B. Research Articles

Growth, Profits and Technological Choice: The Case of the Lancashire Cotton Textile Industry

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Industrial history is necessarily concerned with economic growth and decline. Lancashire Cotton textiles provides a classic case study of these processes. From being the vanguard sector of the industrial revolution in the eighteenth and early nineteenth centuries, the industry fell into rapid and terminal decline in the twentieth. Determinants of growth and decline, such as industry structure, profitability, capital accumulation and technological choice have been addressed in previous studies, although certain variables have enjoyed more attention than others.1 The period 1870-1914 has been regarded by some as a time when Lancashire entrepreneurs made the mistakes that condemned the industry to its subsequent downfall. In particular, they have sought to establish links between industrial organisation and economic decline. As a result, debates on the poor performance of Lancashire cotton textiles have been somewhat dominated by the issues of technology and organisation.2

A mythology has thereby developed based on the ostensibly old fashioned attitudes of Lancashire entrepreneurs and commonly believed interpretations concerning incorrect investment decisions, poor leadership and inappropriate industry structure. Accordingly, the evidence below is examined considering the arguments that have dominated typical discussions of Lancashire textiles. Mostly these have concerned choice of technique, primarily between ring and mule spinning.3 The first is that Lancashire entrepreneurs did not replace mule spindles and power looms with ring spindles and automatic looms to the extent they should.4 Second, that ring spindles from a relatively early date were more efficient than mules, especially regarding labour cost.5 Third, and following on from the first two, that industry structure was an important influence on these investment choices.6 Each of these points will be examined in more detail below. An additional point of reference, hitherto neglected entirely, will be the strategies and profitability of specific companies differentiated by their investment policies.

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The business history of Lancashire textiles has thus far not been informed by evidence from financial and accounting sources. Yet such evidence is of relevance to the major areas of discussion and controversy, such as encrepreneurship, technology and structure, and world markers, dealt with by previous histories. Recent work has used this new evidence to re-examine the strategies of Lancashire entrepreneurs and the business networks that facilitated their operation before i9i4.7 The debates concerning technology, structure and world markets are also important in the light of new evidence and the present purpose is to reconsider these issues.

Accounting records, capital market data, and business archives for a sample of cotton companies, form the main body of evidence for this re-examination. (For a list of principal source material, see appendix i.) Financial performance, growth and financial policy are the three broad aspects of business strategy examined. The first is measured by profitability, taken as return on capital employed (ROCE), defined as profit before interest as a percentage of long term capital invested. Growth is measured by accumulation of equity capital employed and financial policy refers to principal sources of debt and equity finance for investment, together with the extent of divestment by capital repayments and dividends. The sample is segmented by ownership, vertical structure and choice of technology.

The discussion below uses a political economy framework 8 to examine the development of the cotton economy of Lancashire. Within this framework, the use of accounting and financial data facilitates an examination of the shareholder and manager governance relationship, and the impact of profits and wealth changes in one period and growth and investment in the next. Political economic analysis also moderates some of the difficulties of following an accounting based method, for example the presupposition of capital market efficiency.9 Publications of accounting numbers are treated as historical events and form a body of empirical evidence for judging the behaviour and response of entrepreneurs and investors. Accounting techniques may have been relatively primitive, but the purpose here is to examine what was reported under historical conditions, rather than what would have been reported under modern conditions.

None of the evidence considered to date has included any case studies of the experience of actual companies, nor reference to the profitability of those companies that shifted to the less familiar technology. To what extent, therefore, were Lancashire entrepreneurs genuinely reticent in experimenting with ring spinning and the automatic loom, and if so why7 Was any such reticence justified, and if so, did it ultimately cost the industry its world leadership? To address these questions, the actual experiences of Lancashire companies are examined. The analysis is divided into four sections, which link previous explanations with a framework for empirical evidence introduced by this research. First, the special characteristics of Lancashire entrepreneurship are defined. Then the diffusion of alternative technologies is examined and examples of companies are identified that sought to specialise in ring spinning or experiment with automatic looms, in some cases from a relatively early date. The diffusion pattern is then explained by reference to the financial performance and factor cost structures of companies pursuing different capital investment policies. The causes and consequences of Lancashire's specialised industry structure are then reassessed. Finally, conclusions are drawn and the implications for our understanding of the process of industrial growth and decline are examined.

II

During the late nineteenth century important changes occurred in the social nature of Lancashire capitalism. As the industry moved from growth to maturity, wealth became increasingly concentrated. Unlike other industries, this did not result in monopoly, carrelisation, concentration and the emergence of large managerial hierarchies. Although it is true that some large firms were formed, they failed to dominate the industry.10 What makes Lancashire a fascinating case in the period 1890-1914 is that increasing wealth concentration among individual owners accompanied increasing specialisation in industry structure.

The process of capital accumulation underpinned the emergence of family and local commercial elites. Growth of reinvested equity capital was highest where private or family control was exercised, for example at Horrocks Crewdson,11 and for the small minority of companies that raised finance beyond local Lancashire capital markets. Conversely, companies dependent on regional stock markets tended to reduce in size through capital repayments and dividend distributions.12 Dramatic increases in capital in the period 1896-1914, exemplified by the rise of capitalists such as John Bunting (1839-1923) and William Birtwistle (1855-1936), accrued to individuals rather than corporations.13 Bunting typified the Oldham based entrepreneur, using public company flotations as the basis of multiple directorships (Frank Platt, 1890-1955, subsequently managing director of the Lancashire Cotton Corporation (LCC), was a later example),1'1 whereas Birtwistle relied on the closely controlled private company.15 In all cases, profits were divested from established businesses for reinvestment through personal flotation or acquisition of other concerns.16 Crucially, these funds were channelled through the estates of proprietary capitalists. Strategy formulation remained the exclusive remit of these individuals. Meanwhile, managers fulfilled a limited stewardship function designed to ensure surplus cash flow was remitted to the owner as soon as possible.17 Managers functioned merely at plant level and were subjected to interference, close scrutiny and sometimes dismissal by owner-entrepreneurs such as Birtwistle and Edward Fielden (185 7-1942).! 8 They were trusted with routine mill management and supervised only a small hierarchy. For quoted companies in the Oldham district, the pattern was similar, except that shareholder mistrust of management reflected the traditions of shareholder activism associated with working and middle class investment in the i86os and i87os. A series of slumps in share values undermined this ownership structure. In the period 1892-5 an index of representative companies declined almost continuously for 48 months.19 In length, this bear market amounted to a local equivalent of the Wall Street Crash. Companies relied on partly paid shares and had to make fresh calls to stay in business.20 Rather than meet these, working and middle class investors chose to sell, accentuating price falls further. By 1896, when the market finally turned, wealthier investors who had bought cheaply made significant gains.21 Thus, capital ownership centralised around cliques of richer shareholders able to exclude residual shareholders and to impose tighter control on nominee managers.22 Many were skilled at speculation and company flotation. Much borrowing capacity remained unused, whilst lines of credit increased with the social standing of individual proprietors,23 confidence in which increased as share values recovered. By the i90os 'empires of individually controlled mills', on the lines suggested above, whose proprietors possessed ready access to financial resources, became more clearly established.24

