

Small New Firms and the Return to Alternative Sources of Finance

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ABSTRACT. This study analyses the returns to alternative sources of finance in the small new firm sector. Prior work in this area has concentrated on large established firms and has been subject to significant problems of interpretation. Many of these problems are absent when considering small new firms and this paper suggests that the various forms of finance used differ in terms of the return on capital employed they are associated with. In particular, sources of bank finance for small new firms are associated with higher returns than other available sources of finance.

This paper, therefore, supports the results of Baumol *et al.* (1970, 1973) that externally raised finance is associated with higher returns *vis-à-vis* internally raised finance and suggests that small new firms are either inefficient in their use of funds or suffer from imperfections in capital markets. The determination of which of these arguments applies, however, awaits further research.

Introduction

In the early 1970s a debate developed (Baumol, Heim, Malkiel, and Quandt, 1970, 1973; Brealey, Capron, and Hodges, 1976; Friend and Husic, 1973; Racette, 1973; Whittington, 1972), as to whether different types of finance give rise to different rates of return for large established firms. The initial paper in the debate, Baumol *et al.*

(1970), found that externally raised finance was associated with higher returns than internally raised finance; thus raising questions concerning the efficiency of the process of capital formation. The rest of the debate raised questions over the relative rates of return on alternative sources of finance.

The purpose of this paper is to take the lessons available from the debate and then to empirically determine if different rates of return exist for different sources of finance for a sample of small new firms in the U.K. The paper, therefore, seeks to establish whether there is empirical support for the many anecdotal arguments that small new firm finance suffers from imperfections/inefficiencies and by so doing, extend the debate on the returns available from alternative sources of finance to the small new firm sector. This extension is also interesting in that the alternative sources of finance considered in the small new firm sector tend to be rather different to those in the large firm sector; in that the former tend to be unlisted and the latter listed firms. As explained in later sections, a number of the empirical problems which plagued the prior research on large established firms are substantially reduced when researching small new firms.

The first section of the paper briefly considers the role of small new firms and the arguments which suggest that they may suffer from inefficiencies/imperfections in terms of their use of, and access to, various sources of finance. The second section considers how far the problems faced by researchers on the returns to alternative sources of finance for large established firms are applicable to small new firms. The third section describes the hypotheses to be tested, the data to be used and the empirical formulation of the tests. The fourth section presents the results and their implications. Finally, conclusions are given.

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I. Small new firm financing

Over at least the past decade, small new firms have received a great deal of political interest in most western economies. This seems to reflect small new firms being seen as increasingly important providers of wealth and employment opportunities. The political interest has manifested itself in a number of public schemes to aid the establishment and development of small new firms; for example, the loan guarantee scheme and the enterprise allowance scheme in the U.K. Such schemes seem to reflect the view that small new firms face imperfections in obtaining finance from external sources. This view of the problems faced by small new firms in raising finance, is to be found in a number of government supported studies. For instance, the Macmillan Committee on Finance and Industry (1931) reported that small firms faced difficulties in raising long-term finance in amounts up to £200,000. The Wilson (1979) Committee reported that institutions were still failing in the provision of finance (inclusive of overdrafts) to small firms.

Small firms are seen as being precluded from new issue markets by the high fixed costs and the unwillingness of institutional investors to take small holdings. Also, as far as debt finance is concerned, the banks are seen as unwilling to lend beyond the short-to-medium term to small firms. Even in the short-term, small firms would seem to face higher interest charges or restricted access to funds. Given such treatment in the provision of external funds, small firms are usually portrayed as being largely reliant on internal sources of funds. An influential paper by Fazzari, Hubbard, and Peterson (1988) has added empirical clarification to this observation.

Their data show that the proportion of earnings retained by firms differs substantially by size classes — smaller firms retaining a higher proportion of earnings than larger firms. The data also indicate that firms in the smaller size classes accounted for the majority of net new short-term bank debt. The reliance of smaller firms on retained income and short-term bank finance, rather than on external equity funding, being partly explained by the problems external investors (those investors who are unable to closely monitor firm activities) would face in acquiring

information concerning the potential of smaller firms. From this perspective of smaller firms being rationed in their access to certain types of finance, Fazzari *et al.* hypothesised that smaller firm investment will be constrained by liquidity and cash flow considerations. Their empirical results indeed indicate that investment by firms which retain nearly all of their income is substantially more sensitive to cash flow and liquidity considerations.

