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Calculating profit: a historical perspective on the development of capitalism

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Calculating profit: a historical perspective on the development of capitalism

ABSTRACT

The paper introduces the notion of different methods of calculating and analysing profitability as signatures of capitalism at different stages of development. Its point of departure is Bryer's thesis of the capitalist mentality, which is subject to theoretical and empirical critique and developed in new directions. Interactions between the development of the productive forces and the socialisation of capital ownership jointly impact on these signatures, such that profit calculations are historically contingent. Aspects of feudalism, particularly restrictions on usury impacted upon accounting calculation, retarding their development. In the industrial revolution calculations reflected the scale and scope of specialised investment in plant, whilst the progressive socialisation of capital prompted a separate set of calculative practices. It was only in the twentieth century, with the unification of large scale industry and finance capital that the modern notion of profitability as return on capital employed finally developed.

INTRODUCTION

The 'Sombart thesis' that it is impossible to envisage capitalism without accounting (Sombart, 1916), has been usefully extended first by Weber and more recently by Bryer. Weber (1927) suggested that the specific signature of capitalism was not merely double entry bookkeeping (DEB), as suggested by Sombart, but the existence of the capital account which supports rational computation of income yield through modern bookkeeping. Bryer (2000a, 2000b, 2005, 2006a, 2006b) develops the point, arguing *broadly* that what is important is the capitalist mentality, evidenced by the *type of calculations* that accounts are used for and manifested as accounting signatures. More *narrowly*, Bryer (2005, p.25) identifies capitalism with the calculation of rates of return and more specifically still, the return on capital employed (ROCE). In doing so, Bryer offers a completely new and ingenious perspective on the relationship between accounting and capitalism (Chiappelo, 2007, p.274).

In view of the potential importance of Bryer's contribution, this paper seeks to offer a measured critique of the arguments and evidence as presented primarily in recent papers in this journal and elsewhere, in the form of a systematic historical survey of profitability calculations. Whilst one might wish to be broadly supportive of Bryer's approach as a means of taking forward this important area of debate, there are a number of points requiring further development before this can be done. First, if there is to be an understanding of the accounting and capitalism relationship as a series of transitions in the development of a calculative mentality, which is a feature of Sombart and Weber as well as Bryer, the role of scholastic doctrine in the retardation of such development needs greater recognition. Specific aspects of the feudal superstructure, the usury laws, the 'just price' (the social regulation of prices at cost of production), and related scholastic doctrine, significantly undermines the likelihood of feudal and capitalistic calculative mentalities as described by Bryer.

Calculative mentalities described in such terms lead to a second problem. Accounting signatures, such as the feudal rate of return, which for Bryer (2005, pp.29-30, & figure 2) is the accounting signature of capitalistic merchants, and the rate of return on capital employed in production, signifying the full capitalist mentality, are questionable as interpretations of Marx, and of doubtful benefit as indicators of the transition from feudalism to capitalism. Finally, as far as empirical evidence is concerned, Bryer's hypothesis predicts and makes claim to widespread use of rate of return calculations from a relatively early date. However, as will be demonstrated, when this evidence is exposed to detailed scrutiny, these calculations do not correspond very well to Bryer's signatures, and fully capitalist return on capital employed calculations make a much later appearance than suggested in his previous

empirical surveys. As is the case with the majority of Bryer's research, Britain is the empirical focus of this discussion.

Return on capital employed (ROCE) requires careful definition, which is provided in detail below. In general it is defined broadly for the purposes of this article as the ratio obtained by dividing some measure of profit (as a flow of income) by some measure of capital (as a stock of wealth). It is evident however, that if ROCE is an accounting signature, there are a number of definitional permutations. As will be shown, the precise form of profitability calculations is historically contingent and they are subject to considerable variation. It is therefore necessary to offer a detailed definitional taxonomy of ROCE calculations, which is introduced at the beginning of the empirical section of the paper.

The theoretical contribution of this paper is to show that variation in the method of ROCE calculation reflects the organisation of the forces of production (the economic base) *and* the socialisation of capital (the social superstructure) *and* the process of their interaction. As Marshall (1982, pp.115, 117) suggests, the division of labour and horizontal and vertical integration of complex processes call forth the capitalist mentality in the form of systematic profit calculation whilst at the same time economic conduct is a negotiated outcome of social action and ideological constraints on action. The accounting signature is thereby manifested in corresponding and contingent analytical computations of profit and profitability. In other words, accounting technique and calculation is the outcome of a process that includes the capitalist spirit or mentality. Such an approach contrasts with much of the literature which sees the development of accounting technique as a precursor or facilitator of the capitalist spirit of rationality (Sombart, 1916, Weber, 1927, Winjum, 1971), or indeed the notion of capitalism itself (Chiapello, 2007). It is however, consistent with

interpretations that allow the co-existence of techniques in the same historical period so that reasoning itself is not a sufficient explanatory variable (Lemarchand, 1994), or a legitimation process for pre-existing moral attitudes (Carruthers and Espeland, 1991), or as signatures for categories of economic organisation (Bryer, 2000a, 2000b). Nonetheless an entirely new approach is offered to these debates by representing accounting calculation as a mutating dependent variable explained by the dynamic interaction of asset deployment and asset ownership.

The historical contribution of the paper is to re-examine Bryer's and others' evidence to show that accounting calculation as a signature can only be understood by the simultaneous consideration of the material basis of economic activity and the prevailing mentality. Admitting this approach suggests that instead of highly specific calculative methods as signatures of capitalism and feudalism, the evidence shows considerable diversity of method, unevenness of development and a relatively protracted evolution to what might be described as modern methods of capitalist calculation. In contrasting these to the methods employed under feudalism and the reformation, the paper answers a call for further research (Carmona and Ezzamel, 2006, p.125) by providing examples of how religion creates and enforces a notion of social order, and how accounting helps shape and secure this notion of order.

To develop these ideas, the remainder of the paper is set out as follows. The second section considers the computation of profitability ratios from the perspective of scholastic doctrine and accounting theory. It begins with a re-examination of the Sombart-Weber thesis and the origins of Bryer's calculative mentality from the perspective of medieval scholastic doctrine. It then considers critically the relationship of Bryer to Marx, showing that Bryer's exegesis of Marx places conceptual limitations on the application of an otherwise powerful analytical

approach. The section concludes with some theoretical support for a historically contingent taxonomy of profitability ratios. The third section reviews the empirical evidence, first through a re-examination of the case studies used by Bryer and then with reference to a second series of new examples which have not been referenced previously in the context of these debates. The fourth and final section draws conclusions.

PROFITABILITY: A THEORETICAL RE-EXAMINATION

Scholastic doctrine and the capitalist mentality

Capitalism is defined for the purposes of the current argument as a system of private appropriation of profit at any rate independently of interest rates or labour effort.[1] Such a definition is convenient for placing accounting calculation at the centre of the analysis of the development of capitalism. The definition implies that capitalism exists concomitantly with the notion of 'super-profits'. Capitalism is also about the private appropriation of profit, which is enforceable through contract and other institutions of law and governance. Because contracts are often incomplete, private enforceability is partial and therefore risky. The association between capitalism and excess profit also implies that there must be a measurement process, achieved by accounting techniques, such that profit can be ascertained. In Weberian terms this means the presence of calculable law, which would allow legal enforcement of such profits (Collins, 1980, p.928). Under pure feudalism, the required institutions of law

[1] Transitional and fully developed capitalism are specific categories for the purpose of these definitions, both of which correspond to a generic definition of capitalism, as a mode of production characterised by the private ownership of the means of production by a class to the exclusion of the majority of the population (Desai, 1991, p.71).

that presuppose a legal and measurable surplus did not exist and the creation of such legal codes was strongly resisted by the church (Greenfield, 2001). Transitional capitalism, whose emergence coincides with the erosion of the economic authority of the church, is evidenced by private enforcement of profit rates obtainable through legally regulated interest rates or through the application of labour.[2] Transitional capitalism and associated accounting measurement is thereby implicitly defined by the removal of complete intolerance to usury[3] which characterised feudalism.

These definitions suggest that it would be surprising to find return to capital calculations of any description prior to legalisation of lending to a prescribed maximum rate of interest in the reign of Henry VIII. Similarly under transitional capitalism it would be surprising to find such calculations that did not pay heed to usury laws and scholastic doctrine during the period of enforcement of legally regulated maximum rates. As in earlier periods, the law encouraged informers to enforce statutes against usury and oppressions including price fixing and other antisocial economic activities (Jones, 1989, p.93). It was however pressure from commercial interests on monarchs and parliamentarians that circumvented legal restrictions on lending (Tawney, 1925) and facilitated the rise of unbridled profit making. Dating this transition is more difficult, but as will be shown, the long lasting effects of scholastic doctrine deserve more attention than has been given hitherto by the empirical accounting history literature.

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[2] John Calvin (1509-1564) was the first to distinguish between business loans on which interest was acceptable and distress loans which should be made free of charge (De Roover, 1967, p.258, Noonan, 1957). In this sense Calvinism is an important ideological ingredient of transitional capitalism.

[3] In medieval times usury referred to the practice of charging interest in excess of the principal and since then as interest above the legal or socially acceptable rate (Visser and MacIntosh, 1998, p.175).