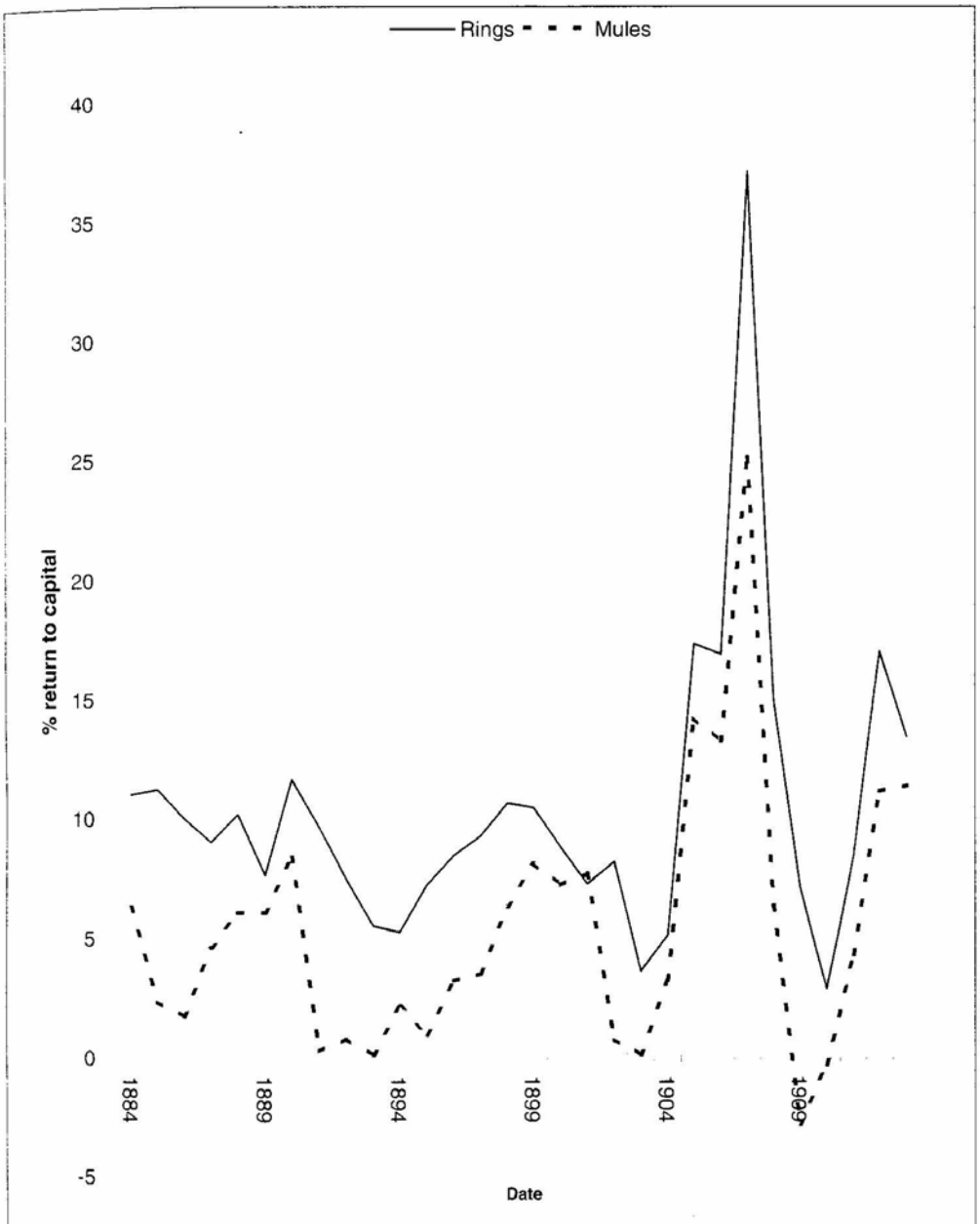
To some extent, Lancashire's development was regionally distinct and remained separate from the rest of the British economy. The stock market crash of the 1890s came at a time when London industrials moved ahead.25 Whilst Lancashire exports suffered under high gold prices, London was helped by rising demand in the domestic market.26 Typically, money was raised locally from the accumulated profits and divestments from other cotton concerns and rarely from the banks, even for working capital.27 Although corporate independence from banks occurred in other sectors, the combined effect was an absence of demand and investment opportunities for capital from outside the county, thereby continuing a divide that had emerged from the time of industrialisation.28 Increasing independence of financial capitalists further underpinned the special characteristics of Lancashire entrepreneurship.

These governance mechanisms to an extent confirm an important case of British 'personal capitalism'.29 However they are also suggestive of a gap in existing interpretations of Lancashire entrepreneurship. In particular, their encapsulation of separate roles for entrepreneurs and managers raises the crucial question of the extent to which these individuals contributed to the decline of the industry, for example their inability to invest in new technology.30 Sandberg argued that decision makers responded rationally to profit signals31 and loyalty to the mule was justified by its apparent superiority on counts above 40s.32 In response, Lazonick argued that entrepreneurship was too narrowly defined, allowing cotton managers to be adjudged successful by reference to their ability to produce a rational or optimal solution given certain constraints. Had entrepreneurs been defined in the Schumpeterian sense, they would have been judged by their ability to remove constraints, for example by vertically integrating as a precursor to introducing ring spinning.33 As it was, 'vertical specialisation ... constrained the adoption of modern capital intensive technologies in the ... two decades or so prior to World War I'.34 Those feeling the constraints the most closely were managers and production technologists, especially those working in the 1920S and 1930s, and their views were quoted extensively by Lazonick as evidence of barriers to such capital intensive production imposed by vertical specialisation.35 But these individuals were excluded from decisions on industry organisation by the governance structure described above. The power to restructure the industry and to invest in new technology rested with entrepreneurs; the individual and financial capitalists whose adeptness lay in mobilising financial resources and mill flotation. Any constraint on adoption of more capital intensive production lay in the ownership of capital rather than industry structure ex ante. Despite attempts to shift the focus to industrial organisation, entrepreneurial attitudes towards technology remain a highly relevant theme and are explored further through case studies of individual companies in the next section.

Ill

The first known Lancashire factory dedicated to ring spinning was the New Ladyhouse Cotton Spinning Co. Ltd, registered on 26 April 1877.36 There followed, in the early i88os, a group of three companies formed around the original New Ladyhouse Company that became known as the 'Milnrow Ring Spinners'.37 These small, but highly significant firms, operated in a geographically concentrated cluster, and like the examples referred to earlier, were promoted and owned by the same dominant shareholder group.38 Figure 1

contrasts their performance with specialised mule companies spinning similar counts in nearby Oldham. The pioneering Milnrow ring spinners outperformed mule spinners in nearby Oldham in all periods, and also fine spinning companies such as Barlow and Jones Ltd and later those under the control of the Fine Cotton Spinners and Doublers Association (FCSDA).[39] Furthermore, the variance of stock market returns suggested that



Sources: Returns calculated for each company listed in appendix 1 and averaged by sub group.

Figure 1. Ring and mule spinners' comparative performance.

the ring spinners were less risky.40 Given the clear and acknowledged41 premium to ring spinning, it is surprising that the Milnrow companies were not expanded further in spindleage or capacity and that these early concerns were not more widely emulated in later decades before 1914.

Partly the explanation lies in the inadequacy of the local capital market as a signalling and capital allocation device. Of particular importance was the obsession in Oldham and nearby towns with dividends.42 According to modern finance theory, where a capital market is efficient, the investor should be indifferent to the proportion of total return received in dividends or capital gains.43 To an extent, therefore, the dividend obsession must have reflected a degree of market inefficiency. Preferences for immediate cash instead of future capital growth indicated the distrust of managers discussed earlier, and was rational in the sense that it minimised monitoring costs. Also there was a lack of confidence in a relatively thin market,44 especially in periods such as 1892-5, when difficulties and cost of finding buyers for shares to liquidate investments became a problem for some classes of investor. Specific shareholdings rather than portfolio based investment, and the dominance of 'voice' over 'exit' 45 in most trading conditions fuelled the demand for dividends and prevented the expansion of even the most profitable concerns. Furthermore, the maximisation of dividends, rather than shareholder wealth, cannot have enhanced the allocative efficiency of the market.