Given the data and results presented by Fazzari *et al.* there is now a need to consider the possible reasons why small firms using internal sources of finance might be expected to earn lower rates of return on this source of finance compared to those using external sources. First, internal financing may be cheaper than external financing. As already mentioned, since a large part of the costs associated with supplying funds are fixed, suppliers might be seen as rationally responding to such costs by charging higher interest rates where the funds advanced are relatively small (as in the case of small firms) or by lending to firms where the total returns are considered to be higher.

The expensive nature of external financing *vis-à-vis* internal financing for small new firms, can also be explained in terms of an information gap between the supplier and user of external funds. Uncertainty surrounding the returns to small new firm investment is likely to be high since such firms have little or no history to show potential creditors or investors, and by their very nature such firms often exhibit volatile performance (see Storey *et al.*, 1987). This uncertainty may be compounded in the search for external finance by small new firm management not having the relevant skills to present convincing applications for funds. More importantly, the informational asymmetries existing between small new firm management and potential financiers can be used to explain constraints upon the receipt of finance from external sources. Incumbent management may be in a position to evaluate the true nature of investment returns but potential financiers may be at a serious disadvantage because of the lack of history of such small new firms. Informational asymmetries relating to particular investment projects can be ameliorated where the past performance and reputation of the firm and its management in investment terms can be gauged; a possibility primarily relevant to established firms. Given this,

an indirect cost can be added to the cost of external financing in the sense that profitable opportunities may be thwarted for many small new firms. This may be sufficient to raise the cost of external financing well above the opportunity cost of internal finance and give rise to a 'pecking order' of finance where internal finance is preferred to external finance (see Myers, 1984).

Jaffee and Russell (1976) also note how informational asymmetries can give rise to credit rationing in the market of external debt, where differences in borrower quality cannot be easily observed. Similar problems can also be identified for equity finance (see Myers, 1984; Myers and Majluf, 1984). In terms of debt, external suppliers have to cover their fixed costs and they may rationally demand higher rates of interest from smaller firms or they may prefer to lend to larger firms given the lack of information surrounding small new firms. Given the costly nature of external finance it can be hypothesised that the returns to investment when financed by external rather than internal finance will need to be higher to compensate for such costs.

A second major argument offered for the existence of higher rates of return on external sources of finance (relative to internal sources) is related to the scrutiny of external financiers. The vigilance of external financiers may mean that funds are used in a more efficient manner so that agency costs within the firm are reduced (Jensen and Meckling, 1976).

A third major reason for external finance attracting higher returns than internal finance is in terms of investment selection by suppliers of funds. Given this, one would expect external suppliers of funds to grant finance only to those small new firms who would be expected to produce high investment returns. Consequently, the rate of return on external financing may be higher *vis-à-vis* internal financing simply because external financiers only invest in 'good' projects.

Other sources of external funds, such as government loans and trade credit are not expected to show the same returns as internal funds or other sources of external funds because of the differing objectives behind their provision. Government loans are not normally granted to solely maximise the return subject to an allowance for risk. Instead a mixture of employment and wealth creation

objectives lie behind their provision. Likewise, trade credit is not usually granted to maximise the return. Rather it is granted as a matter of exchange custom and to secure customer loyalty.

Finally, in terms of internal finance, it can pay the owners of firms to invest their wealth (inclusive of retained profits) via director loans rather than through retentions or share issues. This is because, given a positive probability of insolvency, it is rational for the owners to take out any wealth as director fees and put the funds back into the firms via director loans. In the event of insolvency this strategy gives the owner a direct claim on the funds. Thus share capital and reserves are not expected to be an important determinant of small firm performance.

