Abstract
The work of the Oxford Economic Research Group under the chairmanship of George Richardson is taken as the starting point for a new analysis of the limits to small firm growth. Following Richardson’s emphasis on costs of organisational change within the growing firm, caused by the need to train and assimilate new managerial recruits, a transactional efficiency explanation is developed emphasising three small business types: sole proprietorship; partnership; and private company. These types are identified from a contemporary database of new small firms, and their growth and performance characteristics are compared both by descriptive statistics and econometric evidence. The importance of business type to the growth/profitability trade-off relationship is confirmed, thus supporting Richardson’s analysis. More complex organisational forms reduce short-term performance. A new finding is the additional importance of capital structure to this trade-off: higher geared firms experience lower growth and lower profits than lower geared firms. This effect can be explained by costs of debt servicing and exposure to risk.

JEL Classification: D2, L2, M2

Keywords: George Richardson, grounded theory, growth/profitability trade-off.

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Limits to a Firm’s Rate of Growth: 
the Richardsonian View and its 
Contemporary Empirical Significance 

by 

Gavin C Reid*

Introduction
In a special issue of Oxford Economic Papers in 1964 two notable papers, by Leyland (1964) and Richardson (1964), on the growth of the firm were published. They were the product of an enquiry into ‘Business Policy in an Expanding Economy’ which had been undertaken by the Oxford Economic Research Group under the chairmanship of George Richardson. Richardson’s own contribution ‘The Limits to a Firm’s Rate of Growth’ was an elegant piece. It is an example of ‘grounded theory’.¹ Thus his starting point was with that empirical evidence from the enquiry which illuminated perceived constraints upon a firm’s growth rate. Based on evidence from interviews with sixteen businessmen over three years, he identified four principal constraints: labour or physical inputs; finance; lack of suitable investment opportunities; and lack of sufficient managerial capacity. His evaluation of the potential significance of each of these constraints was not theoretical (i.e. not based merely on a priori reasoning) but rather empirical. He simply asked: what did the respondents report? His unqualified conclusion was: ‘A very striking number of our guests expressed the view without hesitation that the availability of suitable management had been, and was, the operative check on their expansion’ (p.10). He went on to elucidate the meaning of a managerial limit to expansion of the firm.

It is this which is the focus of the paper. I address the problem of managerial limits to growth by first making reference to Richardson’s ‘grounded theory’. I then turn to a modern body of data, gathered by similar grounded methods to those used by the

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Oxford Economic Research Group in their enquiry. Relating Richardson’s own work to subsequent advances in the analysis and testing of a theory of managerial limits to growth, I present new estimates of the growth/profitability trade-off. They emphasise the roles of both organisational and financial structures in limiting a firm’s growth.

Richardson’s View on Restraints to Growth

Richardson’s (1964) starting point was to ask why a shortage of good managers did not simply lead to their prices being bid up. Why did not interviewees report a rising price of talent, rather than reporting, as they did, a scarcity of talent? He identified obvious, and perhaps minor reasons: conventionality in determining salaries (especially in the underpayment of senior personnel); and ‘lock-in’ features of contracts, like non-transferable pension rights. More important however, was the problem of what we would today call adverse selection: ‘To hire outsiders is to invest in assets of uncertain yield; the rate of new recruitment, at least to the higher levels, may therefore be limited by considerations of risk’ (p.11). In drawing attention to the problem of information asymmetry in recruiting new management, Richardson referred in a modern way to ‘insiders’ whom Directors are able to size up more easily than ‘outsiders’, because their performance capabilities are better known than those of new managerial recruits. A further problem was that ‘new-comers are at an inevitable disadvantage [compared] to established personnel in terms of the experience of the firm’s products, markets and internal organisation’ (p.11). There was a learning curve to be ascended, or what Arrow (1962) called ‘learning by doing’ to be experienced, by new recruits to management as ‘their services can be developed fully only after experience of the particular circumstances of their job’ (p.11). The argument advanced by Edith Penrose in The Theory of the Growth of the Firm (1959) was noted as being supported by direct evidence from one of the respondents, who had observed that ‘the real curb is the lack of managerial ability in the sense that it takes a long time to train people into the ways of the firm and its wide range of activities’ (p.11). As a consequence, Richardson concludes (p.11) that ‘there is a functional relationship between the “organizational efficiency” of a firm and its rate of growth, and that the former will decline, after a point, as the latter rises’. That is, there is

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1 In the sense of Glaser and Strauss (1967). For the application of this method in
ultimately a growth/efficiency trade-off. In the modern literature of industrial organisation, this is often called the Penrose Effect.\textsuperscript{2}