Investment decisions were also influenced by entrepreneurial perceptions of risk.46 In the i89os, as the coarse trade suffered significant losses in the Indian market, gloom enveloped the industry, with many regarding its prospects with great pessimism.47 Resulting depression of share values and capital concentration reduced the capital market's operational efficiency and undermined its ability to allocate capital according to rational financial signals in the mill building boom of 1904-7.48 Meanwhile, whilst the depression lasted, very few new mills of any kind were built in the i89os, and the diffusion of the ring was undoubtedly slowed by the dampening of expectations. Indeed, little investment of any sort took place, particularly in the depression hit Oldham of the i89os, and this may be one reason for Oldham's notable commitment to the mule. Mule spindleage in the area declined from 11.4 to 10.9 million spindles between 1891 and 1897.49 Few other significant ring mill constructions occurred before the early i90os, notable exceptions being the Palm (1884), specialising in strong rope yarns, the Nile (1898) in Oldham, Bums Ring Spinning Co. Ltd at Heywood (1891) and the Era (1898) in Rochdale.50

In many cases capital equipment manufacturers were closely involved with the promotion of new mills. For example, the Milnrow companies and the Era Mill were backed by Howard and Bullough Ltd, whose ring frame was an important addition to its product range, and the Burns company by Samuel Brooks Ltd.51 In the i90os the Draper Corporation backed British Northrop Loom Company, in liaison with the Greg, Toocal Broadhurst, and the Hollins family entrepreneurial group fostered similar local experiments in automatic weaving.52 The backing of such suppliers was common and may have helped underwrite risk, but also reflected interlocked business networks and was thus vital to the diffusion process.53

Another reason for limited diffusion was the association of ring spinning with product and geographical specialisation. It was embraced more enthusiastically in some districts, notably Rochdale, than in others, notably Oldham. Traditions of throstle spinning54 in the former area and the role of capital equipment suppliers and their acquisition of

patents, reinforced the local tendency towards specialisation in rings. Despite early patent registration in the USA and in Britain, it was improvements of the Sawyer and Rabbeth spindles from the i87os and their associated increase in productivity, that encouraged the replacement of throstles with rings in the Rochdale area.55

Use of shed style constructions might also have influenced the diffusion of ring spinning into areas such as Rochdale where land prices were lower. The New Ladyhouse mill used such a style and was subsequently emulated by larger ring mills, notably Cromer (i9o6).56 In south east Lancashire in the Oldham and Manchester areas, where land was more expensive,57 it is noteworthy that ring mills built in the i90os were either smaller, or combined with mule capacity, and availed themselves of the traditional storeyed construction. Capital ownership and the mobilisation of financial resources through local centres such as Oldham, where exercised through the joint stock company, supported larger investment in capital intensive mule companies. These offered substantial economies of scale.58 Although such economies were present in the large Oldham mule mills of the i90os, the advantages were less obvious for the smaller ring mills.

It has been argued that the structure of labour relations and the substitution of cheaper inputs was the basis of the survival and indeed success of the mule before 1914. According to this view, Lancashire's success was based on its responses in these areas to the cost cutting strategies of overseas companies, which were armed with the ostensibly advantageous combination of the ring spindle and cheap labour.59 Again, if the hypothesis is correct, vertically specialised mule mills would be expected to outperform vertically specialised ring mills in Lancashire. Wage cost savings in ring mills would be outweighed by the option of substituting cheaper raw materials in mule mills. Also, there would be additional reasons, associated with packaging and transport costs, to expect the superior performance of the latter.

As the evidence in table i and figure i suggests, however, although labour cost was higher in ring mills, neither this nor constraints associated with transport and packaging damaged their profitability.60 In contrast to the mills of Oldham, the ring mills of Rochdale did not provide the allegedly technologically conservative Lancashire entrepreneur with capical-intensive-based competitive advantage.61 Due mainly to high labour intensity in intermediate processes, in the i89os labour cost and labour intensity was higher in Rochdale ring mills than their mule equivalents in Oldham.62 Superior profits demonstrated in figure i arose from greater efficiency in output per spindle and specialisation through market niches.63 If labour cost savings did exist, they were confined to the spinning process itself. Ring spinning required more labour in roving and other preparation stages and in after spinning processes, such as doffing and winding.64 Doffing was an unskilled task, normally assigned to teams (four per machine) of young and inexperienced workers, and their employment no doubt added to the labour intensity of ring spinning.65 When other entrepreneurs finally began to emulate the Milnrow experiment in the early i90os, there was little concern with labour saving potentialities.

Ring spinning offered a cheap capital, smaller scale alternative to the mule, but it was to the latter that entrepreneurs turned in the search for economies of scale. After a lag 01 more than twenty years, the centre of the coarse spinning trade in Oldham to a very limited extent began to copy Rochdale from 1904 onwards. Out of 74 new mills started in the Oldham district between 1900 and i907,66 eight were specialist ring spinners. In spindleage terms they were small in relation to mule mills.67 Nonetheless, ring spinners

Table 1. *Labour cost and intensity in Mule and Ring mills, 1890–92*

(1) Wages analysis, 1889–90

	Spind.	*Hands*	*Wages (£)*	*Wages/ hand (£)*	*Wages/ spind. (£)*
Ring mills					
Haugh	27,200	260	8,692	33.43	0.3196
New Hey	38,000	370	11,802	31.90	0.3106
New Lady-house	15,728	200	5,477	27.38	0.3482
Average				30.90	0.3261
Mule mills					
Hathershaw	77,424	376	9,644	25.65	0.1245
Stanley	48,480	236	7,172	30.39	0.1479
Lees Union	63,000	306	7,048	23.02	0.1119
Dowry	66,670	324	8,244	25.44	0.1237
Average				26.13	0.1270

(2) Comparative cost analysis, early 1890s

	Ring (%)	*Mule (%)*
Material	70.8	74.7
Labour	13.9	12.9
Depreciation	3.8	3.2
Other	11.5	9.2
	100.0	100.0

(3) Comparative labour intensity in mule and ring mills, 1890

	spindles/hand
Ring mills	
Haugh	10
New Hey	103
New Ladyhouse	79
Average	96
Mule mills (industry average)	206

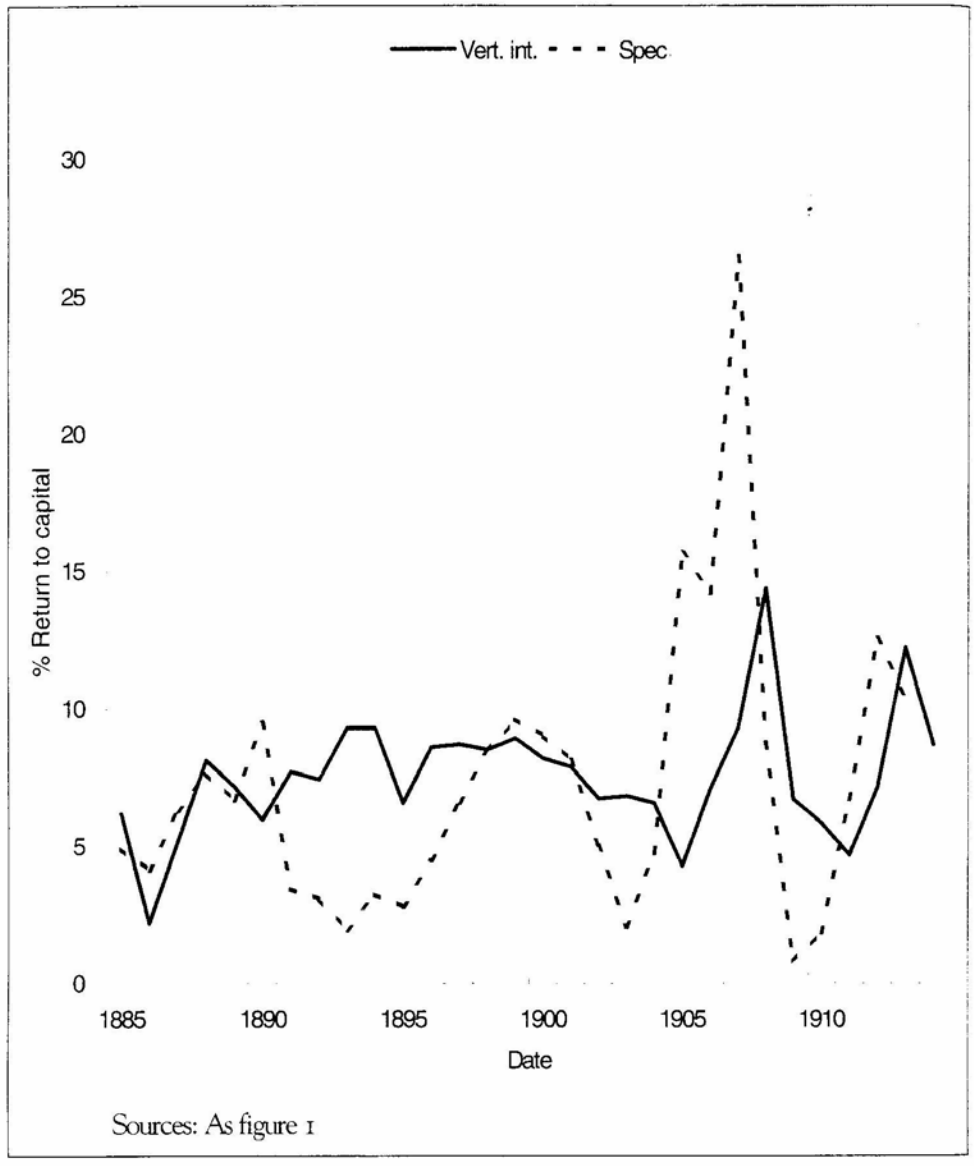
Sources: (1) Compiled from, *Oldham Chronicle*, 1st October 1889, *Rochdale Observer*, 28th June 1890 (for mule spinners, in the absence of data on actual hands employed the number was estimated using the industry average of 206 spindles per hand, per G. H. Wood, 'Factory Legislation Considered with Reference to the Wages etc of the Operatives Protected', *Journal of the Royal Statistical Society*, vol. LXVI, 1903, p. 316). Wages data per the quarterly reports of each company, as published in the above newspapers; annual equivalents obtained by multiplying by four. (2) Collation of figures for the same companies as in (1).