Restrictions on usury descended from tribal custom, Roman, and later ecclesiastical law, which opposed lending within the common group, and tended to permit it only when loans were made to groups outside the jurisdiction (Visser and MacIntosh, 1998, Weber, 1927, p.267-8) or came from sources 'outside the brotherhood of Christ' for example from Muslims and Jews (Aho, 2005, p.47). In this case, an important feature of intra-group transactions was elimination of risk through its socialisation, providing a material basis for feudal opposition to usury. At the same time, laws limiting gain from usurious contracts necessitated a parallel analysis of the nature of profit and its regulation through the notion of the 'just price' (Baldwin, 1959, p.8).

External trading activities created exceptions to the social elimination of risk and excess profits. 'Sea Loans' made between Italian merchants reflected differential levels of risk in voyages of differing length and perceived hazard and were therefore tolerable (Weber, 1927), as were interest bearing mortgages on trading vessels (bottomry) (Ashley, 1931, p.339-340). Most other loans considered usurious were opposed by the medieval church, culminating in the Council of Vienne (1311) (Aho, 2005, p.44, Visser and MacIntosh, 1998, p178). In the rural communities of feudal Britain, usury was 'at once too scandalous to be tolerated and too convenient to be altogether suppressed' (Tawney, 1925, p.20).

Social tensions and latent conflicts between the Church and mercantile classes ultimately erupted into the Protestant reformation and the beginning of the withdrawal of the church from the regulation of economic affairs. The withdrawal of the church from economic regulation of society has impacted on the historical relation between accounting and religion. As a consequence, researchers today confront a profane/sacred divide, used by some religious denominations (for example the Church

of England, [Laughlin, 1988]) to exclude economic considerations from religious affairs, (Carmona and Ezzamel, 2006, pp.119-20). In other settings, from ancient Egypt (Ezzamel, 2002, 2005) to Islamic societies past and present applying the Shari'ah (Napier, 2009, p.125) there is no such demarcation, leading rather to intertwined practices such as those still found in present day Iona, which reunite theology and economic regulation, accounting for time and money in their social context, based directly on biblical teaching (Jacobs and Walker, 2004, pp.367-68).

In the British context in particular Protestantism became the principal force behind the separation of the church from economic control. An important feature was the progressive dismantling of restrictions on lending,[4] in which Calvinists recognised the desirability of lending within the rich elite who carried on business using borrowed money (Weber, 1927, pp.267-71). From this recognition follows Weber's characterisation of capitalism as dependent on a calculable law and accounting's ability to determine capital's income yielding power (Weber, 1927, p.275). For Weber, this is achieved by striking the balance, a device first suggested by Simon Stevin in 1608.[5] However this process does not explain how capitalists carried out their calculations, be it in terms of calculative mentality (Bryer, 2000a, 2005) or, as suggested here, that as capitalism develops, a number of possibilities for computing income yielding power arise. These might include residual income, profit margin, and returns relative to different classes of capital. Because all of these methods potentially

[4] The 1571 Act explicitly allowed interest to be charged (at a maximum rate of 10%). A subsequent Act of 1623, amended this to 5% and there were further adjustments throughout the seventeenth (Grassby, 1969) and eighteenth (Pressnell, 1960) centuries. The framework of the 1571 Act remained in force until 1854 (Kerridge, 2002, p.74).

[5] In Weber (1927) 1698 was inserted in error for 1608 and Stevin did not prescribe the drawing up of a balance, rather he referred to the practice common amongst merchants (Yamey, 1994, p.254).

contained elements of income acquired without corresponding labour or risk, or implied prices that varied from the cost of production, such calculations were made difficult or impossible by the restrictions of scholastic doctrine, including lending at interest under the usury laws.

Scholastic doctrine therefore has serious implications for the development of capitalism, the capitalist mentality, and accounting, and moreover, represented the social enforcement of the labour theory of value (LTV). Aquinas and other Catholic scholars equated merchants' money to their tools of labour so that lending to others reduced their capacity to work and therefore entitled them to compensation for enforced idleness (Noonan, 1957, p.127; Ashley, 1931, p.392). Even architects of the Protestant reformation such as Luther argued that merchants' profits were indeed nothing more than the fruits of their labour (Tawney, 1960, pp.35-6), and condemned loans made at excessive interest (Marx, 1984, p.611, Homer, 1963, pp.79-80). The physiocratic sentiments of the LTV became even more embedded in orthodox political economy until the mid-nineteenth century (Tawney, 1960, pp.35-6), and with the emergence of the political economists came renewed attacks on usury (Child, 1694).[6] So, although Tawney is correct to suggest that the sixteenth century began the marginalisation of the church from economic affairs,[7] hostility to excessive profit remained a feature of secular pronouncements.

In turn the political economists (for example Cary, Smith and Ricardo), like the medieval schoolmen, were proponents of the LTV (Meek, 1973). Mercantilists,

[6] Tawney (1960, p.36) notes the first of these schoolmen was Thomas Aquinas and the last was Karl Marx. For, Marx the violent battle against usury is a demand for the liberation of commerce and the subordination of interest bearing capital to industrial capital (Marx, 1984, III, p.603) by political economists.

[7]

such as Nicholas Barbon, writing in 1690, argued that 'time' was the determinant of prices charged by Artificers, whereas for merchants the source of profit was interest.[8] The political economists' ideas reached their highest expression with Ricardo, for whom the LTV, located in productive activity, was the basis of attacks against the landlord class (Mátyás, 1985, p.15). It was not until the two decades following the death of Ricardo in 1823, when the LTV was adopted by representatives of the increasingly powerful working class movement (Hodgskin, Gray, Ravenstone, Thompson, Edmonds), that 'orthodox' economists reacted by rejecting the labour theory of value, for example Scrope, Read and Longfield, (Meek, 1973, pp.124-5), and began the search for an alternative theory (Bentham, Say, Senior, Bastiat). Utility theory, with its focus on the pleasure of the individual had its starting point conceptually in consumption (Mátyás, 1985) and legislatively in the laissez faire programme of the 1830s and 1840s (Polanyi, 1946).[9] Marx's persistence with LTV only confirmed its increasing isolation from mainstream economics. The spread of joint stock organisation and the socialisation of capital formed the material basis of the Austrian School, which, with consumption as its starting point, arrives through the process of economic imputation at the value of products through the value of the return, or capitalised expected dividends (Wieser, 1893, Mátyás, 1985, pp.19, 35).

The history of the LTV has important implications for the history of accounting. Capitalism does not abolish the LTV, but through developing its own institutions, overcomes restrictions on its practical enforcement. During the scholastic and classical periods, the application of LTV to the of value to merchant's profits so

[8] Barbon (1690). Meek (1973, p.17) points out that the Artificers approach to pricing is inconsistent with the notion of profit on capital.

[9] For example, the Bank Act, 1844, the Anti-Corn Law Bill, 1846 and the Poor Law Amendment Act, 1834 (Polanyi, 1946, p.138).

that they appear as wages and the general social unacceptability of excess returns, suggest that it would be extremely unlikely that businessmen would use accounts to compute the *ex post*[10] ROCE. As England's economic base expanded from the 15th century, *lucrum cessans* became the sine qua non of partnership accounting, so that as Ashley explains (1931, pp.399-401, 404, 412-416), the 'sleeping partner' Italian commenda system was supplanted, and partners only shared profits if they shared the risk. Because profit making without corresponding effort or risk was restricted by scholastic doctrine and law, the notion of just price or a justifiable accrual to labour effort, merchants, where not fully respecting these rules might hide usury in an *emptio venditio* (purchase-sale) by simply charging a higher price on credit sales than on cash transactions (De Roover, 1967, p.260).[11] Whilst such behaviour might allow the identification of profit on individual transactions, it was unlikely to promote the computation of profit at the level of the business unit.

The principal corollary of the above review of feudal restrictions and their necessary impact on the transition to capitalism, is that profit rates, where calculated at all, might be expected to show deference to legally acceptable norms, in terms of interest rates, entrepreneurship as labour effort, and the avoidance of manifestations of excess profit other than in long distance trade. As the above review also suggests,

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[10] Equalisation of risk through the Sea Loans system, associated development of insurance contracts, and the doctrine of *lucrum cessans* (loss of profit through merchants' labour), led to the revision of scholastic doctrine by Cardinal Cajetan in the early sixteenth century, such that differences in expected risk justified *ex ante* lending decisions at differential interest rates (Noonan, 1957, pp.252-255). The parallel doctrine of *turpe lucrum*, or ill-gotten gains, which specified the remedy for monopoly profit at the expense of unknown persons, as the requirement to give alms to the poor [as opposed to restitution under usury] (De Roover, 1951, p.498) would have reinforced this attitude.

[11] Such methods are similar to Sharia-complaint *murabaha* transactions in Islamic banking (Napier, 2009, p.126).

the decline of scholastic influence and the LTV was protracted, and the decisive break in this mentality might not be expected until the middle of the nineteenth century with the socialisation of capital in the form of joint stock share ownership.