Richardson noted that firms with greater adaptability would be less subject to this trade off than those with inferior adaptability.\textsuperscript{3} In a growth context, whilst longer-term planning requires greater flexibility, the attempt to reduce uncertainty by a more close coordination, using futures contracts, of complementary activities, militates against achieving this flexibility. As Langlois (1995) indicates, the cognitive limits of managers may make long-term contracting difficult in an uncertain world. The current capabilities of managers in a firm may set limits on flexibility, in much the same way as do fixed plant and equipment. However, such costs are more properly regarded as fixed, rather than sunk, so no issue of asset specificity, in the sense of Williamson (1975), arises. That other plank of the Williamson construction, opportunism, is largely concerned with the strategic issue of ‘guile’ rather than with the more central issue of cognitive limits of managers, and the implied growth-profitability trade-off, emphasised by Richardson. Moral hazard, as a potential further source of incompleteness or inefficiency in the coordination of future contractual commitments, pales into insignificance compared to difficulties of coordinating complementary production activities. Thus, as Langlois (1995) emphasises, a move towards a Richardsonian, rather than Williamsonian, approach requires “a major shift of emphasis away from problems of coordinating commitments toward problems of coordinating production”.

\begin{itemize}
\item industrial organisation, see Reid (1987, Ch.3).
\item See the detailed analysis of this in, for example, Hay and Morris (1991, Ch.10). A thorough mathematical treatment of it is provided by Slater (1980).
\item In Richardson (1960, p.153) what he was later to call ‘capability’ was anticipated by reference to ‘management itself, together with the skills, experience and traditions which it embodies’. Such fixed capability, allied to problems of cognition (essentially mental limits to problem formulation and solution) result in limits to growth along lines suggested in the main text. In Richardson (1972, p.88) capability became referred to, in a well known passage, as ‘the knowledge, experience and skills’ of the firm. It is this that is often referred to in the work of business strategists like Kay (1964, p.11). However, it is to be noted that capability was also referred to implicitly in the present context when Richardson (1964, p.11) spoke of ‘appropriate commercial contracts, production experience and marketing skills’.
\end{itemize}
In seeking a superior coordination of production within the firm, consideration must be given not only to the magnitude of its contemplated growth, but also to its proposed direction. Expansion into new markets is likely to raise more acute problems of the coordination of production than expansion within existing markets. Thus one is confronted with the paradox recognised by Richardson (1964, p.12) that ‘the most creative and enterprising’ Directors are the ‘most likely to stress the managerial and organizational restraint on expansion’.

By reference to the *Principles* (1890) of Alfred Marshall, Richardson reminds us that his own argument is not simply that managerial diseconomies of scale cause long-run unit cost curves to be U-shaped. For such curves, the relevant levels of unit cost are ‘those attainable by a firm already endowed with an organizational structure appropriate to the corresponding scales of output’ (p.13). But, in the case Richardson is exploring, these levels of unit costs are irrelevant, for ‘the firm lacks the appropriate organization and cannot hope to build it up during the planning period’ (p.13). He rejects the possibility of constructing a modified long-run unit cost curve which takes account of the inverse relationship between organizational efficiency and the growth rate because the particular position and shape of such a curve ‘would depend upon the size and the elasticity of the managerial resources at the firm’s disposal’ (p.14): in short it would be indeterminate. He argues against narrowly conceiving the managerial function as keeping down the costs of production, because ‘part of their job is to decide upon the precise character of the product, or products, to be made, and to find, or create, a market for them’. Thus Richardson concludes (p.14) that ‘managerial difficulties, associated with an unduly high rate of growth, will show up, not just in costs, but in all of the determinants of profitability’. The import of all this is that the efficiency/growth trade-off also implies a profitability/growth trade-off: ‘If an increasing rate of growth causes, after a point, decreasing organizational efficiency, then this should show up in profits’ (p.14). A major purpose of this paper is to address this question of whether such a trade-off exists. In doing so, I make appeal in section 3 to a contemporary body of data, gathered by field-work methods. I use it

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4 The relevant quote from Marshall (1890, p.377) is that in the long period ‘all investments of capital and effort in providing the material plant and the organization of a business, and in acquiring trade knowledge and specialised ability, have time to be adjusted’.
first in a descriptive way, and then turn in section 4 to an econometric investigation of
the hypothesised growth/profitability trade-off.

Contemporary Evidence on Limits to a Firm’s Growth

In this section I shall introduce new field work evidence on small firms which can be
used to cast light, in a contemporary fashion, on Richardson’s limits to growth
argument. Three types of firms will be identified, and their organisational features
will be explored. Descriptive data on growth and profitability will then be related to
these organisational forms of firms.

We have seen that Richardson (1964) had case study evidence to the effect that ‘for
most of the firms dealt with, managerial capacity . . . was the strongest restraint on
their rate of growth’ (p.10). As a consequence, he argued that limitations to
managerial capacity caused organisational inefficiencies to arise as energetic and
creative Directors tried to push forward a firm’s growth rate. This suggests that
investigation of the organisational forms which firms assume is worthwhile. Their
relative efficiencies can then be related to their performance. In this way one gets a
transactionally-based account of how an efficiency/growth trade-off might arise, in
turn leading to the Penrose Effect of a profitability/growth trade-off. The aim is to
build upon the Richardson insights in a way that has now become possible since the
development of the markets, hierarchies and bureaucracies literature.⁵ This being
done, I move on to statistical analysis of the implications of this organisational
approach.