ilso became larger, and, unlike the highly specialised large new mule mills, developed higher count product ranges. While the counts spun by the Milnrow group had been 18/365 range in the i88os and became 6/36s by i9i4,68 the newer companies had average counts of 3 is, including some, such as Cromer spinning up to 64s Egyptian and Nile, 8os Egyptian, entering the finer product range.69 As mule mills exploited economies of scale for ring spinners product specialisation and market niches were more important, although the ostensible constraint of sub-4os coarse specialisation for ring spindles was far less applicable in the 19005 than it had been in the i88os.

IV

The previous sections have examined the special characteristics of Lancashire entrepreneurship and some of the reasons why entrepreneurs chose, to a limited degree only, to invest in ring spinning technology. Considering this evidence, it is now useful Co re-examine the issue of industry structure and vertical integration, in particular, the hypothesis that the increasing vertical specialisation of the industry became a constraint on the development of high throughput, integrated manufacture.70 According to this argument, in the rest of the industry both branches began to resist the introduction of new technology because of their structure. Vertical specialisation prevented co-ordinated decision making between spinning and weaving mills necessary for the replacement of power looms with automatic looms because the spinning companies could only supply yarn suitable for the former.71 Thus, in Britain, only in the production of warp yams were specialist ring spinners able to compete, since whether rings or mules were used for warp, the yarn still had to be rewound from bobbins onto beams before weaving.72 If entrepreneurs were concerned to remove the constraints on weft yam, they could have either installed rings in existing integrated concerns that could also take advantage of developments in automatic weaving, or built brand new integrated factories.

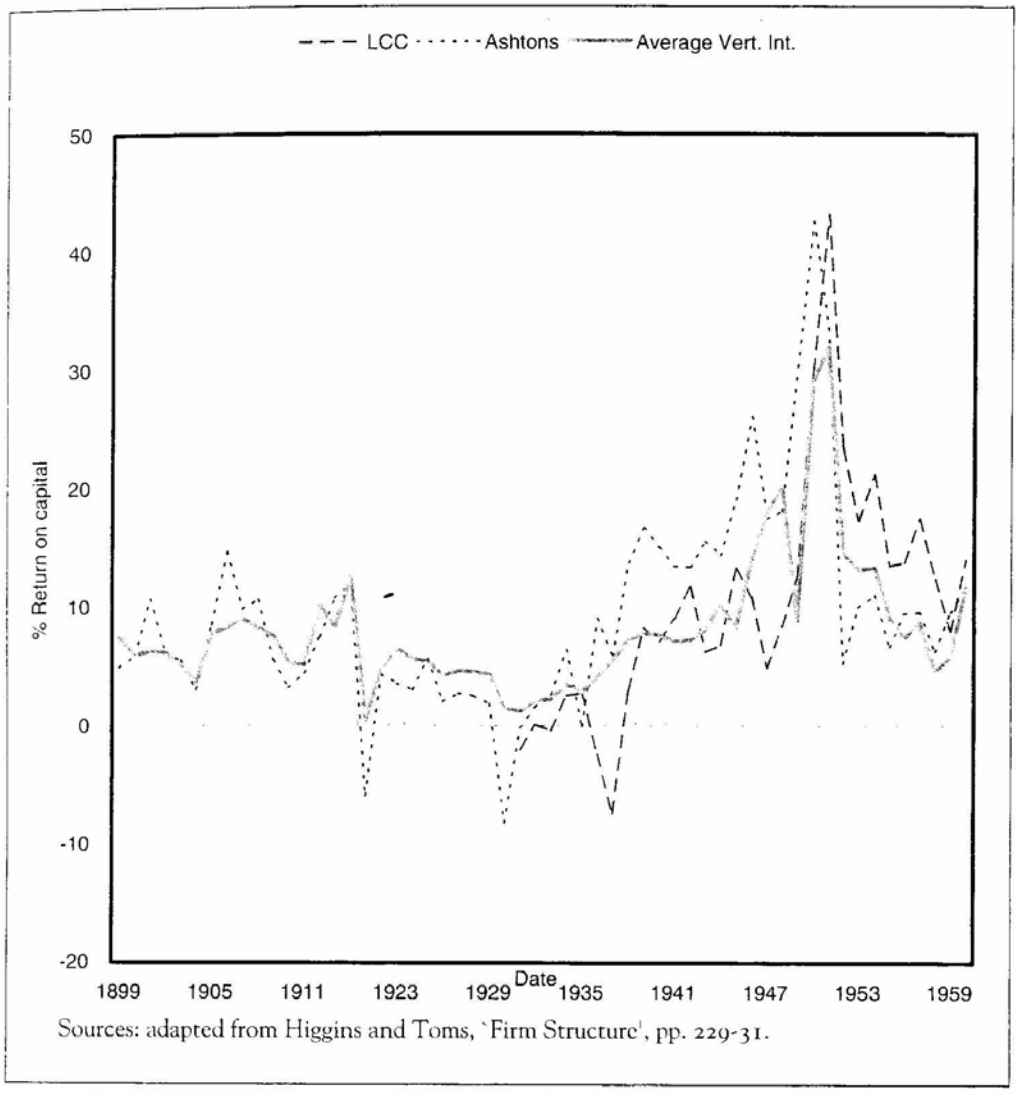
When investment did occur, there were many reasons why entrepreneurs preferred to float specialised rather than integrated concerns. First, as the trends in figure 2 illustrate, to specialise was more profitable during periods of boom. Specialised companies generally performed much better than those companies that perhaps attempted to achieve internal throughput economies through the adoption of vertically integrated structures. One company that almost uniquely followed the strategy of simultaneous investment in ring spinning and automatic looms was Ashton Brothers (another less prominent case was Fielden Bros. Ltd).73 Whilst the performance of Ashton's was average, specialised ring spinners enjoyed superior profitability. It may have been, however, that in times of depression, integration was a preferred strategy. Thus from figure 2, vertically integrated companies did relatively better in the i89os than in the i90os. It was also true that vertical integration was rewarded relative to specialisation in periods of market contraction and penalised in periods of boom for all phases of the trade cycle to i96o.74 Given such variability and uncertainty, and the absence of permanent periods of advantage to vertically integrated companies, it is not surprising that the integration driven, throughput 'technology based methods of Ashton's were not emulated, even during the most serious slumps. During the 1930-2 depression, management problems in the early days of the LCC were added to by the sheer scale of a business operating in an industry characterised by relatively small order size and the pedagogic planning problems endemic in centrally



Sources: As figure 1

Figure 2: Vertically Integrated and Specialised Firms' Comparative Performance

allocating these orders to the large number of operating factories.[75] A boardroom battle led to the abandonment of centralised management control in 1932, and its replacement with a profit centre structure. Platt's emergence as managing director ensured that the company remained a relatively decentralised federation of vertically specialised units.[76] As figure 3 illustrates, subsequent under-performance *vis-à-vis* Ashton Brothers was temporary, and reversed by growth phases in the trade cycle, notwithstanding further advances in technology.[77] Accordingly, the argument that entrepreneurs employing capital intensive, throughput technology had more to gain when using ring spinning in integrated production appears illusory.



Sources: adapted from Higgins and Toms, 'Firm Structure', pp. 229-31.