Bryer's capitalist mentality and exegesis of Marx

Although Bryer has made a significant contribution to the notion of the capitalist mentality, his attribution of return to capital definitions to Marx imposes an unnecessary conceptual rigidity. Only two mutually exclusive profitability measures are used in Bryer's formulation, corresponding to the semi-capitalist and capitalist eras and their transitional (or 'capitalistic') and fully developed capitalist mentalities. Respectively, these are the feudal rate of return and the return on capital employed (Bryer, 2005, figure 2). The feudal return of return is defined (Bryer, 2000a, p.136) as the feudal surplus[12] divided by the initial capital advanced, and 'by contrast, the modern mentality aims to maximise Marx's capitalist rate of return, profit divided by capital employed in production.' As the quote suggests, Bryer believes this to be Marx's perspective, and goes on to say (Bryer, 2000a, p.136):

> From Marx's perspective, by contrast, only if DEB calculates the feudal rate of return on capital is there evidence of the capitalistic mentality, and use of DEB is only evidence of the capitalist mentality if it produces the return on capital employed in production.

Elsewhere Bryer argues (2005, p.35) that accounting signatures of capitalism correspond to 'capitalist' ROCE calculations where there are depreciation adjustments (Bryer, 2000a, p.146) and the real subsumption of labour.

[12] Feudal surplus is defined as the consumable surplus of commodities or cash directly appropriated (less collection costs) arising from forced labour, levies, privateering and royal charter (Bryer, 2000a, p.141); the examples cited correspond to Marx's examples of 'labour rent'.

These definitions do not follow from the premisses of historical materialism. For example if depreciation is a necessary condition for the capitalist calculative mentality, it is not possible to characterise organisations that do not possess depreciable assets as capitalist. It would seem inappropriate for example to classify a financial firm operating from a rented office, and participating in the capital circulation process, as non-capitalist. A similar question arises for firms that do not employ labour, but which otherwise have obviously capitalist attributes, for example a self-employed businessman with a 'rate of return' mentality. According to Bryer (2005, p.35):

'relative surplus value - the ratio of surplus value to wages - underlies the accounting rate-of-return on capital employed… [So] … the tell-tale signature of real subsumption is accountability for the rate-of-return on capital employed. Present value calculations *ex ante* and rate-of-return or residual income calculations *ex post* provide evidence that management is accountable for the rate-of-return on capital employed (Bryer, 2004b)'.

Present value calculations necessarily exclude depreciation and neither present value nor residual income calculations necessarily require deductions for depreciation or labour cost. Moreover, rather than characterise these methods as being sufficient determinants of the ROCE mentality, surely a historical materialist would find interesting reasons for such variants in the organisation and ownership of the means of production?

Marx, meanwhile, makes no reference to the rate of return on capital, either in the feudal/capitalistic or modern senses. Instead, Marx is interested in the analytical device of the rate of profit. Marx (1984, p.42) defines the rate of profit as the proportion of surplus to the total capital advanced, where the latter consists of a variable capital component, corresponding to the capital advanced as wages. The fixed component includes depreciation and other materials costs. In other words this

is a revenue based mark-up calculation that is only reconcilable to ROCE through consideration of capital turnover, subsequently written by Engels in a separate chapter (1984, Ch.IV). The purpose of Marx's analysis, supplemented by Engels, is to explain the relationship between the rate of profit, and the surplus value/variable capital component, not to present the reader with a textbook of contemporary accounting practice. As Engels points out (Marx, 1984, IV [F.E], pp.74, 76), 'the amount of variable capital invested in his business is something the capitalist himself does not know in most cases' and '…very few capitalists ever think of making calculations of this sort with reference to their own business…'.

In summary, Marx and Engels do not believe that capitalists are interested in using accounting data to measure real subsumption, and as far as they are concerned, if ROCE calculations are made, they can only be without reference to the analytical categories of Marx's formulation. Looking again at the last quote from Bryer above, because real subsumption (and the same might be said of depreciation) is not a necessary condition for computing ROCE from a set of accounts, it cannot be inferred that ROCE is a signifier of real subsumption (or a capitalist mentality in general). At the same time, where management is accountable for ROCE, it does not follow that they are at the same time managing the process of the real subsumption of labour. Indeed such calculations could be performed for a variety of other useful purposes, such as the reduction of a principal's monitoring costs. Therefore, whereas in all probability the real subsumption of labour and accounting for the ROCE co-exist, using ROCE to infer real subsumption is insufficient. The small theoretical likelihood of a causal relation between labour subsumption and ROCE potentially draws a question mark over Bryer's consistency with Marx's historical analysis.

Bryer makes only general reference to Marx's account of the transition from feudalism to capitalism in this respect, noting that it is Bryer's own project to derive 'the transitional forms of accounting that *should* appear from Marx's discussions of the transition' (Bryer, 2000a, p.136, emphasis added). Although one possible interpretation of Marx, it seems an unlikely one since Marx, unlike Weber, gave no recognition to the calculable aspect of technology, or to the causal importance of calculable law (Collins, 1980, p.928). Whilst Marx (1984, III, p.610) acknowledges the role of usury and merchant's capital in primitive accumulation, he downplays monetary factors together with inter alia economic ethics and the organizing role of religion (Collins, 1980, p.938). Citing Gilbart in a quote from 1834, Marx (1984, vol.3, p.610) suggests that 'In our times, it is the rate of profit which regulates the rate of interest. In those times (referring to the period of regulated interest rates from Henry VIII to Queen Anne) it was the rate of interest which regulated the rate of profit'. In other words, Marx is not expecting Tudor and Stuart merchants, 'capitalistic' or otherwise to be calculating profits other than with reference to interest rates as regulated by the usury laws. The implications are that the merchant's calculative mentality would be informed by this regulatory framework, rather than by Bryer's suggestion of the feudal rate of return.

For Bryer, a further determinant of the rate of return mentality for both capitalistic and capitalist economic organisation is the development of socialised capital.[13] For Bryer (2000b, p.328), 'Marx's theory predicts that feudal merchants

[13] Socialisation refers to the pooling of money reserves, whether through banks or capital markets (Campbell, 1998, p.134), which as a process applied to ownership begins with partnerships, extends through capital markets to promote the mobility of capital (Marx, 1984, p.196, Bryer, 2005, p.29), to its fullest expression as pooled capital on a globalised basis (Henwood, 1998, p.241, Desai, 2002, Toms, 2005), as restrictions on the transfer of capital are broken down. In similar and parallel fashion,

only became capitalistic, signatured by their use of DEB to calculate the feudal rate of return on capital, when they socialised their capital' (emphasis added). It follows that the triumph of the bourgeoisie in the mid-seventeenth century is nothing less than the victory of the rate-of-return mentality (Bryer, 2000a). The transition from feudalism to capitalism is explained thus (Bryer, 2005, p.30):

> Harnessing the merchant's rate-of-return mentality to the farmer's mentality of exploiting labour in production gave us the *capitalist mentality* of pursuing the rate-of-return on *capital employed*. It was revolutionary because it drove farmers, and then landlords, manufacturing entrepreneurs and ultimately managers, to constantly 'improve' production; to continuously increase the intensity and productivity of labour to earn an *excess return* on capital (emphasis added).

An excess return on capital implies a rate above some required rate, which for Bryer, originates in the 1690s. First citing Marx, Bryer (2005, p.30) argues:

> in a word, it [the National Debt] has given rise to stock-exchange gambling and the modern bankocracy…whose full development dates from the founding of the Bank of England in 1694" (Marx, 1976, pp.919-920). In these markets for social capital, the *required return on capital appears* and becomes related to market prices.
> (Emphasis added).

Dating the origins of ROCE calculations and the notion of the required rate of return to the 17th century is however problematic since capital socialisation was relatively incomplete. For such an outcome to be possible, it would be necessary for fictitious stock market capital to be realisable through the expansion of the credit system, or in other words the unity of commercial and bank capital through the medium of the stock market. Such unity, as Marx suggests, was embryonic in 1694, and pushed backwards by restrictions of market development following the bubble collapse of 1721 (Neal, 2000). The inclusion of industrial activities in required rate of return calculations necessitated the further unity of industrial capital with bank and

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capitalist property relations emerge and develop from the internal contradictions of existing property relations (Dobb, 1946).

commercial capital, in effect the creation of finance capital (Hilferding, 1981), which would suggest the hypothesis, explored below, of the rise of finance capital in the early 20th century coinciding with the origins of modern ROCE calculations.

Whilst offering a critique of Bryer's approach, the above discussion has suggested that the analysis of the development of the productive forces in combination with the development of the social composition of capital offer an alternative method of understanding the development of the calculative mentality. This alternative approach is now explained in more detail.

An integrated approach

As the above review and critique of Bryer suggests, the use of rates of return ought to reflect the socialisation of capital ownership through the institutions of credit, banking and stock markets. In accounting terms, the socialisation of capital as it progresses implies new rules about the circulation and distribution of profit and processes of accountability through the development of DEB as ownership is widened and credit relations multiply. However, capital socialisation gives only a partial explanation of accounting for profit. Again, as the critique of Bryer's approach suggests, it is possible to have ROCE calculations with or without labour subsumption, requiring a further analysis of the organisation of economic resources as an explanatory of accounting calculation. If such an analysis of the forces of production is added, a framework to explain the variety and transition of rate of return calculations can be developed as a dialectical relation of the centralisation of the forces of production and the socialisation of the ownership of production (Toms, 2005). As centralisation occurs through vertical integration, businesses become more internally complex and

accounting mechanisms are required to trace costs expended in production and levels of efficiency. Charging capital costs to departments becomes useful in this respect, but use of segmental ROCE remains problematic due to the presence of shared assets. On the other hand, as capital centralises through horizontal integration, ROCE becomes more useful as it provides managers[14] with a homogenous standard for diverse businesses and allows them to manage without detailed understanding of the separate complexities of individual branches. The modern origin of ROCE has been linked to the emergence of such organisations (Johnson, 1984). Because they are relative latecomers, their accounting methods are more a product of the second rather than the first industrial revolution.