The general arguments underpinning the access to and use of investment funds elaborated upon in this section of the paper can be summarised as follows. It has been argued that a preference ordering over finance can be established in terms of a 'pecking order', where the access to finance is dictated by the cost of the relevant financing. The argument being that expensive finance is not necessarily used more efficiently but rather is only selected for projects offering high returns or after cheaper sources of finance have been depleted. Alternatively, differing rates of return on alternative finance sources can be explained in terms of efficiency of usage. External sources of finance command higher rates of return because of the vigilance and monitoring of the suppliers of such finance. A further possibility is that a process of selection may be taking place where, for example, lenders only extend finance to those small firms with good investment prospects. In addition, a combination of all three arguments could be relevant to the financing of small new firms and to the thesis that alternative sources of finance are associated with differing rates of return on capital employed.

II. The benefits of researching small new firms

The approach adopted by the earlier papers on the returns to alternative sources of finance was to regress a change in earnings variable on various lagged finance variables. The basic hypothesis being that 'capital markets' could be deemed efficient if the various sources of finance attracted

equal returns (on investments of equal risk). The research suffered, however, from a number of problems because of the use of large established firms.

The first problem with researching the issue of returns to alternative sources of finance on large established firms, is that it is difficult to separate out the return to the assets obtained by the specified finance, and the return achieved on assets obtained prior to the specified finance. Any given performance for large established firms is derived from a set of projects with varying vintages and most likely varying financing structures. The empirical task of trying to establish the performance effects of a given set of finance for established firms is, therefore, extremely difficult. In contrast, if new firms from birth are analysed this problem of returns to prior assets is significantly reduced.¹ New firms have no confounding history and the returns that are analysed will be related to the finance considered and not to earlier financing structures.

Second, as argued by Brealey *et al.* (1976), the estimates of the returns to alternative sources of finance may be biased because of certain capital market influences. One such capital market influence refers to investor expectations. If investors expect earnings to rise, the share price will be relatively high and this may affect the choice of financing method. Brealey *et al.* give the example of a company having outstanding convertible securities,

in this case, favourable company prospects will increase the price of the shares and lead to the substitution of equity for debt. Estimates of the return on new equity would be biased upward and the return on new debt would be biased downward. (p. 471)

Since the firms considered here do not have their equity traded on a capital market, such problems are avoided. The unlisted nature of the small new firms used in this paper, also means that the financial environment surrounding such firms is quite different to that facing the large listed firms investigated in the prior debate.

Third, since the prior work was conducted on well-established firms the empirical results suffer from survivor bias: namely, if the probability of failure is affected by the chosen financing method, then it is likely that the return on debt finance will be biased upwards by the omission of failed com-

panies. The research conducted here considers a sample of companies from birth to three years of age. The first three years are considered to minimise the survivor bias but offer enough data to enable the analysis to be conducted. If a longer time horizon had been taken the failure rate of small firms would have led to major problems of survivor bias. It needs to be recognised, however, that for any reasonable time horizon the returns to small new firms are volatile (see Storey *et al.*, 1987). Nonetheless, survivor bias is not altogether eliminated, because some companies will die within the first three years of life.

Fourth, as the research is concerned with returns to alternative sources of finance, the risk of the project for which the finance is to be used, needs to have a control. In the prior studies this was achieved by company wide measures such as the residual variance of earnings. Clearly, for large companies, the potential lack of correspondence between company and project risk could lead to biased estimates of returns to alternative sources of finance. This problem should not apply to the analysis of small new firms for a number of reasons. First, although we have no evidence on this from the present dataset, 'anecdotal' evidence strongly suggests that the overwhelming majority of small new firms set up with a single project. Therefore, the risk of the project and the risk of the firm should be one and the same thing. The problem remains, however, over how to estimate the risk of the firm. Given that only the first three years of data for each firm are used in the analysis, standard deviation type measures of earnings are not appropriate. Instead, risk has to be controlled for a more fundamental level.