Figure 3: Production and Organisation Strategies - Relative Profitability

Secondly, and a reason why the observed profit differentials are not surprising, is that the technical advantages of integrating ring spinning and loom automation were not fully established until the 1920s. In particular, the automation of intermediate processes such as high drafting and high speed winding were important prerequisites of such efficiency gains.[78] Despite the alleged compatibility of ring spinning and automatic weaving prior to 1914,[79] the possibilities for their efficient integrated use were only established by the 1930s. In contrast to gradual developments in continuous spinning, the automatic loom was a steep improvement, and a potentially far more efficient machine than its predecessor. Although vertically integrated companies adopted ring spindles, their financial performance was not enhanced *vis a vis* their specialised competitors (figure 2). Labour intensity at preparation, doffing, and winding stages meant fully automated throughput production was not possible before 1914.[80] Because of labour intensity in

preparation and doffing, unlike the potential of the new loom, major improvements in ring spinning productivity were not available until after i9i4.81 Experiments with automatic weaving did not therefore necessarily lead to superior profits, despite the greatel efficiency of the machines.82

Vertical integration was also resisted because entrepreneurs could enjoy its benefits through informal networks without the cost of creating complex organisation structures.8^ An example was the contacts built by most firms with the Liverpool and Manchestel markets; particularly the use made by Oldham spinners of Liverpool warehouse operator; as cotton stockholders.84 As noted in relation to technological diffusion earlier, linkage; with capital equipment manufacturers were also important. It might be added that because of their control by different entrepreneurial networks, these encouraged either ring 01 automatic loom installation but not both.

Although factor costs and productivity were important and their emphasis in recent debates is well justified, they do not fully explain performance differentials. Management of integrated companies such as Horrockses and Tootals tended to find that efficient marketing and efficient production worked in opposite directions. Investment in wide product ranges limited the benefits of internal economies of scale in these companies but especially in the case of Horrockses, provided the basis of sustained competitive advantage via superior profit margins.85 Internal economies of scale were absent prior tc i9i4,86 but also in subsequent periods. To the cotton economy as a whole, marketing was more important than manufacturing efficiency and production costs remained insignificant relative to total cost.87

All the above reasons for specialisation were underpinned by the experience of the trade cycle. The British government's commitment to free trade and the gold standarc were capable of exercising a dominant influence on the destiny of the industry. Foi example, the loss and recovery of the Indian market, reflecting lobbying, British electora arithmetic, and the relationship between the British and Indian governments,88 had c decisive impact on the development of the coarse spinning American section. First market changes impoverished working and middle class investors and centralised capita ownership in the i89os. They then led to the investment boom in specialised concern; during the i90os backed by the new class of individualistic freelance promotional anc speculative capitalists referred to above. (In a parallel process, the 1920S witnessed the impoverishment of the promotional entrepreneurial class and its replacement by the creditor banks). To all sections of the industry, the world market was vital to profitability and variation in profitability,89 and entrepreneurs were understandably reluctant tc commit themselves to the high fixed costs of big firm organisation.90 Risk associated wifl-large variations in demand also reduced the value of internal economies of scale.

Finally, the vast returns generated in the days of 'easy money'91 had an important iterative influence on investor behaviour and reinforced the tendency towards specialisation. This was particularly true of the over-investment in coarse mule spinning capacin during the boom of I905-7.92 Perhaps to an extent such entrepreneurial behaviour is tc be expected for industries whose output is cyclical around an upward secular trend, a; cotton was in the i90os. Confident expectation of a new and greater boom would nc doubt have alleviated the worries of entrepreneurs whose new mills came on stream in 1908 just after the close of the greatest boom hitherto experienced by the industry.

Despite justified optimism, there was a damaging legacy of overcapacity and high cost

base that contributed to most subsequent problems of uncompetitiveness. In this sense, the cause of Lancashire's decline was the pattern of capital accumulation during the period of growth. Furthermore, capital ownership became a constraint preventing future investment. There were five reasons for this, all of which would have been relevant in a counterfactual world of widespread vertical integration. First, many of the entrepreneurs who had made money before 1914 had divested through their personal estates by the early 1920S or lost their capital in the slump.93 Second, after 1920 average profit rates were low, risk perceptions high, and entrepreneurs therefore reluctant to reinvest. Thirdly, such reinvestment had always occurred through new flotation (and re-flotation in the case of the 1919-20 boom) rather than modernisation of existing capacity, and new flotation was not possible due to overcapacity. Fourthly, the overcapacity problem and loss of market share were iterative and compounded difficulties further. Lastly, because of overcapacity reinvestment had to be preceded by scrapping. This raised exit barriers cind the opportunity cost of new investment. Thus in some periods after 1920, entrepreneurs used price fixing schemes to support marginal factories creating further market share losses.94 Meanwhile, serious reorganisation and re-equipment was only countenanced on the basis of external intervention from the Bank of England or the government. The legacy of overcapacity prevented the success of these schemes. In the case of Bank intervention in the 1930S, reorganisation was not helped by the traditional independence of Lancashire from the financial institutions.95 In the case of government intervention in the 1950s, as suggested by one commentator in 1959, the result was an apparently illogical industrial policy: 'The idea of a subsidy to reduce capacity in order to be eligible for a subsidy to increase it, has a faint flavour of paradox to say the least.'96 Although the original investments had been made for the best possible reasons, Lancashire unfortunately was not living in the best of possible worlds.

V

There are some obvious limitations to the study presented here, for example, the absence of comparatives with other economies and with other periods.97 However, the current study has hopefully succeeded in deepening the debate and through introducing new evidence might promote a wider triangulation of views beyond simple economic categories of efficiency. Accordingly, some useful conclusions can be drawn at this stage.

In the above discussion it has been shown that ownership and hence entrepreneurship were important influences on the profitability of and investment in the Lancashire textile industry. In turn, this had an impact on the limited diffusion of ring spinning, although as argued in the final section technological choice was not constrained by industry structure. From the perspective of the entrepreneurial failure hypothesis, it was the character of capital accumulation, rather than the failure of a class of individuals that was important.

Ownership decisively affected growth and industry structure and Lancashire entrepreneurship had several interesting features. Perhaps the most significant was the creation of business empires through personal shareholdings and the ability of entrepreneurs to manage personally relatively large numbers of similar firms. Conversely, they were reluctant to establish professional management hierarchies, which, although increasingly common elsewhere, were compromised in Lancashire by preference for individual, and

not corporate, accumulation. The lack of institutional capital accumulation in the industry was, at least in part, a function of the separate development of Lancashire, as an export led manufacturing sector, from the institutional and investment priorities of the British economy as a whole. Ownership of capital thereby became crucial to the development of the industry, with profitability an important determinant of its deployment.

In Schumpeterian terms, the issue was not simply the entrepreneurial removal of constraints, but the broader process of 'creative destruction'.98 On a broader level still, this was linked to the problem of over-investment described above. The emergent class of pre-1920 entrepreneurs had the purchase of new factories as their hallmark. Given the accumulated financial resources and flotation skills of individuals, and the expansion strategies of some private companies around 1900, there was nothing to stop entrepreneurs investing simultaneously in spinning and weaving capacity.

Why then did these capital rich entrepreneurs not simply eliminate technical interrelatedness constraints by setting up new integrated mills799 The answer might be that the industry's markets were growing absolutely before 1914 and that this favoured the entry of more vertically specialised firms.100 Thus, Lancashire was able during this period to optimise subject to non-problematic constraints of industrial organisation and remain competitive.101 However, the difficulty with this argument is that Lancashire did not enjoy a smooth growth trajectory before 1914. As discussed earlier, there was a severe depression in the i89os, characterised by an overvalued currency, loss of market share and serious financial losses for businesses and individuals. Surely if a genuine constraint was imposed by specialisation, it was just as problematic in this period as in the years after 1920? Industry commentators argued, with some justification, that the conditions of the early i89os paralleled those of the 1920S and early 1930s.102 Extending the comparison further, if industry organisation was a problematic constraint in the 19205 and 1930s, does it also follow that it again ceases to be problematic in the periods of renewed growth in the late 1930S and after 1945?

To argue that industry structure and labour relations were simultaneously a constraint and non-problematic 103 is a historical contradiction. Remedial action is definable by the hindsight blessed historian and not by the entrepreneur. If, at the time the entrepreneur is supposed to realise a constraint exists, the historian also defines the constraint as non-problematic, it is difficult to see how the entrepreneur can escape the criticisms that have been applied in the case of Lancashire cotton. In reality, there were no structural constraints, and even had they been problematic, the means to eliminate them were also present before 1914, namely the fortunes and reinvestment priorities of individual entrepreneurs. In this sense, the ownership and circulation of capital, not industrial organisation, was the constraint, and as such was only relevant after 1920.