Meanwhile as capital socialised in joint stock companies corresponding mechanisms for equitable distribution of profit emerged. Such arrangements lead to specific analytical performance measures such as dividend yield and price/earnings ratios, as opposed to Bryer's ROCE. Even so, these do not appear simultaneously, but reflect the state of development of capital markets (Rutterford, 2004). If price/earnings for example is related to the degree of socialisation, then its use would be rare under conditions of thin capital markets, individual share ownership and full dividend distribution, and more common where there is capital accumulation by corporations whose shares are traded in deep markets, for example where channelled by investment institutions. However, neither centralisation nor socialisation proceeds in historical straight lines. The forces interact, so that changes in the forces of production can reorder socialisation, which follows from a standard historical materialist base-superstructure approach, but in addition, vice versa, so that ideology

[14] 'Managers' as opposed to 'agents' are associated with the development of diversified businesses from the mid nineteenth century onwards and consistent with the etymology of 'Management' as a collective noun (Williams, 1976).

from the prior period interacts with the embryonic productive organisation of the next,[15] thereby setting accounting calculations in the context of a historical dialectic.

Bryer suggests that (2005, p.27) 'the capitalist mentality drove revolutions in the technical and social relations of production in key sectors of the economy'. Instead it can be argued that the capitalist mentality arises from revolutions in the organisation of the forces of production, or the material base, which themselves ultimately arise from the physical and mental activities of the inventors. The physical and mental labour process of others is then subsumed in the economic base and capital is valorised as abstract labour in the superstructure. Following accumulation and capital socialisation the investing capitalist is confronted with abstract labour as accumulated capital. Accounting is therefore concerned directly with money capital circuits and the distribution of money capital and only indirectly with subsumed labour. In other words accounting is the administration of the social relations of production.

The arguments presented so far can be summarised in the form of likely empirical relations that can now be tested against the evidence, utilising a wide ranging survey of the adoption of accounting calculations in Britain. Feudalism is characterised by conditions of dispersed productive forces and the absence of socialised capital as a result of economic underdevelopment and because restrictions on profit and usury limit the deployment of capital and its profitable accumulation and recirculation. Neither ROCE calculations, nor profit related calculations, occur under these circumstances. In transitional capitalism because either of the conditions may have broken down to a certain extent, partial calculations of profitability, for example

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[15] For examples of capital market imposed 'downsizing' in the 1980s, see Jensen (1993) Toms and Wright (2002).

transaction specific percentages, annuities and residual income calculations that comply with legal maximum interest rates might be expected. The centralisation of the productive forces of capital and the socialisation of capital ownership are necessary conditions for the generalised adoption of ROCE calculations, which even so vary according to the precise historical circumstances. Centralisation occurs on a large scale for the first time with industrialisation, generating a corresponding requirement for social capital, but predating full abolition of restrictions on usury and joint stock organisation. Only when their influence finally disappears do modern ROCE-style calculations become possible and observable by the historian. In the review of the evidence that follows in the next section, this approach is contrasted with Bryer's interpretation.

ROCE CALCULATIONS: EMPIRICAL EVIDENCE

In this section, these interpretations are examined against the evidence, in approximate chronology, and as part of what is necessarily a wide ranging review. Before examining the evidence, an important methodological caveat is required. Feudalism, transitional capitalism and modern capitalism are periodised and thereby made exogenous with reference to standard authorities on economic history. Without ex ante periodisation, any argument becomes a potentially tautological association of accounting calculation with certain economic epochs and patterns of capital ownership. For the purposes of this analysis, the end of feudalism in Britain dates to around 1500, so that transitional capitalism encompasses the discovery of new markets, and the rise of the seaborne empires which set the scene for the Tudor's enacting of laws facilitating the expropriation of the poor (Marx, 1976, ch.28) and the

first removals of outright restrictions on usury (Tawney, 1925). The onset of modern capitalism dates from the 1840s when a series of legislative acts removed restrictions on unbridled profit making (Polanyi, 1946).

In the two sub-sections that follow, the evidence presented by Bryer on the use of ROCE calculations is examined, with reference to instances of Bryer's feudal rate of return and Bryer's modern return on capital employed (hereafter labelled $ROCE_{BF}$ and $ROCE_{BC}$ respectively). The following section deals with other cases not dealt with by Bryer in an effort to widen further the evidence base on profitability calculations. There is a multiplicity of different methods of computing rates of return and to assist the reader, tabulations are used. Table 1 provides a definitional taxonomy of the calculative methods discussed with an abbreviation and definition for each. Table 2 provides an analysis of the examples directly cited by Bryer (2005) and elsewhere (2000b, 2006b) of uses of the ROCE measure. Selected calculations used by others not cited by Bryer are shown in Table 3. The table shows the name of the entrepreneur or business, the date at which the ROCE calculation was observed and the industry in which the firm was involved. The next column provides a summary of the method used, and in Table 2 where Bryer makes a claim of ROCE, the method described in the original source cited by Bryer is also outlined in italic underneath as a commentary.

Table 1 about here

Table 2 about here

Table 3 about here

Bryer's evidence on ROCE calculations

According Bryer, (2005, p.29) joint-stock trading companies 'were the first to pursue a rate of return on capital using DEB'[16]. These were 'semi-capitalist' because they calculated the 'feudal rate of return' by taking 'feudal surplus' and dividing it by initial capital advanced. However, as Baladouni points out (1986, p.28) in the case of the East India Company, and as the evidence from Grassby (1969) suggests, there was no consistent conceptual framework underlying these calculations.[17] Whilst there is certainly evidence that some merchants in the sixteenth and seventeenth centuries, of the East India Company [EIC] (Chaudhuri, 1965), and others (Grassby, 1969, p.749) did calculate rates of return, and in the case of the EIC calculations responded to the socialisation of capital (Bryer, 2000b, p.365), they did so in a context of colonisation and licensed privateering and associated profit sharing calculations (Andrews, 1964, p.16). As discussed earlier, in the feudal period excess profits and usurious gains were acceptable where earned at the expense of foreigners, which in the case of such gains from the Indian trade were dealt with secretively (Grassby, 1995, p.238). Grassby provides exhaustive evidence of rate of return calculations (1995, pp. 234-36), but stresses that contemporary calculations were usually gross profits on particular transactions, in most cases assisting the merchant with the pricing decision, and that 'merchants rarely calculated their net return on capital.' (1995, p. 236).

Socialisation also implies profit sharing within legally established rules and social norms which changed as a function of the latent conflict between medieval

[16] For Bryer, the pursuit of a rate of return is the product of the corresponding mentality, which is related to calculative method and the social relations of production (Bryer, 2005, p.28).

[17] The political economist Thomas Munne suggested an investors' target ratio of value returned to value invested of 3.5 to 1, which would seem to approximate to the notion

laws on usury, discussed above, and the steady accumulation of mercantile profit. In the 1570s there is no evidence that woollen merchant John Isham calculated return on capital or that this could have been done accurately (Ramsay, 1962, p.lxxxiii). Throughout the period 1494-1840, balances were struck irregularly and the capital account provided no basis for rational calculation (Pollard, 1963, p.78). Merchants' ledgers of the seventeenth century did not give them the means to compute the return on capital, but their accounts did record transactions (Grassby, 1969), giving them the financial control and accountability they needed (see the example of Monteage below). So whilst capital socialisation provides a convincing explanation of the adoption of DEB in the sixteenth and seventeenth centuries and risk related profit sharing schemes (Bryer, 2000b, pp. 336-7), it provides a far less convincing story of the adoption of an ROCE-based calculative mentality.

The earliest example of such a mentality cited by Bryer is Robert Loder who developed 'a single entry system for calculating the return on capital' (Bryer, 2000b, p.376) and who in 1611, was performing residual income calculations (Bryer, 2005, p.39, table 2). For Bryer, Loder is a transitional character, half feudal, half capitalist. Loder apparently 'capitalised interest as a cost of production' which 'is evidence of a feudal mentality' (Bryer, 2000b, p.373). However, interest capitalisation is not obviously feudal. In modern accounting it can be quite legitimate to add interest charges to the capitalised cost of fixed assets, for example FAS34 and IAS23 both consider the circumstances in which such capitalisation is appropriate.[18] Loder also charged 10% on the capital tied up in his crops as a deduction from his surplus and

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of a rate of return (Chaudhuri, 1965, p.67). At the Dutch East India Company 'the strict notion of profit was never grasped…' (Levy, 1950, vol. 1, p.19).

[18] http://www.iasplus.com/standard/ias23.htm.

according to Bryer (2000b, p.373), 'charging notional interest on total capital employed to divide the surplus between the required rate of return on capital and the residual income is evidence of the modern capitalist mentality' (see also, Bryer, 1994, p.225).