Factors used to control for the risk of a small new firm are age, location and industrial classification. The works of Evans (1987a, 1987b) and Hall (1987) on firm growth indicate that firm age is an important determinant of firm dynamics. The probability of firm failure and the variability of firm growth are shown to decrease with firm age. Therefore, the age of a firm would seem to be a reasonable proxy for the risk of a firm. In terms of age all the firms considered here are from birth to three years and are, therefore, homogeneous as regards this contribution to risk. As all of the firms are located in the north-east of England, they are also relatively homogeneous as regards location. Finally, to allow for industry specific risk, dummy

variables at the industry order level are used. Thus, by careful sample selection and by using dummy variables, most of the problems faced by the prior work on large established firms when trying to control for risk (namely a potential lack of a correspondence between firm and project risk) can be avoided when researching small new firms. The final problem which might not affect small new firm research on the return to alternative sources of finance so much as the research on large established firms, is model specification. The model tested by the majority of the prior work assumed that all types of financing have the same lags of income generation and this lag, is the same for all firms. Given that the firms researched were established firms of different ages in many different industries and were likely to have many parts of their operations at different stages of the life cycle, the heterogeneous nature of the sample goes against this empirical model formulation. On the other hand, the homogeneous nature of the sample used here, in terms of age and the fact that most small new firms set up with a single project, is far more amenable to such a model formulation.

III. Data, hypothesis and empirical formulation

The sample used for empirical investigation is drawn from a financial and employment data base of 650 single plant independently owned firms in the north-east of England, compiled by the centres of Public and Industrial Economics and Urban and Regional Development Studies at Newcastle University. The financial data, which covers the years from 1970–1980, has been cross-checked² with other small firm data bases and as far as it is possible to conclude on such an issue, firms in the north-east of England are not significantly different in terms of their balance sheet structure (see Storey *et al.*, 1987).

Because of the tendency of small firms either not to submit accounts or to submit incomplete accounts (see Storey *et al.*, 1987) and the need for the analysis of this paper to have a wide range of financial data over the first three years of a firm's existence, the final sample used consists of 127 firms, 35 of which failed between 1974 and 1980. While there might be a slight expectation for firms who supply complete information to be more organised in their operations, it is difficult to see in

which direction, if any, the rates of return on the various sources of finance may be biased.

The null hypothesis to be tested here is that the rates of return to alternative sources of finance are positive and equal. The arguments presented in Section I give rise to the alternative hypothesis that in the first few years of a firm's life, the rates of return on the various sources of funds are unequal.

In accordance with the arguments presented in Section I and prior work in the area, the above hypotheses are tested via the following functional form:

$$Y_3 - Y_2 = (B_2 - B_1) + (BS_2 - BS_1) + (C_2 - C_1) + (D_2 - D_1) + (G_2 - G_1) + (S_2 - S_1) + I + U \quad (1)$$

where the subscript $i = 1, 2, 3$ refers to the first, second and third years of operation respectively. The definitions of the variables are as follows:

- Y = pretax profits + directors' remuneration + interest payments;
- B = mortgage liability on purchase of freehold property + hire purchase liability + other loans from external lenders on commercial terms;
- BS = bank overdrafts and short term bank loans;
- C = Net trade and other creditors of the business including VAT owing to customs and excise;
- D = the total amount owing to the directors of the firm;
- G = government grants and loans;
- S = accumulated revenue and capital reserves of the company;
- I = Industry Dummies.³

The dependent variable and all the finance variables, are deflated by the total assets of the firm.⁴ The dates on the balance sheet variables relate to the end of period values. U is a $N(0, \sigma_u^2)$ disturbance term, assumed to be drawn independently of the rest of the explanatory variables. The independent variables have been lagged one period

to take account of the lags in production and selling.⁵

Equation 1 has two noteworthy estimating features. First, if the level of earnings is in part a reflection of fixed but unobservable entrepreneurial factors, then the first differencing of Equation 1 avoids the possibility of biased estimates because of the omission of these unobservable factors. Second, the first difference form of Equation 1, minimises the influence of miscoding, misinformation and misreporting errors on the estimates.⁶

IV. Results

Univariate statistics

Before reporting the regression results for Equation 1, a brief preliminary analysis is made of the

component variables using some univariate statistics. Referring to part a of Table I it is clear that all the sources of finance considered, excepting long to medium term bank loans (*B*) and government loans (*G*), have significantly increased in monetary terms between the first and second years of operation. The general growth in the various sources of finance is mirrored by a considerable growth in total assets between periods one and two.