In his own work, Richardson did not attempt to go from direct observation based on
case studies to statistical inference based on market data. A profitability/growth
trade-off is implied by the analytical argument he constructed (or ‘grounded’) on case
study evidence, but this is not something he explored empirically. In fact this trade-
off relationship has since been widely explored, by authors like Cubbin and Leech
(1986), Dobson and Gerrard (1989). It has also been the focus of my own recent
work, as in Reid (1993, 1994), where in this case all the businesses analysed were
small.

⁵ Notably by Williamson (1975).
However, most of this new empirical work has been preoccupied with testing models of industrial economics. Notably so-called ‘managerial theories of the firm’ have been tested against neo-classical alternatives, without much attention being given explicitly to the organisational form of the firm. The greater concern has been with agency problems arising from the so-called “divorce of ownership and control”. My approach is naturally different from the managerial theory of the firm literature, because none of the SBEs analysed had outside equity participation. Even so, a choice of organisational form had to be made by owner-managers. Even with an SBE of, say, twenty persons, choices arise as to how authority is delegated in terms of span of control and levels of hierarchy. Whilst lacking the organisational complexity of the larger corporations that one conventionally associates with managerial theories, small firms raise important organisational issues. My purpose in this section is to put these distinctive organisational issues of the small business enterprise (SBE) at centre stage. In the next section, I then make appeal to, and report upon, new econometric work on the growth/profitability trade-off relationship.

Richardson’s own evidence was based on interviews with sixteen senior managers of firms which had experienced a good growth performance. Over a three year period they came into Oxford University to participate in interviews which, according to Richardson and Leyland (1964, p.1), ‘dealt primarily with the methods of formal planning, with the motive for growth and with the limits to growth’. A summary of these responses has been provided by Leyland (1964). My own evidence is similarly ‘grounded’, and was also gathered over a three year period. However, the sample was considerably larger (seventy-three rather than sixteen respondents) and also provided more detailed and systematic information.

I have reported on this evidence at several points in the recent past so I shall be relatively brief here. In 1985 I engaged in field work with Lowell Jacobsen that created a database composed of the responses from seventy three detailed structured interviews. These were conducted with a random sample of Scottish owner-managers of small business enterprises (SBEs). These SBEs had an average employment size of nine (counting full-timers as one and part-timers as a half) and an average age of 3½ years (from financial inception). In 1988 I returned to the field again with other co-
workers, and traced all surviving firms to obtain a further forty-seven follow-up structured interviews. In addition, in 1985, a sub-sample of seventeen owner-managers were taken through a semi-structured interview on small business strategy. The 1985 structured interviews looked at general features (e.g. employment, products), pricing, costs, sales and competition, and finance. The 1985 semi-structured interviews looked at competitive forces, competitive strategy, and defensive strategy. The follow-up interviews in 1988 looked at general features, competitiveness, innovation, skills and financial structure. The largest body of evidence was gathered in the 1985 structured interview, and it is primarily this evidence that I appeal to, although all the evidence available has been influential in the way I formulate and test hypotheses.

[Table 1 near here]

Before looking at explicitly model-based evidence, it is useful to look at two revealing cross-tabulations of the data. The first of these is contained in Table 1 which relates size of SBE (measured by sales and employment) to business type. Within the sample, there were three business types: sole proprietorship (30%); partnership (21%); and private company (49%). These categories are exhaustive and mutually exclusive. The three business types may be ranked, in increasing order of size, as: sole proprietorship, partnership and private company. This is true by sales, and by employment, both absolutely and by maximum size in each category. Thus, measuring sales at 1985 prices, sole proprietorships had average sales of about £60,000; and the corresponding figures for partnerships and private companies were £105,000 and £190,000 respectively.\(^7\) The categories of firms I have identified tend also to be the forms assumed, typically in sequence, as the SBE grows over a period of years. Thus a sole proprietorship, perhaps initially started from home, might become a partnership some months after it has been seriously launched, and then become transformed into a private company after some years, as it enjoys further success. It is possible that an SBE starts as a partnership and then transforms into a private company, or that the partnership form is skipped, with the SBE going directly

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\(^{6}\) Reid (1993) is the main work, but Reid and Jacobsen (1987) and Reid, Jacobsen and Anderson (1993) are also relevant.

\(^{7}\) To arrive at these figures I have interpolated within the sales ranges given in the Notes according to the decimal fractions of Table 1 itself.
from a sole proprietorship to a private company; but generally speaking the ordering is progressive, in terms of business development.