An alternative explanation is that such calculations reflected the productive forces employed and the process of social accountability. So the charge was partial, applied only to that proportion of capital tied up in crops and not the other assets such as livestock etc which are listed in Loder's 1611 balance sheet (Bryer, 2000b, p.372) and, as Bryer says (2000b, p.373), 'he fails to account for all his fixed capital'. The 10% charge, as Bryer acknowledges, was the maximum rate decreed by the usury laws (Bryer, 1994, p.225), and corresponds to the rate of interest then in force following the Act of 1571. According to Jones (1989, p.79): 'By the early seventeenth century people had become so inured to 10 per cent as the proper rate for a loan, they began to record it openly in their accounts'.[19] As Scorgie suggests citing Edwards and Newell, 1990, p.52) 'the use of interest may well have its origins in landed estate accountancy.' He also points out that as discounting became more widespread, the rate of usury effectively became the discount rate, as evidenced by Culpepper's arguments before parliament in 1621 (Scorgie, 1996, p.242). For Loder, the surplus beyond the legal rate corresponded to reasonable remuneration for his labour according to medieval scholastic doctrine. As Fussell (1936, p.xxiii) points out, his objective was to make a living from his estate and obtain the maximum return from his expenditure of capital and his managerial and manual labour. Therefore it does not make sense to quantify the latter two components of the investment as a *rate of return*. Instead, it is

[19] Jones cites the example of the accounts of Thomas Harvey, the London agent of the Earl of Huntington, 1606-1613.

sensible to compute it as an *amount*, in the seventeenth century sense as a reward for husbandry (Tribe, 1978, pp.54-59) having deducted the charge for capital. Like the merchants, Loder was concerned with profit on specific activities in its relation to revenue, as the main emphasis of his accounts show, so that his concern was with the gross margin (Freear, 1994). Whilst mark-up calculations were useful to merchants for pricing, commission and customs calculations, the purpose of the 'feudal rate of return' seems less obvious.

In the second example listed in table 2, Bryer (2005, p.37) claims that 'Monteage's system calculated the feudal rate of return', defined as the feudal surplus added to the initial capital, where the feudal surplus excludes allocation of overheads to products. It is not the case that such feudal rates of return were calculated, for a number of reasons. In Monteage's (1675) example set of books, Grange Farm is one activity for a gentleman who also owns a manor and invests in commercial voyages. To account for this collection of activities, Monteage advocates a specific order, begin with loss and gain from the 'Grange Farm' account and other activities and then carry the balances to the 'Stock' account, the loss and gain representing the increase in value of the Stock account (in the form of a net gain). The value on the 'Stock' account is then taken to the 'Balance' account of outstanding debtors and creditors. The purpose of closing the three accounts in this order is to act as a check against error. Indeed the system Monteage advocates is remarkably similar to the extraction of a trial balance from the underlying books of account. So the next step is to add opening debits and credits to debits and credits from the profit and loss account and the netted off result added to the outstanding balance sheet debits and credits to be carried forward. In other words the profit is not just the difference between closing capital and capital realised and opening capital and other expenditure (as suggested by

Bryer, 2005, p.37), it is the figure that reconciles profits from diverse activities with opening capital and difference between outstanding assets and liabilities at the end of the year.

Further reasons why this example does not correspond to Bryer's feudal rate of return arise from the treatment of taxation, wages and depreciation in Monteage's example. In the case of Grange Farm, there is a taxation charge, which would normally be considered an overhead, and certainly in the case of Bryer's definition of feudal surplus, should necessarily be excluded from this departmental account. Grange Farm's account also shows that wages were paid.[20] As Bryer (1994, p.317) suggests correctly, from Marx's perspective feudal surplus was based on labour coercion, implying an absence of wage labour. Bryer (2005, 2006a, p.370) then argues that where farmers use feudal surplus semi-capitalistically 'they accounted for feudal surplus as the increment to initial capital, that is, for the feudal rate-of-return'.[21] It is possible Besse Hobbes[22] could have her labour coerced and be paid wages at the same time, but even if that is the case it is not clear from Monteage's (1675) example how coerced labour is accounted for since there are no entries to this effect and there is no calculation of anything resembling a 'feudal surplus'.

In addition to the payment of wages, not just to Besse Hobbes but to others employed on Lees Manor, Monteage's system charges depreciation by reducing the value of the horses as 'loss by their use', crediting the horses account and debiting the

[20] Wells (1978) uses Grange farm as an example of a departmental account.

[21] In this case the 'increment to initial capital' is not the same as the rate of return as a ratio. This is more than a matter of semantics, as the notion of calculative mentality requires precision vis a vis the method of calculation.

[22] Besse Hobbes is the sole employee on Monteage's hypothetical Grange Farm.

loss and gain account.[23] However, as Bryer suggests elsewhere, commenting on another 17th century farmer, Sir John Banks, 'was not a capitalist' (2006a, p.382) because he did not charge depreciation. Therefore if Monteage's example is capitalist by Bryer's definition because the horses *are* depreciated, the result from the loss and gain cannot be described as a 'feudal surplus'.

Finally, there is no evidence of the 'initial capital' being used as a denominator in any of Monteage's calculations, nor does the cited example show how profit is incremented to the initial capital and carried forward. What actually happens as far as Grange farm is concerned, is that profit of £136 is computed as cash received minus cash paid minus the loss of value of the lease during the accounting period. The only percentage rates specified in Monteage's books are agreed commissions payable to factors and interest paid 'at usuance' to one creditor.[24]

The numbers in calculations from Monteage and elsewhere do not relate to feudal surplus or the feudal rate of return, so there seems little or no evidence that such calculations were performed. In another example of 1618, Bryer (2000b, p.375) says the rate of return on the opening capital *would be* £85/£1455 = 5.8% (and) …Nicholas Toke *could have* calculated the feudal rate of return on capital' (emphasis added). There is no evidence that Toke did any such calculation. Moreover, Toke was accountable only to himself and his father (Bryer, 2000b, p.374), and this hardly constitutes socialised capital. Similarly according to Bryer, (2000b, p.342), 'These

[23] Monteage (1675) ledger, p.4, 'Horses' a/c, 'by loss and gain, lost by their use'.

[24] Monteage's system would have enabled a return on capital calculation, because it computes loss and gain and aggregates assets from diverse activities in the balance account post depreciation (for the total estate the ratio is 1204/7151 x 100 = 16.8%), but although Monteage spends 45 pages outlining the advantages of his system with illustrative examples, he does not mention that it would allow such a calculation, nor does he provide one.

merchants (as discussed by Grassby, 1969) *could have* calculated the feudal rate of return on capital' (emphasis added).[25]

The earliest example of a specific rate of return calculation is the New Mills Cloth Manufactory, 1681 (Table 2). For Bryer, the company uses DEB to calculate the 'feudal rate of return' since there is no apparent allowance for depreciation (Bryer, 2000a, p.146).[26] Mepham (1988, p.62 citing Scott, 1905, lxxxiv-lxxxix) suggests that Sir James Stansfield computed forecasted profit in order to compare to the legal rate of interest. However there is no evidence in Scott of such calculations carried out by Stansfield and the only example is Scott's own calculation of profits in excess of 25% (Scott, 1905, p.lvii) before deductions for the legal rate of interest on capital based on information from the prospectus (Memoriall). In a separate calculation recorded in the minute books, wear and tear is included (Walsh and Stewart, 1993, p.785), and is specifically used to determine product cost (minute #352, Scott, 1905, p.55-56). However, the charge seems to be partial, relating to some but not all of the capital equipment listed in the prospectus (Scott, 1905, p.lxxxviii) and there is no evidence of depreciation forming part of a ROCE calculation. Walsh and Stewart (1993, p.785) suggest that New Mills, c.1681-1703, used a customary rate of profit (16.66%) as a mark up on expenses, which reflected the notion of just price (for an example see minute #68, Scott, 1905, p.10-11).

[25] In similar vein, rate of return calculations 'as such' are absent from the Bowes, White-Ridleys and Cotesworth business and estate papers (Oldroyd, 2007, p.105), but endeavouring to support Bryer's view, Oldroyd on three occasions, suggests cases where underlying accounts 'would have enabled' entrepreneurs to calculate ROCE (2007, pp.113, 135).

[26] Bryer compares New Mills with New Lanark, and although he doesn't provide any evidence of ROCE calculations at New Lanark, in contrast to New Mills, he does argue that it was capitalist because of real labour subsumption (2005, p.57).

At Carron, a forecasted rate of profit on capital was calculated in 1766 (Bryer (2006b, p.702), corresponding to some extent with $ROCE_{BC}$ (Tables 1, 2). The calculation involved a 10% notional interest charge and the expected rate was adjusted for risk, reflecting similarities with the accounting signatures of investors in the coal industry (discussed below). Carron employed significant fixed capital, including collieries, and as in the coal industry, calculations were ex ante. Ex post calculations, for example where concerned with accountability and cost control, were made with reference to profit levels, for example at the plating forge and the colliery (Fleischman and Parker, 1990, pp.215, 217). As Carron's ownership became less socialised, the coherence of the accounts declined (Bryer, 2005, p.60), placing serious constraints on the possibility of accurate ROCE calculations. Factional division between the partners prevented them from imposing common standards of accountability, so that the managing partner, Joseph Stainton was able to enlarge his block shareholding and run the firm for his own benefit (Campbell, 1961, pp.170-80), but without making the firm any less 'capitalist'. Consistent with Toms (2005) the evidence shows that the consequence of reduced socialisation is actually reduced accountability.