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Appendix: data and sources

COMPANY	SOURCE
Specialisd Companies	
(i) Mule Spinners	
Crawford	'Commercial Reports', Oldham Chronicle (Saturday issues, published summaries of quarterly reports detailing profits, dividends, share and loan capital) April i884-December 1913.
Dowry	Courtaulds pic Archives, Coventry, LCC/DOWI, Nominal Ledger; June i885-December 1912; 'Commercial Reports' Oldham Chronicle, April i884-December 1913.
FCSDA	London Guildhall Library (LGL), Commercial Reports, Half Yearly Balance Sheets, 1899-1913
LCC	Stock Exchange Official Intelligence, 1929-1950; Cambridge University Companies Database, 1950-60.
Moorfield	'Commercial Reports', Oldham Chronicle, April 1884 - December 1913; Smith, 'An Oldham Limited Liability Company', pp. 34-53.
Oshorne	Lancashire County Record Office (LCRO), DDX/869/3/i, Trade, Capital, and Profit and Loss Accounts, June i889-June 1914.
Sun Mill	'Commercial Reports', Oldham Chronicle, April i884-December 1913; Tyson, thesis, appendices i and 2.
Werneth	Oldham Local Studies Library, Misc. 42/17 and 18, Quarterly Reports to Members, April i889-0ctober 1912; 'Commercial Reports', Oldham Chronicle, April i884-December 1888.
(•2) Ring Spinners	
Haugh	'Commercial Reports', Oldham Chronicle, April i884-December 1913; Rochdale Observer, 28 June 1890 and Quarterly Reports April i892-June 1914 inclusive.
New Hey	'Commercial Reports', Oldham Chronicle, September i886-June 1913; Rochdale Observer, 28 June 1890 and April i892-June 1914.
New Ladyhouse	'Commercial Reports', Oldham Chronicle, April i884-December 1913; Rochdale Observer, 28 June and April i892-June 1914.
Vertically Integrated	
Armitage (Sir Elkanah)	LGL, Commercial Reports, Yearly Balance Sheets, 1891-1913.
Ashton Bros	LGL, Commercial Reports, Half Yearly Balance Sheets, 1899-1913.
Barlow & Jones	LGL, Commercial Reports, Half Yearly Balance Sheets, 1900-1913.
Fielden	West Yorkshire Record Office (WYRO) €353/475, December 1891-

December 1914; 1884-1889, Law, Fieldens of Todmorden, Table XVII, p. 129.

Healey Wood Rossendale Museum, BB6i4, Balance Sheets, Quarterly Trading and Profit and Loss Accounts and Balance Sheets, April 1907 - December 1914; Dividends Ledger, April 1882 - December 1914.

Horrockses CVR, Detailed Accounts, Half Yearly Balance Sheet's and Profit and Loss Accounts, November 1887 - October 1905; LCRO, DDHs/53, Balance Sheets, Half Yearly Balance Sheets and Profit and Loss Accounts, October 1905 — April 1914.

Rylands LGL, Commercial Reports, Half Yearly Balance Sheets, 1884-1913; Farnie, 'John Rylands of Manchester', pp. 71-2.

T & R Eccles LCRO, 868/7/1, September 1897 -September 1914.

Tootal Manchester Central Reference Library, M.46i, Board Minutes, Yearly Balance Sheets and Profit and Loss Accounts, July 1888 -July 1914.

Whiteley LCRO, DDX/868/2I/5, September 1898 - September 1914.

Note: The above show the primary sources from which profit and capital series were constructed; aggregate data from these companies have been used to construct financial indices which are used throughout the text. CVR is an unlisted archive, previously held by Coats Viyella, recently deposited at Lancashire County Record Office (LCRO).

Notes

1. For an analytical survey of these contributions, see A.J.Marrison, 'Indian Summer', in M. B.Rose (ed.), The Lancashire Cotton Industry: A History Since 1700 (Preston, 1996).
2. For a comprehensive summary of these debates, see W. Mass and W. Lazonick, The British Cotton Industry and International Competitive Advantage: The State of the Debates', Business History, XXXII (1990), pp. 9—65.
3. The essential difference was that ring spinning was a continuous process, whereas mule spinning was intermittent, with twist inserted only on the outward movement of a wheeled carriage. For a more detailed explanation see L. Sandberg, Lancashire in Decline (Columbus Ohio, 1974), pp. 18-20. Although ring spinning eventually supplanted mule spinning, and the automatic loom the traditional power loom, during this period the two technologies coexisted in direct competition.
4. D. H. Aldcroft, 'The Entrepreneur and the British Economy', Economic History Review, 2nd Ser. vol.17 (1964), pp.113-34.
5. Sandberg, Lancashire in Decline, pp. 29-30.
6. W. Lazonick, 'Industrial Organization and Technological Change: The Decline of the British Cotton Industry', Business History Review, vol. LVII (1983), pp. 195-236.
7. J.S.Toms, 'Windows of Opportunity in the Textile Industry: The Business Strategies of Lancashire Entrepreneurs 1880-1914', Business History, vol. 40 (i); pp. 1-25; J. S. Toms, The Supply of and Demand for Accounting Information in an Unregulated Market: Examples from the Lancashire Cotton Mills', Accounting Organisations and Society, vol. 23 (2); pp. 217-38.
8. Political economy is the interplay of power, the goals of power wielders and the productive exchange system. M. Zaid, 'Political Economy: A Framework for Comparative Analysis', in M.Zald (ed.), Power in Organisations, (Nashville 1970), and is concerned with the origins and distribution of power in society. B.Jackson, The Political Economy of Bureaucracy, (Oxford

1082) For current purposes, although changes in power and influence are held to be functions if changes in wealth, the term political economy is used in a pluralist non-Marxist sense, ie individual interests are not systematically reconstructed as class interests.
In an efficient market, prices quickly reflect all available information. Although chis may be more accurate assumption in modem computer-based markets, in historical settings it is less likely to be the case. For example, an efficient market assumption might fail to consider ocial processes, such as habit and emulation (H. White, 'Where do markets come from7', American Journal of Sociology, 1981, p. 518), and historical antecedents, W. Mitchell, Business Cycles (California, 1913, p. 86). Market institutions possess social and historical specificity; market processes may require context especially where characterised by disequilibrium. L. Putterman, The Economic Nature of the Firm (Cambridge, 1986, p. i6).