**TABLE 1: SIZE AND BUSINESS TYPE**

<table>
<thead>
<tr>
<th>Business Type</th>
<th>Size</th>
<th>Sales</th>
<th>Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (Std. Dev.)</td>
<td>(Max, Min)</td>
<td>Mean (Std. Dev.)</td>
</tr>
<tr>
<td>Sole Proprietorship (n=22)</td>
<td>2.1818 (1.4019)</td>
<td>(5,1)</td>
<td>2.6818 (2.4570)</td>
</tr>
<tr>
<td>Partnership (n=15)</td>
<td>3.1333 (1.7674)</td>
<td>(6,1)</td>
<td>5.4000 (4.8374)</td>
</tr>
<tr>
<td>Private Company (n=36)</td>
<td>4.7500 (2.7710)</td>
<td>(9,2)</td>
<td>12.833 (15.046)</td>
</tr>
</tbody>
</table>

**Notes:** Employment = full-time employees; Sales = 1 for £0-£50k; 2 for >£50k-£100k; 3 for >£100k-£150k; 4 for >£150k-£200k; 5 for >£200k-£250k; 6 for >£250k-£300k; 7 for >£300k-£350k; 8 for >£350k-£400k; and 9 for >£400k, all ranges measured in 1985 prices.
An important feature of Richardson’s work, with the emphasis on the organisational disabilities which accompany new management recruitment, is that it anticipates the later transactions cost based analysis of the likes of Williamson (1975, 1985). In deference to Richardson’s insight, in this paper written in his honour, I should like to make some observations about organisational form which are essentially transactions cost based, and which I think are in sympathy with his general approach. The inspiration for this is the famed analysis of evolving organisational forms in Williamson (1975, Ch.3).

Clearly one of the consequences of growth is the tendency for it to be accompanied by the use of hierarchy to control the firm. Using the figures of Table 1 we see that the mean employment sizes for each of the three firm types were: three, for a sole proprietorship; five, for a partnership; and thirteen, for a private company. These average figures suggest possible organisational forms of the types indicated in Figure 1.

[Figure 1 near here]

In (a) the ‘peak coordinator’ at the top is the owner-manager, or proprietor, and he has three subordinates. In (b), the five members of the firm are of equal status and if they each wish freely to communicate with other partners, in so-called ‘all channel communication’ it is necessary to have 10 channels open, as indicated by the connecting lines. When the firm size is larger, this organisational form becomes inefficient. For the n-firm members case, the required number of two-way communication channels is \( n(n-1)/2 \), which grows at a rate which is governed by \( n^2 \) as \( n \) becomes large.\(^8\) For example, if thirteen firm members are involved, 78 channels of communication are required. However, if hierarchy, and thus a system of superiors and subordinates is used, the number of two-way channels is \( n-1 \) in simple hierarchy. That is, it is possible to economise on channels. This is illustrated in (c) where a simple serial replication of (a) is displayed, indicating how thirteen persons might be organised in a private company, with one managing director, three managers (e.g. production, marketing, accounts) and nine workers. Now it just so happens that the statistics of Table 1, by business type, all closely tally with the illustrations of Figure 1 in (a), (b) and (c). I did this to make the evidence ‘come alive’. However, I think

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\(^8\) See Williamson (1975, pp.45-47).
there is more that a lecturing trick behind both the data and the illustrations of it, because modifying organisational forms from (a) to (b), from (b) to (c), or even from (a) to (b) to (c), are all transitions that my field work suggests are typical of real SBEs over a period like three years.⁹

Consider first the transition from (a) to (c) in Figure 1. If an SBE with a boss and three workers is to change to an SBE with a boss and 12 workers, the boss will have to keep 12 channels open if he is to communicate directly with all subordinates. That is four times what he is used to dealing with. It might over-stretch his supervisory capabilities, and in this sense is a cognitive problem. It will most certainly divert him significantly from those strategic and entrepreneurial functions which first made him an active rather than passive player in the job market. His solution, to ease the transactional costs of business transformation with growth, is to appoint three managers. These might be the same three who were his first employees, but who have now learned in some measure the ropes of the business, and can be entrusted with some level of responsibility. They, in turn, will supervise three new employees each, and in learning how to do this, will appeal to the previous experience of the boss in doing so. Amongst the tasks they confront will be guiding new employees up the learning curve. Thus promoted employees are learning new managerial skills, and new employees are being trained in skills relevant to the firm they have just joined. To the extent that organisational transformation occurs in a frictionless way, there are no ‘costs of growth’. But, most realistically, the process of change in itself is costly, in the way which Richardson has emphasised, and in a way which I have illustrated above. To express the matter in modern terms, change is costly because it involves the creation of a new organisational technology. This will only be contemplated if the anticipated benefits outweigh the costs in the long run. In the short run, the goal will be to minimise the transactional costs of change. The voluntary change from an SBE of form (a) to one of form (b) would be expected to reflect this.

It has been indicated that Richardson saw the process of growth as leading to costs. Today we might choose to call these ‘convex adjustment costs’, and would expect their existence to be reflected in reduced business performance.¹⁰ Before examining

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⁹ See, for example, Profile K (electronic instrumentation) of Reid, Jacobsen and Anderson (1993).