The next main example in Table 2, Arthur Young's illustration of the accounts of Mr Ruggles of Clare, in the period 1784-1787, is another possible early case of Bryer's $ROCE_{BC}$. According to Bryer (2000b, p.376), this is a 'single-entry system for calculating the return on capital employed', although this is not precisely consistent with the evidence. Young (1787, p.238) calculates the rate of profit as £205/£646, or 31%. £205 is the average profit over four years and £646 is the capital advanced at the beginning of the period in the form of a stock valuation and the amount paid to the

preceding tenant for labour, rents and taxes.[27] Like Loder, Ruggles (or Young on his behalf) uses residual income, and again the calculation has nothing to do with ROCE in the modern sense.[28] Even so, Bryer (2000b, p.377) says '…that this profit is authentically capitalist is signatured by including in the expenses the *decrease in value* of the capital assets which "are no more" *by* £398 4s 1d. Buried in this charge is the *depreciation* of the livestock…' (emphasis added). However, the depreciable assets at the beginning of the period were only valued at £289 in total. Because the original £646 is the combination of opening stock and an accrued payment for work done by the preceding tenant, split £289 and £357 respectively, when like is compared with like, the opening and closing stock values for the livestock, deadstock, manure tillage etc are £289 and £248 respectively. Only £41 can therefore be buried 'depreciation', in the loosest sense (ie a difference between two stock valuations four years apart) and the remainder is a write off of accrued expenses.

An important omission, from the point of view of Weber and Bryer, is the absence of a capital account, since Young makes no attempt to aggregate the assets at the period-end or reconcile the change in value to the profit figure.[29] Meanwhile in a separate calculation Young (1788, p.238) believes the annual charge for 'wear and tear' is £30 and presumably this is Bryer's 'buried' charge, but this is unrelated to

[27] Curiously, the £205 is arrived at by deducting only three years' interest, whereas the profit after interest, £180, is after deducting four years' interest. The interest charged throughout was 5%, which compares with the official rate of 4.5% and the usury law limit of 5% (Pressnell, 1960, p.192).

[28] In all the examples of residual income accounting cited by Bryer (2005), the evidence amounts to a charge on capital, which might be expected in partnership accounting, without reference to whether the charge is on opening capital or how the cost of capital was derived.

[29] Such a calculation would have involved adding the value of unsold production, £660 and the £248 for livestock. Young does not provide details of Ruggles's cash or drawings, so the closing capital cannot be ascertained or reconciled to the profit.

Ruggles's cattle as the costing is for arable output only. In the absence of accuracy and any clear accounting for capital or definition of depreciation or consistent use it is difficult to draw any conclusion about the nature of these accounts, capitalist or otherwise. Similarly, for Coton Hall, (Table 2) whose accounts resembled Loder's and Young's (Bryer, 2006a, p.390), it can only be said that their procedures 'allowed', or meant that ROCE 'could', be calculated (Bryer, 2006a, pp.383, 386). Meanwhile, the only evidence of farmers actually calculating ROCE is in the late nineteenth century (Stamp, 1916, cited Bryer, 2006a, p.393).

In several other cases (Table 2) capital charging computations were as important as ROCE calculations. Of the seven further examples cited by Bryer as using ROCE (2005, table 1, p.35), only three (Ashington, British Iron and Robert Morris) were using rate of return on assets calculations of any kind, two (Charlton and Mona) used capital charging, whilst Boulton and Watt used mark-up on cost[30] and Thomas Hall used discounted cash flow (DCF) [Table 2]. Capital charging indicates the treatment of interest as a cost for the purpose of planning new ventures, but might equally be used in conjunction with partnership profit sharing systems for example at the Knight's Stourbridge partnership where the partners credited their accounts with interest on undistributed capital (Pollard, 1963, p.80). In this sense, methods of accounting for profit by early industrialists are explained by capital socialisation through partnerships.

Other evidence of ROCE calculations

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[30] Specifically, Boulton and Watt include depreciation charges in arriving at cost (thereby satisfying one of Bryer's conditions for a capitalist ROCE calculation) and add the required mark-up.

Pollard's (1963, 1965) extensive surveys suggest few cases of ROCE calculations during the industrial revolution, although his evidence is disputed by Bryer. In particular, Pollard (1965, p.235) finds no evidence of ROCE calculations because capital mainly financed fluctuating current assets and liabilities. For Bryer (2005, p.40) this is proof that Pollard

> 'does not understand the modern meaning of capital employed…and seems unaware that the fluctuating balance of the owners' capital is the residual after profit or loss that, no matter how "wildly" it fluctuates, always does so around a positive capital employed, that is, the sum of assets. Pollard assumes management is not accountable for all its assets and its debts, that is, here he defines capital employed as owner's equity!'

Even if it were true that Pollard does not understand the *modern* meaning of capital employed, it would not necessarily undermine his ability to recognise earlier forms of these calculations. Pollard meanwhile notices that loan finance was conflated with partners' capital, attracting interest as a division of profit (Pollard, 1965, p.234) and rightly equates owners' equity with net assets as capital employed. As in earlier times, interest rates used to determine the division of partners' profits corresponded to the usury laws, for example the 5% rate used by the firm of Cowpe, Oldnow Siddon and Co. in the late eighteenth and early nineteenth centuries (Piggot, 1949, p.35).

Conflation of partners' loan and equity capital made it was entirely reasonable to expect early partnerships to have wildly fluctuating balances on their residual capital accounts. For example Edwards's (1967, pp.255-58) analysis of the accounts of Birley which indicates that in 1796, the firm had fixed assets of £160, current assets of £182,764 and partners' capital of c.£78,000 (estimate based on the capital of one of the partners, John Hornby, Edwards, [1967], p.255). The assets are for the weaving side of the business only, suggesting current assets, factoring in the spinning operation, for the total business in excess of £300,000. Capital fluctuations were

compounded by ordinary drawings, partners' salaries and the requirement for capital withdrawals on partner retirements.[31]

The use of forecast rates of return was common throughout the 18th century as evidence from textile firms such as Paul-Wyatt and J&N Phillips suggests (Wadsworth and Mann, 1931; Table 3). Such an approach, and indeed the use of credit terms at 'tollerated interest' with differential discount rates on bills of exchange by Thomas Marsden of Bolton in 1683 (Wadsworth and Mann, 1931, p.94), is consistent with the scholastic doctrine of *lucrum cessans*, and its reliance on *ex ante* estimates (there is no evidence of the capital employed being computed *ex post* in any of these cases). These might be described as separate transaction profit margin (STMP, Table 1) calculations and correspond to the practices of 17th century merchants described above (Grassby, 1985).

In early industrial forms, such as the putting out system and in early textile factories, capital was owned by sub-contractors and employees and labour was only formally subsumed, so global ROCE calculations were rendered difficult and relatively useless by capital decentralisation, whilst the importance of bookkeeping was reinforced by attenuated social relations, moral hazard and contract enforcement requirements. Samuel Oldknow relied on a detailed double entry system debiting each weaver's account with specification, quantity and price of yarn given out and credited with the quantity of cloth returned and wages paid. Oldknow and others received support from the development of small debtors' courts and anti-embezzlement legislation (Unwin et al, pp.34-37, 48-50), and only used RI rather than ROCE calculations (table 3).

[31] For example the partnership agreement of 1791 establishing the firm of McConnel Kennedy (MCK/1/2)

The organisation of productive forces determined the precise nature of profit calculations in other cases. Prior to 1780 there is no evidence of rate of return calculations in the estate accounts of three different mining entrepreneurs, although there is much detail on cost control (Oldroyd, 2007, p.107). Brackenborough et al (2001) attribute the sudden and widespread adoption of DCF in the North East coalfield around 1800 to technical and organisational changes in mining practice which increased the capital intensity of the typical operation. The use of DCF calculations at Thomas Hall is illustrative and the use of risk adjusted discount rates (in this case 12.5%) was a useful method of relating required return to the impact of geological and similar conditions on invested assets, analogous to the use of Sea Loan finance in the Renaissance period. Fleischman and Macve (2002) point out that the use of risk-adjusted rates of return on capital investment was a frequent feature of the calculations of investors in the North East coal industry, ranging from 6% to 15%, and incorporating sensitivity analysis, for example at Hetton colliery.[32] The maximum rate of interest allowed in law between 1714 and 1832 was 5% (Mathias, 1979, p.91), and used as the risk free factor, with appropriate additions for risk (Brackenborough et al., 2001, p.143). There were other examples from the extractive industries (Pollard, 1963, p.84, 1965, p.238, Taylor, 1980, pp.59-61),[33]

[32] As Brackenborough et al (2001) explain in their review of a large number of these calculations, valuations were usually in monetary terms, although the medieval method using years' purchase (Scorgie, 1996) was also used. Profit forecasts were based on combined effects of estimates of output, capacity, unit cost and selling price and capitalised as annuities.

[33] There is at least as much evidence of DCF calculations in the 'semi-capitalist' seventeenth century for the purposes of lease valuation (Lewin, 1970, Scorgie, 1996).

reflecting the underlying risky nature of the managed assets, although these sometimes contained 'shocking' inaccuracies.[34]

Whereas the features of industrial organisation and finance influenced profit calculations, they were also modified by the effects of the usury laws until well into the nineteenth century. Businesses such as Birley and similar cotton concerns with large working capital balances depended on the use of bills of exchange for trade finance and demonstrated similar practices to Thomas Marsden over a century earlier.[35] They could not ignore the 5% legal maximum without risking non-enforceability of debts. An important component of profit calculation was a technique of usury law evasion employed by some firms, exemplified by McConnel and Kennedy, Evans and Sons of Derby and Strutts in their STMP calculations. These firms charged higher prices for their output but allowed customers to deduct a percentage in return for prompt payment. By setting terms of trade in this fashion and allowing discounts differentially by product, returns on book debts for these firms could vary between 7.5% at McConnel Kennedy and 20% for Evans candlewicks (Shapiro, 1967, pp.66-67).[36]

In the mid nineteenth century the characteristic method of profit calculation used for measuring the economic performance of industrial enterprises was the return

[34] So much so that the capital could not be ascertained on the subsequent dissolution of the firm and analysing the figures provided (Fleischman and Parker, p.139), it is impossible to reconcile the change in profit to the change in sales within any reasonable range of assumptions about change in assets or profit margins.