10. H. Macrosty, The Trust Movement in British Industry, (London 1907).
11 I. S. Toms, The Profitability of the First Lancashire Merger: the Case of Horrocks Crewdson, 1887-1905', Textile History, 24 (2) (1993), pp. 129-46.
12 I. S. Toms, The Finance and Growth of the Lancashire Cotton Textile Industry, 1870-1914', Unpublished Ph.D Thesis, University of Nottingham (1996), chs 7, 8 & 9; Toms, 'Windows of Opportunity', table i, p. 4; J. S. Toms, The Finance and Growth of the Lancashire Cotton Textile Industry, 1870-1914', Business and Economic History, vol. 26(2); pp. 323-9. J. S. Toms, •Financial Constraints on Economic Growth: Profits, Capital Accumulation, and the Development of the Lancashire Cotton Spinning Industry, 1885-1914', Accounting Business and Financial History, vol.4 (3) (1994). PP-364-83-
13. Toms, 'Supply and Demand', pp. 226-31; Toms, thesis, chs 8 & 9.
14. D.A.Farme, 'John Bunting', in D.Jeremy (ed.), Dictionary of Business Biography (London, 1984-86). J. Bamberg, 'Sir Frank Platt' (ibid). Other examples included T. E. Gartside (Jeremy, ibid) and J. B. Tattersall (Mclvor, ibid) Thomas Henthorn, Harry Dixon, William Hopwood, Ralph Morton, John S. Hammersley, and Sam Firth Mellor (D. Gurr, and J. Hunt, The Cotton Mills of Oldham, Oldham, 1989, pp. 9-10).
15. T & R Eccles and Company Ltd, LCRO, 868/20/1, Directors' Minutes and DDX/868/7/i, Profit and loss accounts and balance sheets; Geo. Whiteley and Co. Ltd, DDX/868/2I/5, Balance sheets, 1898-1914 and DDX/868/2i/i, Directors' Minute Book.
16. Toms, 'Financial Constraints', pp. 364-83; for other examples in the Manchester area, see H. Berghoff, 'Regional variations in Provincial Business Biography: The Case of Birmingham, Bristol and Manchester, 1870-1914', Business History, vol.37 (1995), p. 76.
17. In addition to dividends, high withdrawals occurred through directors' emoluments in private companies such as Fielden (WYRO, €353/475, Detailed Accounts, 1890-1914), and sales commission, for example in the Birtwistle companies (LCRO, 868/7/1, Profit and Loss Accounts and Balance Sheets, 1897-1931).
18. Fielden Brothers Ltd provides a useful case study of sometimes technically proficient managers being dismissed by proprietors relying on knowledge of markets, position and profit margins to manage the business; J. S. Toms, 'Integration, Innovation, and the Progress of a Pennine Cotton enterprise: Fielden Brothers Ltd. 1889-1914', Textile History, vol.27 (1996); pp. 77-roo; B. Law, Fieldens of Todmorden: A Nineteenth Century Business Dynasty, Littleborough: George Kelsall (1995).
19. A simple average index of 20 Oldham companies, selected from the Oldham Chronicle share listing and with a value of 100 at June 1890 had fallen to 50.2, its pre-war low, by March 1896. An index for industrial companies quoted on the London stock exchange, K. C. Smith and G. F. Home, 'An Index Number of Securities, 1867—1914', London and Cambridge Economic Service, Special Memorandum, No. 37 (1934), columns i-io, pp. 14-15) showed correspond- •"'.. ing figures of 100 and 128.3.
20. W.Thomas, The Provincial Stock Exchanges, (London 1973), p. 147.
21. In a couple of years, 1896 and 1897, investor returns were two and three hundred percent. For example, the Albert saw a rise in its shares from is and 6d to i5S 6d in just over a year, Oldham Chronicle, 28 September 1895; 26 December 1896; Toms, thesis, p. no.

22. For example at Sun Mill; R. E. Tyson, 'Sun Mill: A Study in Democratic Investment', unpublished M.A. Thesis, University of Manchester (1962); pp. 294-5; Toms, 'Supply and Demand', p. 229.
23. F. Jones, The Cotton Spinning Industry in the Oldham District from 1896-1914' Unpublished M.A. thesis, University of Manchester (1959); for example the Times No. 2 Mill floated by Bunting had using £250,000 loan capital on only £8,000 equity, pp. 87-8.
24. Toms, thesis, ch. 9; in the flotation boom of 1905-7, the paid up capital of new companies was issued to relatively few shareholders; Thomas, The Provincial Stock Exchanges, p. 155. Those shareholders in turn made significant investments in several mills, and in many cases bought themselves into board positions; Toms, 'Supply and Demand', p. 230; Tyson, 'Sun Mill', p. 299.
25. Toms, thesis, p. 406.
26. Toms, thesis, ch. n.
27. Toms, 'Windows of Opportunity', table 3.
28. J. B.Jefferys, Trends in Business Organisation in Great Britain since 1856, with Special Reference to the Financial Structure of Companies, the Mechanism of Investment and the Relations between the Shareholder and the Company', Ph.D. thesis (London: London University, June 1938); the evidence from Lancashire informs further a broader discussion of separate development. See for example G. Ingham, Capitalism Divided7 The City and Industry in British Social Development (London, 1984) and W.D.Rubinstein 'Modern Britain' in idem (ed.), Wealth and the Wealthy in the Modern World (London, 1980).
29. A. D. Chandler, Scale and Scope: The Dynamics of Industrial Capitalism, (Cambridge Mass. 1990), p.240.
30. Chandler, Scale and Scope, p. 333.
31. As figure i makes clear, profit signals varied dramatically through time - a point not fully dealt with in Sandberg's analysis.
32. D. McCloskey, and L. Sandberg, 'From Damnation to Redemption: judgements on the late Victorian entrepreneur'. Explorations in Economic History, Winter 1971-72, vol.9 (1972). p. 100; Sandberg, Lancashire in decline, p. 28. The fineness of yarn was measured by the count(s), the ratio of hanks to the pound.
33. Lazonick, 'Industrial Organisation', pp. 232-6.
34. Lazonick, 'Industrial Organisation', pp. 204-5.
35. For example, F. Holt, J. Kershaw and B. Robinson, Journal of the British Association of Managers of Textile Works, 1929-30, 1912-13, 1918-19 respectively; cited in Lazonick, 'Industrial Organisation', pp. 205 and 207.
36. Rochdale Local Studies Library (RLSL), New Ladyhouse Cotton Spinning Co. Ltd, Memorandum and Articles of Association; 'Milnrow Ring Spinning Companies', Rochdale Observer, 28 June 1890, p.4.
37. The mills were in the township of Milnrow south east of Rochdale and north west of Oldham. Ring spinning developed from the earlier throstle which in rum dated back to the continuous spinning of Arkwright's water frame; W. Murphy, The Textile Industries: A Practical Guide to Fibres, Yarns and Fabrics, (London 1910), vol. 3, p. 68, M. Copeland, Technical Development in Cotton Manufacturing Since 1860', Quarterly Journal of Economics, vol. 24 (1909), pp. 122.
38. 'Milnrow Ring Spinning Companies', Rochdale Observer, 28 June 1890, p. 4.
39. Toms, 'Windows of Opportunity', table 2.
40. For the period 1884-1913, the average stock market return for ring spinners was 10.9 with a standard deviation of 11.1, compared to mule spinners with 13.82 and 33.08 respectively; Toms, thesis, p. 89.
41. Commenting on the profit per spindle results for 1890, in a table showing the Milnrow group at ist, 2nd and 4th positions, an Oldham Chronicle correspondent wrote: The ring spindle concerns lead the way as usual ...', 3 January 1891.
42. The dividend propensities of limited companies created a local perception that the companies existed primarily for the purpose of paying dividends and nothing more, earning Oldham the

nickname of 'Diviborough'. D. Farnie, The English Cotton Industry and the World Market, (Oxford: Clarendon Press 1979). P- 263-

. i M H. Miller, and F. Modigliam, 'Dividend Policy, Growth and the Valuation of Shares', Journal of Business, vol. 34 (1961), pp. 4"-33-

44. Thomas, The Provincial Stocl< Exchanges, p. 155.
Shareholders preferred the 'voice' mechanism of scrutinising management at quarterly meetings rather than the 'exit' option of selling their shares, as defined in A. Hirschman, Exit, Voice and Loyalty (Boston, 1970). See also Toms, 'Supply and Demand, pp. 223-4.

j.6 The Rochdale experiments were described as a 'leap in the dark, involving great risk', Rochdale Observer, 28 June 1890.

4-. 'Is the Cotton Trade Leaving the Country?', Textile Mercury, 21 January 1893, p. 43.

48. In the earlv i90os, stock market returns for mule spinners outpaced ring spinners. Toms, rhesis, pp. 87-8.

4D. D. A. Farnie, The emergence of Victorian Oldham as the Centre of the Cotton Spinning Industry', Soddleworth Historical Society Bulletin, vol. 12 (1982), p. 42.

50. For a list of newly floated mills, see Jones, thesis, pp. 221-3; for Palm Mill see the company's advertisement in the annual editions ofJ.Worrall, The Cotton Spinners and Manufacturers Directory for Lancashire (Oldham); for Era Mill see Era Ring Mill Company Ltd, History of the Era Ring Mill (Rochdale, undated), p. i.

51. Rochdale Observer, 4 January 1890. I am grateful to D. A. Farnie for information on the Bums Mill.

52. M. B. Rose, The Gregs o/ Quarry Banic Mill, (Cambridge 1986); Toms, The First Lancashire Merger', pp. 129-46; Toms, thesis, ch. 6.

53. Toms, 'Windows of Opportunity'.

54. Textile Recorder, 13 May 1897, attributed the spread of ring spinning in Rochdale to the previous tradition of throstle spinning; see also Cotton Factory Times, 26 March 1897.

55. These advances stimulated the adoption of ring spinning internationally; G. Saxonhouse, and G.Wright, 'Rings and Mules around the World', Research in Economic History, Supplement 3 (1984), p. 289. In England, prior to these developments, capital equipment manufacturers concentrated on the further 'perfection' of the flyer throstle (Rochdale Observer, 4 January 1890.