Part b of Table I reveals that the long-to-medium term bank loans (*B*) expressed as a percentage of total assets have undergone a significant decline. Similarly the dependent variable (*Y*) (pretax profits plus directors' remuneration plus interest payments) has increased significantly in monetary terms but has fallen significantly when deflated by total assets. All the other sources of finance have remained relatively stable when

TABLE I
Univariate statistics for component variables

a. Unscaled by total assets								
£00's	Year 1		Year 2		<i>T</i> ^a	Year 3		<i>T</i> ^b
	Mean	S.D.	Mean	S.D.		Mean	S.D.	
<i>Y</i>	136.17	175.14	206.25	293.45	—	241.90	390.49	1.63
<i>B</i>	30.17	73.48	28.89	63.79	0.3	42.93	85.98	—
<i>BS</i>	62.53	125.12	88.93	176.52	2.18	114.65	205.31	—
<i>C</i>	201.98	398.00	254.58	405.76	5.17	347.28	514.04	—
<i>D</i>	63.02	105.45	72.15	112.40	2.16	86.02	136.56	—
<i>G</i>	6.04	36.56	8.43	47.73	1.86	21.75	113.94	—
<i>S</i>	118.02	352.02	194.69	503.40	3.88	260.89	693.87	—
<i>TA</i>	510.04	869.71	695.55	1078.55	5.76	942.29	1409.66	—
b. Scaled by total assets								
	Year 1		Year 2		<i>T</i> ^a	Year 3		<i>T</i> ^b
	Mean	S.D.	Mean	S.D.		Mean	S.D.	
<i>Y</i>	0.445	0.504	0.430	0.463	—	0.374	0.337	2.21
<i>B</i>	0.067	0.099	0.048	0.084	2.88	0.050	0.085	—
<i>BS</i>	0.150	0.254	0.141	0.240	0.64	0.135	0.226	—
<i>C</i>	0.399	0.236	0.398	0.237	0.06	0.379	0.226	—
<i>D</i>	0.206	0.239	0.207	0.256	0.09	0.191	0.227	—
<i>G</i>	0.009	0.032	0.009	0.029	0.25	0.014	0.044	—
<i>S</i>	0.135	0.291	0.146	0.333	0.75	0.183	0.301	—

T^a = *T* statistic when comparing the difference between means for each variable between Year 1 and Year 2.

T^b = *T* statistic when comparing the difference between means for *Y* between Year 2 and Year 3.

The critical *T* statistic for a two tailed test at the 5% level = 1.96 where the number of degrees of freedom = 126.

expressed as a proportion of the total assets of the firm.

Finally, univariate statistics and a correlation matrix for the differenced variables of Equation 1 are to be found in the appendix to this paper.

Regression estimates

Table II reports the regression results for Equation 1. The correlation matrix for the variables contained in Equation 1 (see Appendix) does not suggest that the explanatory variables suffer from serious multicollinearity problems.

The estimates for Equation 1 are presented in column one of Table II. From column one it is clear that the only finance variables that have significantly positive coefficients are long (B) and short-term (BS) bank loans. Thus, indicating that bank finance earns a higher rate of return than other forms of external finance, or indeed internal finance. Of particular note is the size of the coefficients on variables B and BS which indicate rates of return of 83% and 92% on long and short term bank finance respectively. Such rates of return appear large but are not too surprising bearing in mind the very high growth potential of

new firms (see Mueller, 1972; Evans, 1987b; Thompson and Wright, 1988).

The insignificance of the government loan variable here has to be treated with some caution since only 13 out of the total sample of 127 firms received a government loan. In addition, of the 13 firms with a government loan there was little variation in the amount of loan received.

To test the null hypothesis of this paper, that the returns to alternative sources of finance are positive and equal, a restriction was placed on Equation 1 such that the coefficients on B , BS , D and S were equal. The restricted and unrestricted forms of Equation 1 were used in a Chow test and yielded an F value of $5.95 > F_{(4,112)} = 3.48$ at the 1% level of significance. It therefore follows that the observed differences in the coefficients for bank loans as compared to director loans or reserves are characteristic of the underlying population and not merely attributable to sampling fluctuations. Loans from the banks are associated with higher returns than those arising from the business or from the entrepreneur him/herself.