[35] Although these examples are taken from the cotton industry, the practice of using book credit to generate high implicit rates of return was quite general in the early modern period (North, 1691, p.7).

[36] McConnel Kennedy charged interest at 4% on capital invested in buildings and machinery, (table 1), but there is no evidence from their fairly comprehensive archives that they computed return to capital (see Lee, 1972, pp.139-141 on the intermittent nature of the underlying capital and profit measures that might have allowed ROCE calculations).

on capital advanced (ROCA, Table 1). Table 3 gives examples from the iron, shipping and textile industries from the 1830s and 1840s of the use of this method. A return of 5% on 'the original capital' (British Parliamentary Papers [BPP], 1833, ev.6587, H. Tanner) is computed by a Select Committee member, notwithstanding the witness's presentation of the 'present value' of shipping. There are similar references to the rate of profit on 'the money embarked' (BPP, 1846, ev.3930-3934, H. Ashworth) and projected rates of profit on the 'sum invested' (BPP, 1846, ev.4405, R.H. Greg). Similar calculations were performed at Bolckow Vaughn, and following the incorporation of businesses, investors computed a variant of ROCA using the return to (called-up) share capital (RSC), for example in the transport and utilities sectors (table 3).These methods bear some resemblance to Marx's (1984, p.42) definition of the rate of profit discussed earlier.

As capital became socialised in the hands of the portfolio investor, underpinned by the Joint Stock Companies Act 1844 and Limited Liability Act 1855, new calculative methods emerged. Gladstonian finance repaid national debt quickly in this period but the demand for Consol-style investments expanded as the capital accumulated during industrialisation sought opportunities for diversification. Limited liability companies therefore issued fixed interest stock, in the form of loan stock, and increasingly from the 1880s debentures and preference shares, with the equity market only developing significantly after the 1880s (Cottrell, 2004, pp.257-279). For the investor, a common method of monitoring investment performance was the dividend as a return on the nominal capital. For example Owen Owens, a prominent Manchester merchant, monitored his railway portfolio in this fashion.[37] Railways and

[37] Owen Owens Archive, John Rylands Library, OWN/3/2/4/11, OWN/1/1/1/4. In addition to railway investments, the Owens and his son John were serial investors

other incorporated firms that placed high reliance on preference share and loan capital in addition to ordinary shares, gave rise to what might be termed the weighted average net return (WANR, table 1) method. This calculation took dividend as a percentage of paid up capital and added interest on loans, debentures and preference shares using coupon rates, weighting each class of capital according to its paid up value. As a result the overall performance of the business could be assessed (Tyler, 1873).[38] When *The Economist* used the term ROCE when reporting cotton companies' results (Table 3), its method was to take the simple average of dividend yield and bond coupon rate. To assist investors making judgements on the performance of individual firms, press analysis used physical profit per unit of physical capital (spindles) and RSC. There were two reasons why firms generally used these methods. First, because firms tended to distribute rather than accumulate profits (Toms, 1998, 2001; Church et al, 1994, p.711), and second, because the taxation system did not allow an accurate imputation of pre-tax and pre-interest profits (Seligman, 1914). A similar approach was to compute the weighted average gross return (WAGR, Table 1) using the profit as a percentage of called up share capital instead of dividend in the calculation described above (for examples see Table 3).

In general, dividends were the principal performance measure for equity investors. The use of profit rates on equity instead of dividend yields to value shares, was delayed by the Wall Street crash, and in Britain investors continued their nineteenth century fixation with dividend yield for much longer (Rutterford, 2004, pp.136-8). Such approaches influenced the perception and calculation of ROCE. As

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(Toms, 2005, p.343), the proceeds of which contributed to a bequest leading to the establishment of Owens College, (Heywood, 1878, p.539), later the University of Manchester.

late as 1937, the *Economist* was using an RSC measure (profits as a ratio to issued capital) rather than using accumulated equity in the capital employed measure (Table 3).

The above discussion has shown that ROCE calculations in the return on investment (ROI, Table 1) sense were the exception rather than the rule before 1840 and investors' used variants of ROCA for a long period thereafter. So when did modern ROCE calculations emerge? The use of ROI incorporating all capital invested and associated monitoring of returns emerged as a management rather than an external investor ratio. In this context, its use reflected the integration of previously specialised businesses, for example Du Pont's integration of the Gunpowder Trade Association after 1903. Integration of production, sales and purchasing provided the basis of the analytical system of measuring return of investment developed by Dupont after 1914 (Previts and Merino, 1998, Johnson and Kaplan, 1987, p.66-88). In Britain, there are relatively few examples in the early twentieth century, Campion's (1934) calculation (Table 3) being an exception. At Hawthorne Leslie shipbuilders on Tyneside, similar ROI type calculations were performed by the company's auditors, Messrs. Monkhouse Goddard and Co., by reference to the three departments in the period 1896-1902, although the capital allocations suggested were arbitrary and the resulting figures treated with some scepticism by the management (McLean, 2006, p.117). ROI along these lines also reflects entity theory, which argues the objective of business is to increase the wealth of all sources of financing and which was not recognised until 1922 (Paton, 1922).[39] Only with the unification of industrial and

[38] Dividends also formed the basis of share valuation (Farr, 1873, who also dismisses the LTV).

[39] Although the origins of entity theory is commonly attributed to Paton (Zambon and Zan, 2000, p.809), it has been argued that there were Italian precursors (Zambon, 1996, Zan, 1994).

financial capital from the early part of the twentieth century onwards (Hilferding, 1981), might ROI calculations be viewed as simultaneously conveying the same information to managers and investors alike.

In summary, the evidence suggests that far from a unified calculative mentality developing concomitantly with the emergence and maturity of capitalism, the story is one of adaptation according to historical stages of productive development and capital socialisation and restrictions on capital socialisation. Scholasticism and the commercial values of the early enlightenment impacted upon the nature and disclosure of profit calculations, which in combination with the rise of the portfolio investor and decentralised production, restricted the extent and disclosure of return on capital calculations in general before 1840 and ROCE calculations in particular prior to 1914. Whereas it may be true that landlords, manufacturing entrepreneurs and ultimately managers were concerned to earn excess return on capital, there is no evidence in this case that it comes from a capitalist mentality of pursuing ROCE, since there are few surviving examples of such calculations being performed.

There is accordingly value in attempting to explain the British Industrial Revolution in terms of calculative mentality, but not in terms of the adoption of ROCE calculations alone. If the variations in ROCE calculations set out in table 1 are applied to the empirical evidence, the approximate story is as follows. In feudal times there was no distinct notion of profit so no expectation of return other than to compensate for entrepreneurial labour and risk at a just price. The transitional period from the mid 16th century onwards was characterised by RI style calculations as entrepreneurs used the legal rate of usuance to cost their invested capital. Industrialisation based on embryonic single unit specialised production, prompted

ROCA style calculations because capital was accumulated by individuals and not within the pre-corporate business unit. After the legalisation of joint stock companies from the mid-nineteenth century capital socialised with the emergence of portfolio investor, whose priority was dividends. Investor ratios stressing called up share capital and dividends therefore predominated. Separation of managerial and investor functions provide a separate genealogy for ROI style calculations, which have their origin at least in a managerial calculative mentality, as they are required to account for ever more diverse capital deployments.

CONCLUSIONS

Although the above discussion has been critical of Bryer's notion of the calculative mentality, it is nonetheless recognised that his contribution is an important next step in the Sombart-Weber debate. The present paper is intended as a step further. Instead of the association between capitalism and basic accounting techniques, the concern has been the rationale behind accounting calculation, and therefore with the mentality of economic decision-makers. Whilst accepting Bryer's broad view, his narrow view has been challenged. In particular, Bryer uses the capitalist mentality to predict behaviour in all forms of capitalism with only partial reference to the organisation of productive forces, leading to over-reliance on $ROCE_{BC}$ as the accounting signature of interest to the accounting historian.

Instead the evidence shows a wide diversity of calculative method and the appeal of this paper is to call for greater recognition of alternative accounting signatures. If accepted, then mapping these calculations is a new and important part of the research agenda. A start has been made in the analysis above, but the scope of the paper is wide, so only limited depth has been given in each case. Also the paper only

covers up to the interwar period, when what might be described as the ROCE method used in today's accounting textbooks began to come into use. Significant developments after this time, such as the introduction of tax imputation systems and the rise of shareholder ideology could also be considered. Further archival work is necessary, particularly to evidence the actual calculations performed by entrepreneurs, managers, and investors in different periods, either to confirm the commonality of accounting signatures or to record exceptions and to explain them. Inter-firm comparisons within industries where accounting practices are known to have varied, for example railway and canal companies, provide further opportunities to refine and revise the arguments set out in this paper. For the pre-Tudor period, archival work is difficult, in view of the hypothesis of no or very restricted profit calculations, and the argument may have to be borne out as in this paper, with further interpretation of scholastic tracts. For later periods contemporary publications and circulars in contexts where business people are required to explain economic performance in accounting terms are also likely to be productive sources of enquiry.