56. Rochdale Observer, 28 June 1890, p. 4; D. A. Farnie, The Cotton Towns of Greater Manchester' in M. Williams, with D. A. Farnie, Cotton Mills in Greater Manchester, Royal Commission on Historical Monuments (1992), p. 44; Farnie, English cotton, p. 230.

57. T. Leunig, The Myth of the Corporate Economy' (unpublished PhD thesis, University of Oxford, 1996), p. 144.

58. S. Kenney, 'Sub regional specialization in the Lancashire cotton industry, 1884-1914: A study in organizational and locational change', Journal of Historical Geography, vol.8 (1982), p. 59.

59. W. Lazonick, 'Production Relations, Labor Productivity, and Choice of Technique', Journal of Economic History, vol. XLI (1981), pp. 512-13, W. Lazonick, and W. Mass, The Performance of the British Cotton Industry, 1870-1913', Research in Economic History, vol. IX (1984), p. 5.

no. Leunig, thesis; transport costs were relatively insignificant and were unlikely to have increased costs of vertically specialised ring spinners.

A i. Sandberg, Lancashire in Decline, p. 30.

62. Toms, thesis, ch. 5.

63. In 1890, there were 400,000 ring spindles installed in the Rochdale district, producing a weekly output 17,200,000 hanks (Rochdale Observer, 4 January 1890), or the equivalent of 43 per spindle. The comparable output of a mule spindle in 1893 was 31 hanks (T. Thornley, Modern Cotton Economics, London, 1923, p. 302). With the emergence of the cotton industry Rochdale began to specialise in flannels and flannelettes, the latter being introduced in 1883. The district also specialised in supplying strong yams, eg for tyres to the motor industry (Farnie, 'Cotton towns', p. 44).

64. J. Winterbottom, Cotton Spinning Calculations and Yarn costs (London, 1921), p. 261. J. Jewkes and E. M. Gray, Wages and Labour in the Lancashire Cotton Spinning Industry (Manchester, 1935), p.129.
65. C. Kenney, Cotton Everywhere: Recollections of Northern Women Mill Workers (Bolton, 1994), pp. 130-1. The New Ladyhouse had a spindles to operative ratio of 79; a ring spinning mill in France in 1882 producing 305 twist had a spindle per operative ratio of 75. F. Merrtens, The Hours and Cost of Labour in the Cotton Industry at Home and Abroad', Transactions of the Manchester Statistical Society (1894), p. 160; the comparable figure for mule spinning was 205, derived from G. Wood, 'Factory Legislation Considered with Reference to the Wages of the Operatives Protected', Journal of the Royal Statistical Society, LXV (1902), p. 316.
66. Jones, thesis, p. 223.
67. Belgrave 2 had only 43,200 spindles, although Iris (62,568), Moston Ring (59,796) and Royton Ring (64,176) were more typical. By contrast, the median mule specialist in the Oldham district was by this rime of the order of 100-130 thousand spindles. The largest, Times No. 2, at 174,000 spindles, revealed the limits of economies of scale in the mule section, see Jones, thesis, p. 88, 221-3. This size difference persisted into the 1930S. See G. Bennett, The Present Position of the Cotton Industry in Great Britain' (unpublished MA thesis, University of Manchester 1933).
68. Worrall, Cotton Directory, 1891 and 1913. Below 4os are usually taken to be coarse yarns.
69. Jones, thesis, pp. 221-3.
70. W. Lazonick, 'Competition, Specialization and Industrial Decline', Journal of Economic History', vol. XLI (1981), pp. 31-8.; W. Lazonick, 'Industrial organization and technological change', pp. 195-236; W. Lazonick, The Cotton Industry', in B. Elbaum, and W. Lazonick (eds), The Decline of the British Economy, (Oxford 1986).
71. Lazonick, 'Competition, specialization and industrial decline', pp. 33-4. M. Frankel, 'Obsolescence and Technical Change in a Maturing Economy', American Economic Review, June (1955), p.213.
72. W. Lazonick, 'Stubborn Mules: some comments', Economic History Review, 2nd ser., XL (1987), p. 82.
73. Lazonick, 'Industrial Organisation', p. 211; Toms 1996, thesis, ch. 6.
74. D. M. Higgins and J.S.Toms, 'Firm Structure and Financial Performance: The Lancashire Textile Industry', Accounting Business and Financial History, vol. 7 (1997); pp. 195-232.
75. Bennett, thesis, p. 77.
76. Bamberg, 'Sir Frank Platt', pp. 717-19; Economist, 8 October 1932.
77. That the LCC succeeded in making even small profits in the 1930S is surprising; the company had to bear a burden of inefficient capacity that should have been shared across the industry. A. Lucas, Industrial Reconstruction and the Control of Competition, (London, 1937) p. 156.
78. G. Saxonhouse, and G. Wright, 'Stubborn Mules and Vertical Integration: the disappearing constraint', Economic History Review, 2nd Ser. vol. XL (1987), p. 92; Toms, thesis, ch. 5.
79. Lazonick, 'Industrial Organisation', p. 205.
80. High drafting was a significant technical solution, but not widely available until the 19205; S. Noguera, Theory and Practice of High Drafting, (privately published, 1936).
81. Toms and Higgins, 'Firm Structure and Financial Performance', p. 213; in the period 1893-1915, both ring and mule spinning had average productivity improvements of 0.08 per year contrasting with high draft ring spinning installations of the 1930s which resulted in improvements in labour productivity of 42, 56 and 50; see also Thornley, Modem Cotton Economics, p. 302 and Board of Trade, An Industrial Survey of the Lancashire Area (Excluding Merseyside) (London, 1932), p. 135.
82. Toms, 'Fielden Brothers', pp. 91-5; Toms, thesis, pp. 175-92.
83. Toms, 'Windows of opportunity'; Higgins and Toms, 'Firm Structure and Financial Performance', pp.216-17.
84. D. A. Famie, The Manchester Ship Canal and the Rise of the Port of Manchester, 1894-1975 (Manchester, 1980) pp. 74-5.

8s Toms, The First Lancashire Merger', pp. 132-3; Toms, thesis, ch. 6.
: 86^ Mass and Lazonick, 'British Cotton Industry', pp. 16-17.
S" Hm"ins and Toms, 'Firm Structure and Financial Performance', pp. 219-20; Marrison, 'Indian Summer', p. 264. , , , ,- i r, n
8S E Green, 'Rentiers versus producers? the political economy of the Bimetallic controversy, c. 1380-98", English Historical Review, CIII, July (1988), p. 588; see also the further discussion in A.C.Howe, 'Bimetallism, c. 1880-1898: A Controversy Re-opened', English Historical Renew, CV, April (1990); Toms, thesis, ch. n.
89. Toms, thesis, ch. n.
90. Lucas, Industrial Reconstruction, p. 167.
ui. B. Bowker, Lancashire under the Hammer, London (1928).
y2. Toms, thesis, ch. 10.
op For example, Platt retired temporarily after the re-flotation boom of 1920; Bamberg, 'Sir Frank Platt', p. 716; in contrast, James Henry Bunting (1874-1929), son of John, lost much of his inherited capital in the depression, D. A. Farnie, 'John Bunting' in Jeremy (ed.), DBB, p. 508.
94. H.Clay, The Problem of Industrial Relations (London, 1929) p.137.
95. M. Dupree, Lancashire and Whitehall: The Diary of Sir Raymond Streat, vol. i, 1931-39 (Manchester, 1987), p.34.
| 96. T/ie Accountant, 2 May 1959, p. 539.
o-. But see Higgins and Toms 'Firm Structure and Financial Performance', pp. 195-232.
' o8. I.A.Schumpeter, Capitalism, Socialism and Democracy (London, 1976; first published, 1942), ch. 7.
99. A similar question was asked of Lazonick by Saxonhouse and Wright, 'Stubborn Mules' pp.87-8.
100. Lazonick, 'Industrial Organization', p. 203.
101. Mass and Lazonick, 'British Cotton Industry', p. 57.
102. Federation of Master Cotton Spinners' Associations, Measures /or the Revival of the Lancashire Cotton Industry, Manchester, F.M.C.S.A. (1936).
[03. Mass and Lazonick, 'British Cotton Industry', p. 57.