08)**
Lndol	0.022*	0.018			
	(1.41)	(1.22)			
Lndfl	-0.029				
	(0.43)				
Lnltos	0.070	0.071			
	(1.91)**	(2.12)**			
Lngrow	0.112				
	(0.75)				
Lnsize	0.116	0.115	0.114		
	(5.98)***	(6.15)***	(5.91)***		
Cyclical	-0.041				
	(0.81)				
Genin	0.017				
	(0.19)				
Itech	0.256	0.292	0.336		
	(2.32)**	(2.85)***	(3.22)***		
Ncyc	-0.446	-0.422	-0.447		
	(4.44)***	(4.22)***	(4.39)***		
Resor	-0.029				
	(0.25)				
Util	-0.847	-0.866	-0.857		
	(7.84)***	(8.36)***	(9.91)***		
_cons	0.355	0.356	0.259	0.891	0.877
	(2.38)**	(2.76)***	(2.29)**	(31.59)***	(21.12)***
N	160	160	160	160	160
F	11.91	20.77	25.47	4.89	
R-squared[1]	0.413	0.406	0.387	0.028	0.020

Notes:

[1] Adjusted in models (1)-(4), which are specified as ordinary least squares, and psuedo in (5) which uses median regression.

Bracketed figures are t-values, and in models (1)-(4) are based on White's (1980) heteroscedasticity-consistent variance matrix. They are based on positive one-tailed tests for the continuous variables and two tailed tests for dichotomous industry variables.