¹⁰ On these ‘convex adjustment costs’, see Hilten et al (1993, Ch.5).
their performance implications more precisely, it is useful to refer to another cross-tabulation from this SBE database, as displayed in Table 2. Here two measures of

[Table 2 near here]

performance, asset growth and profitability, are cross-tabulated against the three forms of SBE in the sample. It is clear that the private company enjoys a higher growth rate than the partnership, which in turn enjoys a higher growth rate than the sole proprietorship. This is true both for average growth rates and for maximal growth rates within each category of SBE. Turning now to profitability, it is equally clear that the private company is less profitable on average than the other forms of SBE, and this is true also of peak profitability within each category of firm. Without looking at causality or determinants of growth and profitability, Table 2 at least suggests an inverse association between growth and profitability.

However these data have to be treated with caution. They do not, for example, imply that larger SBEs grow faster than smaller SBEs. Indeed, for the sample as a whole, setting aside firm type, we know this is not the case.11 Thus within each firm type, there is a tendency for the smaller SBEs to grow faster than the larger ones. Further, the data do not simply show that private companies are less profitable than sole proprietorships. Setting aside possible problems in comparing profitability figures across firm types, it has to be borne in mind that, on average, private companies in the sample are much older than the other forms of SBE. They might therefore be more advanced in their ‘life-cycle’, confronting the effects of declining performance first highlighted by Alfred Marshall, and since confirmed in the small firms literature.12 Finally, I turn now to a more formal treatment of what is suggested by Table 2, that is, the possibility of a growth/profitability trade-off, at least partly explained by choice of form of the SBE.

TABLE 2: PERFORMANCE AND BUSINESS TYPE

11 See, for example, Reid (1993, Ch.11).
12 Most notably by Evans (1987). This finding has been confirmed for this database of SBEs by Reid (1993, Ch.11). For an exposition of the Marshallian life cycle analysis and its relation to contemporary industrial economics, see Reid (1987, Ch.5).
<table>
<thead>
<tr>
<th>Business Type</th>
<th>Performance</th>
<th>Asset Growth</th>
<th>Profitability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (Std. Dev.)</td>
<td>(Max, Min)</td>
<td>Mean (Std. Dev.)</td>
</tr>
<tr>
<td>Sole Proprietorship</td>
<td>22.755 (52.150)</td>
<td>243.20 -8.330</td>
<td>31.745 (49.938)</td>
</tr>
<tr>
<td>(n=22)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partnership</td>
<td>56.373 (140.50)</td>
<td>554.20 -2.000</td>
<td>33.987 (42.293)</td>
</tr>
<tr>
<td>(n=15)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private Company</td>
<td>78.303 (234.30)</td>
<td>1333.4 -4.7600</td>
<td>5.8472 (33.227)</td>
</tr>
<tr>
<td>(n=36)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:** Asset growth = \([\text{real assets (t+τ) - real assets (τ)}] \div [\text{Age} \times \text{real assets (τ)}]\) expressed as a percentage. Profitability = \([\text{Net Profit]} \div [\text{Book Value of Assets}]\) expressed as a percentage, as reported in 1988 for the year 1985.
**Limits to Small Firm Growth: The Trade-Off Relationship**

In previous work, Reid (1993, Ch.11), I have explored the possibility of a growth/profitability trade-off in the context of a simultaneous equations model in which growth both causes, and is caused by, profitability. That is \( g = F(\pi) \) and \( \pi = f(g) \), where \( g \) is the growth rate and \( \pi \) is profitability.\(^{13}\) A ‘cumulative causation’ hypothesis concerning growth and profitability, with the one positively reinforcing the other, was rejected in favour of a growth/profitability ‘trade-off’ hypothesis. Furthermore, this latter hypothesis was supported by a model which was shown to be stable and able to generate equilibrium values which were close to the mean values for growth and profitability in the sample.\(^{14}\)

[Table 3 near here]

A first look at the data might be made by reference to Table 3, which displays a profitability equation, estimated by ordinary least squares, using White’s heteroskedastic-consistent covariance matrix. About 30% of the variation in profitability is explained by the thirteen variables used as regressors. The F statistic is significant at the 5% level. However, given the large number of regressors, and relatively small sample size, few of the coefficients are estimated with precision. With more parsimonious models this situation improves [cf. Reid (1993, Ch.11)].

From the standpoint of this paper, the important coefficients to note are those for the \( Bsns \) and \( PGear \) variables. The variable \( Bsns \) denotes ‘Business type’ and is a categorical variable equal to unity for sole proprietorships, to two for partnerships and to three for private companies. The effect of this variable on profitability is clearly negative, confirming the initial impression of Table 2. If instead of this categorical variable for type of business, one uses instead two dummy variables, the first for a sole proprietorship and the second for a partnership (with the private company being included in the constant term) the results obtained are the same, with positive and significant coefficients on both dummy variables. One therefore concludes with some confidence that as the SBE ascends the ladder of firm structure, it does so, in the short run, at the sacrifice of profitability.

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\(^{13}\) Both \( g \) and \( \pi \) are measured as described in the notes to Table 2.