The review of evidence uncovered so far of the employment of ROCE calculations shows that most early modern and industrial revolution entrepreneurs did not make use of such calculations, and their partial use and later adoption reflected both the specialised organisation of production and narrow social ownership of capital. There is evidence to suggest that the methods of calculating and dividing profit emerged in tandem with institutions that governed the accumulation and distribution of profit, particularly the mechanisms for interest rate regulation. Early or transitional capitalism contains only partial aspects of the calculations necessary for the computation of ROCE, which is why there are only limited and partial examples before 1900. The slow retreat of feudalism offers many examples of how religion uses

accounting to impose social order. Its replacement with secular, but personal (as opposed to corporate) capitalism further slowed the adoption of modern accounting calculations in Britain. Modern capitalism as a mentality required the demise first of usury in the courts and associated restrictions on risk free returns, and then of the labour theory of value in the realm of political economy. Only then could the doctrine of capital as a *sui generi*s factor of production emerge and demand its own return, independent of rent and wages, as profit, and only then was the computation and analysis of profit and profitability made possible.

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Table 1: Definitions of Return to capital measures

Calculative method	Abbreviation	Definition
Generic return on capital employed	ROCE	Any ratio obtained by dividing some measure of profit (as a flow of income) by some measure of capital (as a stock of wealth).
Bryer's 'feudal rate of return'	$ROCE_{BF}$	Feudal surplus divided by the initial capital advanced.*
Bryer's capitalist Return on capital employed	$ROCE_{BC}$	Return on capital employed in production**
Mark ups on cost	PC	Profit divided by production cost
Discounted cash flow	DCF	Net forecast revenue multiplied by a discount factor
Separate transaction profit margin	STPM	Transaction profit divided by transaction value
Profit per physical unit of capital	PPC	Net profit divided by physical number of units of capital
Residual income	RI	Net profit minus a charge for capital
Return on capital advanced	ROCA	Net profit divided by initial capital advanced
Weighted average net return	WANR	Dividend as a percentage of paid up capital x interest on loans, debentures and preference shares weighted according to paid up values and using coupon rates.
Weighted average gross return	WAGR	Interest on debt capital plus return on equity capital weighted according to paid up values and using coupon rates.
Return on subscribed capital	RSC	Net profit divided by called up share capital
Return on investment	ROI	Net Earnings (after depreciation and before interest on long term debt) divided by net assets (total assets minus goodwill and intangibles minus current liabilities)***

Sources:
* Bryer (2005, p.29-30)
** Bryer, (2000a, p.146)
*** For example the DuPont formulation, Johnson and Kaplan (1987, p.89, note 13).

Table 2: Profitability analysis in the agricultural and industrial revolutions: Examples cited by Bryer

Example	Date	Industry	Method used according to Bryer/ *Commentary*	Sources
Robert Loder of Romney Marsh	1611	Agriculture	Residual Income	Bryer 2005, p.39
			Interest charged on part of total capital (invested in crops)	Freer, 1970, p.28.
Grange Farm (Monteage)	1675	Agriculture	$ROCE_{BF}$	Bryer, 2005, p.37
			DEB system incorporating depreciation	Monteage, 1675.
New Mills Cloth Manufactory	1681	Textiles	$ROCE_{BF}$	Bryer, 2000, p.146
			Forecast profit rate c/f interest rate	Mepham, 1988, p.62
			Separate computations of forecast revenue and cost (wages plus capital expenditure plus materials)	Scott, 1905, pp.lxxxvii-ix
			Mark up on cost 16 2/3%	Scott, 1905, pp.10-11
Robert Morris Copper smelting co.	1726	Metal	$ROCE_{BC}$	Bryer, 2005, table 1
			Forecast profit on advanced as fixed capital plus stock	Jones, 1985, p.20
Coton Hall	1744	Agriculture	$ROCE_{BC}$	Bryer 2006a, p.383
			Change in cash plus opening minus closing capital values	Bryer, 2006a pp.383-6
Carron	1766	Metals	$ROCE_{BC}$	Bryer, 2006b
			Forecasted profit with 10% notional interest	Bryer, 2006b
Mr Ruggles (Arthur Young's example)	1788	Agriculture	$ROCE_{BC}$	Bryer 2000b, p.376
			RI: Notional interest charged on capital advanced as stock and accrued expenses	Young, 1788, pp.235-244
Mona Mine	1793-1800	Coal	$ROCE_{BC}$	Bryer, 2005, table 1
			RI: 10% charge on capital	Boyns & Edwards, 1997, p.52
Boulton and Watt	1801	Hardware	$ROCE_{BC}$	Bryer, 2005, table 1
	1790s		*PC: 40% mark-up on cost* *PC: Various mark ups on cost*	Roll, 1930, p.248; Williams, 1997, p.206; Williams 1999,pp.79-82
Charlton Mills	1810	Textiles	$ROCE_{BC}$	Bryer, 2005, table 1
			RI: 5% charge on capital	Stone, 1973, p.77.
British Iron Co.	1826	Metal	$ROCE_{BC}$	Bryer, 2005, table 1
			Forecasted rate from promoters' cost estimates	Jones, 1985, p.216
Thomas Hall	1834-1835	Coal	$ROCE_{BC}$	Bryer, 2005, table 1
			DCF: Forecast profit discounted at risk 12.5%	Fleischman & Parker, 1997, p.130.
Ashington Colliery	1843	Coal	$ROCE_{BC}$	Bryer, 2005, table 1
			ROCA: Projected return on initial capital	Fleischman & Parker, 1997, p.139.

Table 3: Profitability analysis in the agricultural and industrial revolutions: Other examples

Example	Date	Industry	Method used & details	Sources
Thomas Marsden of Bolton	1683	Textiles	STPM: 5% for credit on bills, at 'tollerated interst'.	Wadsworth and Mann, 1931, p.94.
Paul-Wyatt	1744	Textiles	ROCA: Forecast rate of profit on capital = 20% on fixed capital, 15% on circulating capital	Wadsworth and Mann, 1931, p.439
J & N Philips and Co	1765	Textiles	ROCA: Forecast rate of profit on capital = 5%	Wadsworth and Mann, p.291
Samuel Oldknow, Mellor Mill	1797	Textiles	RI: Interest on machinery, 10%, 5% interest on capital	Unwin et al, 1924, p.195, 201; Williams, 1997, p.145.
Northumberland mines generally	1800	Coal	DCF: Discounting using risk adjusted interest rates	Brackenborough el al, 2001, p.143.
	1818		DCF: Revenue capitalising using risk adjusted interest rate	Pollard, 1965 p.238.
McConnel Kenn., Evans, Strutts	1800-1830	Textiles	STPM: Bills discounted differentially, 7.5-20%	Shapiro, 1967, pp.66-8.
McConnel Kennedy	1833	Textiles	RI: 4% charge to capital invested in buildings and machinery	JRUL*, MCK 3/1/2 Nominal ledger, 1833, pp.41, 71.
Various commercial and manufacturing	1833	Iron Shipping	ROCA: Profit on originally invested capital	Select Com. on Commerce, Manufacturers, and Shipping, BPP**, ev. S. Gurney, pp.11, H. Tanner, p.402.
Ashworth Cotton Co., RH Greg	1846	Textiles Agriculture	ROCA: Profit on originally invested capital	Select Com. on Burdens Affecting Real Property, BPP, ev. H. Ashworth, p.335, ev RH Greg, pp.381-382.
Bolckow Vaughn	1866	Coal	ROCA: Expected rate of return on shareholders' funds = 15%	Church et al, 1994, p.716.
Metropolitan Railway	1872	Transport	RSC: Net profit divided by called up share capital	*Chadwick's Investment Circular*, 3rd September, 1872.
New River Waterworks	1873	Utilities	RSC: Net profit divided by called up share capital.	Farr, 1876, p.520. Also a general calculation for firms with different classes of capital, p.509.
Railway Cos.	1870s	Transport	WANR: Weighted average net return**	Tyler, 1873, p.262.
Oldham 'limiteds'	1880s 1890s	Textiles	PPC: Profit per spindle RSC: Net profit divided by called up share capital	*Oldham Chronicle*, passim, and respective specific examples 4th January, 1890 *Oldham Chronicle*, 3rd January, 1891.
Cotton companies	1895-1900s	Textiles	WAGR: Weighted average gross return***	*The Economist*, 22nd February, 1895, pp.26-27. *Economist,* 1896, p.27*)*
			RSC: Net profit divided by called up share capital	*Economist* (passim, & eg, 1902, p.32) *Economist* (1901, p.29)
Hawthorn Leslie	1896-1902	Ship-building	ROI: Returns on departmental capitals	McLean (2006, p.117)
Cotton companies	1934	Textiles	ROI: Return on capital employed	Campion, (1934), p.268
Economy wide survey article	1937	All sectors	RSC: Profit divided by total issued capital (ordinary and pref.)	*Economist*, 'Swelling profits', 16th January, 1937, p.106.

* The John Rylands University Library, University of Manchester. ** British Parliamentary Papers.