\(^{14}\) See Reid (1995).
Profitability Equation
(Dependent variable: ProfRate)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>(t-ratio)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bsns</td>
<td>-14.018</td>
<td>(-2.2316)</td>
</tr>
<tr>
<td>MMkt</td>
<td>1.4716</td>
<td>(0.46116)</td>
</tr>
<tr>
<td>Share</td>
<td>1.1942</td>
<td>(0.60839)</td>
</tr>
<tr>
<td>CompNo</td>
<td>-1.2433</td>
<td>(-0.41711)</td>
</tr>
<tr>
<td>PCruc</td>
<td>18.609</td>
<td>(1.8300)</td>
</tr>
<tr>
<td>ProdDes</td>
<td>-8.1809</td>
<td>(-1.0036)</td>
</tr>
<tr>
<td>Adv</td>
<td>-9.7803</td>
<td>(-1.7013)</td>
</tr>
<tr>
<td>Cfp</td>
<td>-18.308</td>
<td>(-1.4001)</td>
</tr>
<tr>
<td>AddDebt</td>
<td>1.9991</td>
<td>(0.20915)</td>
</tr>
<tr>
<td>PGear</td>
<td>-0.10802</td>
<td>(-3.4754)</td>
</tr>
<tr>
<td>DesComp</td>
<td>6.3928</td>
<td>(0.77049)</td>
</tr>
<tr>
<td>Age</td>
<td>0.064201</td>
<td>(1.0278)</td>
</tr>
<tr>
<td>GRate</td>
<td>-0.016316</td>
<td>(-0.76262)</td>
</tr>
</tbody>
</table>

R² = 0.2846

F = 1.805 = F(14,59)₀.₀₅

Note: See Appendix for definition of variables
With so many variables included, for exploratory purposes, the significance of any one variable will be difficult to establish, given limited degrees of freedom. The most obvious point to note is that the equity gearing ratio \((P_{gear})\) is negatively related to profitability, and this effect is highly significant (prob. value < 0.0005). Thus SBEs which over-stretch their indebtedness, in relation to equity invested in the firm, depress their profitability. On the one hand, such SBEs incur debt servicing obligations which are onerous and dissipate gross profit surplus; and, on the other hand, they are relatively exposed to risk by their high gearing, and thus prone to negative profitability shocks. The existence of significant interdependence in pricing is indicated by the \(P_{cruc}\) variable which is equal to unity if the pricing of rivals is crucial to the SBE’s own pricing, but zero otherwise. This variable’s coefficient is significant (prob. level = 0.04) and suggests that those SBEs which experience marked price interdependence tend to experience higher profitability than those which do not. The evidence from earlier work is that such price inter-dependence may take the ‘kinked demand curve’ form.\(^{15}\) It is interesting to note that cash flow problems \((Cfp)\) and having had recourse to additional debt \((AddDebt)\) do not appear to have significant effects on profitability (thought this specification of equation may not favour detecting such effects). These findings are also consonant with the analysis of Richardson (1964), where the consequences of funding difficulties are played down, in comparison with organisational difficulties, for fast-growing firms.

The crude specification of Table 3 does not enable one to identify a clear growth-profitability trade-off, though it is at least suggested by the negative coefficient on the growth rate variable \((GRate)\). To better discover whether this growth/profitability trade-off, or ‘Penrose Effect’ is a feature of the data, one needs to have recourse to simultaneous equation modelling.

[Tables 4 and 5 near here]

In Tables 4 and 5, I report on a simultaneous equations system for growth and profitability. It is estimated by iterative three stage least squares (I3SLS)\(^{16}\). The null hypothesis of a diagonal covariance matrix is rejected, according to the Breusch-Pagan

\(^{15}\) See Bhaskar, Machin and Reid (1991) and Reid (1993, Ch.10).

\(^{16}\) The Shazam software was used for the estimates in Tables 3, 4 and 5.
TABLE 4: TWO ITERATION 3SLS ESTIMATES OF GROWTH AND PROFITABILITY EQUATIONS

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient (Asymptotic t)</th>
<th>Variable</th>
<th>Coefficient (Asymptotic t)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Growth equation</strong> (Dependent variable: <em>GRate</em>)</td>
<td></td>
<td><strong>Profitability equation</strong> (Dependent variable: <em>ProfRate</em>)</td>
<td></td>
</tr>
<tr>
<td><em>SoleProp</em></td>
<td>35.957 (0.40433)</td>
<td><em>SoleProp</em></td>
<td>6.1104 (0.37599)</td>
</tr>
<tr>
<td><em>Partner</em></td>
<td>73.934 (0.91643)</td>
<td><em>Partner</em></td>
<td>8.0096 (0.56165)</td>
</tr>
<tr>
<td><em>MMkt</em></td>
<td>23.987 (1.6244)</td>
<td><em>PCruc</em></td>
<td>9.5408 (0.95859)</td>
</tr>
<tr>
<td><em>Share</em></td>
<td>16.895 (1.9758)</td>
<td><em>PGear</em></td>
<td>-0.14039 (-2.6902)</td>
</tr>
<tr>
<td><em>PCruc</em></td>
<td>-10.783 (-0.19678)</td>
<td><em>DesComp</em></td>
<td>-1.6651 (-0.46520)</td>
</tr>
<tr>
<td><em>ProdDes</em></td>
<td>-59.481 (-1.9975)</td>
<td><em>GRate</em></td>
<td>-0.07304 (-1.7196)</td>
</tr>
<tr>
<td><em>AddDebt</em></td>
<td>-29.094 (-0.89770)</td>
<td><em>Constant</em></td>
<td>28.756 (2.0013)</td>
</tr>
<tr>
<td><em>PGear</em></td>
<td>-1.0857 (-3.4336)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>ProfRate</em></td>
<td>-5.6762 (-3.8121)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Constant</em></td>
<td>255.80 (2.6059)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

System $R^2 = 0.7825$

\[ \chi^2 = 111.37 > \chi^2(15)_{0.05} = 25.0 \]

Breusch-Pagan LM test (for diagonal covariance matrix):

\[ \chi^2 = 14.006 > \chi^2(1)_{0.05} = 3.84 \]
TABLE 5: THREE ITERATION ESTIMATES OF GROWTH AND PROFITABILITY EQUATIONS

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient (Asymptotic t)</th>
<th>Variable</th>
<th>Coefficient (Asymptotic t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bsns</td>
<td>-21.957 (-0.56751)</td>
<td>Bsns</td>
<td>-4.2867 (-0.66708)</td>
</tr>
<tr>
<td>MMkt</td>
<td>15.748 (1.2590)</td>
<td>PCruc</td>
<td>7.6594 (0.77497)</td>
</tr>
<tr>
<td>Share</td>
<td>10.373 (1.4612)</td>
<td>PGear</td>
<td>-0.15509 (-2.9820)</td>
</tr>
<tr>
<td>PCruc</td>
<td>2.9846 (0.05133)</td>
<td>DesComp</td>
<td>-1.0358 (-0.37603)</td>
</tr>
<tr>
<td>ProdDes</td>
<td>-40.553 (-1.5006)</td>
<td>GRate</td>
<td>-0.10096 (-2.7925)</td>
</tr>
<tr>
<td>AddDebt</td>
<td>-19.085 (-0.71419)</td>
<td>Constant</td>
<td>43.816 (2.6695)</td>
</tr>
<tr>
<td>PGear</td>
<td>-1.1405 (-3.5092)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ProfRate</td>
<td>-6.0169 (-5.1373)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>327.08 (2.6753)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

System R² = 0.9006

χ² = 168.50 > χ²(13)₀.₀₅ = 22.4

Breusch-Pagan LM test (for diagonal covariance matrix):
χ² = 9.5119 > χ²(1)₀.₀₅ = 3.84
LM test, for both the two iteration (Table 4) and three iteration (Table 5) estimates. This suggests that it is indeed appropriate to use a system method of estimation like 3SLS which assumes a non-diagonal covariance matrix. In each case, the system $R^2$ is high, and the overall fit is good, judged by the $\chi^2$ statistic. Apart from the variables which define the form of SBE, the variables in each equation are the same in both Table 4 and Table 5. Furthermore, their effects are generally the same, which is one test of model stability. The business form variable in Table 5 is again the familiar $Bsns$ of Table 3, which is a categorical variable which rises as the business form becomes more complex. Business form is represented by two dummy variables in Table 4, $SoleProp$ and $Partner$. According to the Richardson argument, one expects $Bsns$ to be negative and both of $SoleProp$ and $Partner$ to be positive. These conditions are satisfied in both Table 4 and Table 5. Unfortunately, in order to improve the precision of estimation of the coefficients of the $ProfRate$ and $GRate$ variables in the growth and profitability equations, respectively, by increasing the number of iterations in the 3SLS estimates, one loses precision of estimation for the business form variables, $Bsns$, $SoleProp$, and $Partner$. With the sample size one is dealing with, this kind of difficulty is hard to surmount. Fortunately, other evidence on the importance of the form of the SBE has already been presented (Tables 2 and 3).

The main point brought out in Tables 4 and 5 is the growth/profitability trade-off. In both the growth equations of Table 4 and 5, the profit rate variable ($ProfRate$) is shown to have a significant negative coefficient; and in both the profitability equations of Tables 4 and 5, the growth rate variable ($GRate$) is shown to have a significant negative coefficient. Thus the growth/profitability trade-off is confirmed for this dataset of SBEs, supporting Richardson’s argument in favour of a ‘Penrose Effect’. The interesting feature of this analysis is that here his argument has been extended to, and confirmed for, the case of quite small firms (sometimes called ‘micro-firms’). Of course, the reasons for this trade-off cannot be sought exclusively in the form of the SBE, though this clearly does play a role, and SBEs seem to function in some measure as Richardson saw larger firms functioning.

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17 The exception to this is the $PCruc$ variable in the growth equation which has a positive sign in Table 5 and a negative sign in Table 4, though it is not significant in either equation; and indeed has very small asymptotic t-values.
Turning to other variables, recall that for the single equation estimation of Table 3, it was found that gearing ($PGear$) was powerfully negatively related to growth, and several reasons were adduced for this (risk exposure, debt servicing). This result seems to carry over strongly to the simultaneous equations settings of Tables 4 and 5 as well. It is, furthermore, extended in its scope in that higher gearing is also significantly associated with lower profitability.

When Leyland (1965, p.3) wrote about the evidence from the Oxford Economic Research Group he referred to the common desire among respondents for an increased market share. This was often stated in the form of a target level of market share. He also noted that many of his fast growing firms were seeking what he called, in elegant terms (p.6), ‘a vacant space in the lattice of competing products’ - what we would today call (less elegantly) ‘a niche market’. In the growth equations of both Tables 4 and 5 the market share variable ($Share$) is positive and (marginally) significant. Growth is positively associated with an increase in market share which, case study evidence suggests, often involves ‘niche invasion’ or the exploiting of new segments in highly fragmented markets.18 Larger main markets offer the prospect of growth with scale economies, and the evidence is that the greater the market extent ($MMkt$), the greater the growth rate. Other variables play at least some role in explaining growth and profitability but their statistical effects are too unreliably estimated to place much faith in their importance.

**Conclusion**

This paper has taken as its starting point Richardson’s quest for a grounded theory of limits to the growth of the firm. Under his chairmanship in the 1960s, the Oxford Economics Research Group laid the basis for such a grounded theory. What this suggested to Richardson was a theory which emphasised the impediments to growth of the firm which arose from the need, firstly, to recruit more managers as growth proceeded and, secondly, to integrate new managers into the firm’s evolving structure.

This paper on Richardson attempts to do three things: (1) Firstly, to provide evidence on the limits to growth which is as grounded in reality as was Richardson’s. (2) Secondly, to relate modern organisational analysis of the firm to firm types that

18 See Reid, Jacobsen and Anderson (1993), especially Chapters 5 and 6.
might be typical of the fast growing small business enterprise (SBE). It is shown that
<elenp> disabilities as the firm’s form is rapidly adapted and discarded, or rapidly replicated, with increasing tiers of hierarchy, give rise to problems of limits to growth of the sort that Richardson discussed. These create a trade-off relationship between growth and profitability. (3) Thirdly, this paper specifies and estimates such a trade-off relationship using simple single and simultaneous equations models. It is shown that business complexity militates against both growth and profitability, and that growth and profitability themselves lie in a trade-off relationship with one another.

In his paper Richardson (1965, p.18) wrote that ‘the majority of our sample do not regard finance as setting the limit to growth. The operative check in this case is managerial resources, the burden upon which may be made especially heavy through the need to expand in new directions’. This has been confirmed by the models reported, for the trade-off effect is clear, business form seems to be important, and financial variables, like cash flow problems and the raising of additional debt, often seem to have insignificant effects. However, one important exception seems to lie in capital structure, as represented by the gearing ration. Higher gearing has a significant part to play in lowering profitability and growth. It may yet become apparent how Richardson’s analysis of the relationship between the unit cost of funds and the expected unit return can be adapted to provide an explanation of this result.

When Richardson developed a grounded theory of the limits to a firm’s growth, both field work methods as applied to the business enterprise and industrial econometrics were in their infancy. His account of the limits to growth was also formulated before the organisational theory of the firm was well developed. However, both his theory and the empirical support for it stand up well to scrutiny from the standpoint of late 20th century economics. His insight in developing a theory of limits to a firm’s growth was therefore clearly remarkable.
Variables used in OLS and iterative 3SLS estimates of growth and profitability equation.

**ENDOGENOUS VARIABLES**

*GRate*  
Growth rate per month of real assets (in 1985 prices) from inception to the AQ 1985.

*ProfRate*  
Profit rate in 1985 as reported in 1988 reinterviews (RIQ 1988).

**EXOGENOUS VARIABLES**

*Employ*  
Number of full-time employees.

*Bsns*  
=1 for one-man business, =2 for partnership, =3 for private company.

*Sales*  
Sales revenue.

*MMkt*  
Main market: local community (1), region (2), Scotland (3), UK (4), international (5).

*Share*  
Market share for main product group (%).

*CompNo*  
Number of competitors for main product group.

*PCruc*  
=1 if pricing of rivals crucial to SBE’s own pricing, =0 otherwise.

*ProdDes*  
Degree of product differentiation of main product group: identical (1), similar (2), different (3).

*Adv*  
=1 if SBE advertises, =0 otherwise.

*Cfp*  
=1 if SBE has experienced cash flow problems since inception, =0 otherwise.

*PGear*  
Debt divided by owner-manager’s injection of finance.

*Descomp*  
Description of competition in market for main product group: intense (1), generally strong (2), generally weak (3), weak (4).

*Age*  
Age in months from financial inception to AQ 1985.

*SoleProp*  
=1 for sole proprietorship, =0 otherwise.

*Partner*  
=1 for partnership, =0 otherwise.

*AddDebt*  
=1 if SBE had sought additional debt finance since inception, =0 otherwise.
References