However, before drawing any general conclusions, it is important, as far as it is possible, to investigate whether the coefficients on the finance variables reflect the significance of finance for performance, rather than the significance of performance for the receipt of finance. One possible way of accomplishing this might be to control for the effect of inherent strength of the firms in the regression. Suppose there is strong correlation between inherently weak firms and those that eventually fail. If a dummy variable, eventually failed/eventually not failed (F/NF), is added to the regression and the differencing procedure does control for inherent weakness then the coefficient for F/NF would be expected to be insignificant and other coefficients little changed. The results of such a test are presented in Table II, column two and as expected, the coefficient for F/NF is insignificant and the other coefficient values are little changed. Of course there may not be a strong correlation between inherent weakness and eventual failure. Insolvency may arise due to demand shocks distributed randomly over firms. However, as far as it is possible to tell, there is evidence to suggest that the differencing procedure is controlling for unobserved inherent strength. If this is the case, then the tentative conclusion can be

TABLE II
Regression estimates (Equation 1)

	1	2
Constant	-0.008 (0.052)	0.011 (0.071)
$B_2 - B_1$	0.830 (1.931)*	0.842 (1.950)*
$BS_2 - BS_1$	0.922 (2.644)*	0.914 (2.608)*
$C_2 - C_1$	0.301 (0.945)	0.316 (0.986)
$D_2 - D_1$	0.243 (0.760)	0.258 (0.800)
$G_2 - G_1$	-0.450 (0.340)	-0.434 (0.328)
$S_2 - S_1$	0.096 (0.268)	0.096 (0.266)
I_1	-0.344 (2.000)*	-0.352 (2.032)*
I_2	-0.027 (0.168)	-0.040 (0.246)
I_3	-0.018 (0.109)	-0.030 (0.173)
I_4	-0.043 (0.269)	-0.056 (0.340)
I_5	-0.022 (0.116)	-0.022 (0.116)
I_6	0.044 (0.260)	0.031 (0.179)
I_7	-0.010 (0.059)	-0.023 (0.126)
I_8	0.050 (0.313)	0.038 (0.235)
F/NF		-0.030 (0.518)
$\bar{R}^2$	0.202	0.196
N	127	127

T = statistics in brackets.

* Significant at 5% level (one-tailed test).

reached that bank finance helps a firm to perform better than other sources of finance. Nevertheless, given the problems involved in determining the inherent strength/weakness of firms at the time of financing, such a conclusion should be viewed with great caution.

V. Conclusions

One of the purposes of this paper has been to extend the return to alternative sources of finance debate to the small new firm sector. Without the limitations of many of the interpretation problems which affected the prior work on large established firms, the results of this paper indicate that sources of bank finance for small new firms are associated with higher returns than other sources of finance. One interpretation of this result is that the various sources of finance are equally costly but not used with equal efficiency. If this interpretation is correct, then it implies that those small new firms depending on sources of finance other than bank finance, will not perform as well as if bank finance had been used. This interpretation suggests that small new firms are more efficient in their use of funds when they are answerable to, and are monitored by, private sector banks.

A second interpretation of the results is that different sources of finance are not equally costly, bank finance being more expensive than other forms of finance. The small new firm facing such a situation would only tend to use the 'more expensive' money if it has an investment project sufficiently promising to warrant the higher costs, and if it has exhausted cheaper sources of funds.

A third interpretation is that banks only offer finance to those firms who are currently enjoying high rates of return and are expected to enjoy high rates in the absence of any increase in immediate investment. This interpretation suggests that banks offer finance based upon current/future prospects and are not responsible for galvanising firms into the production of high returns from any investment. This interpretation may be a valid one but its relevance to small new firms may be limited for two reasons. First, the firms involved have a very short track record, and prospects based upon the limited time span of past performance may be difficult to gauge. Second, the paper has attempted to control in part for the selection of performance for finance by controlling for the inherent strength

of small new firms, thus reducing the scope for this third interpretation of the results (although such a control for inherent weakness is viewed with caution). However, it needs to be recognised that the attempt to control for this argument is relatively weak. For many new enterprises, Years 1 and 2 are often critical in the eyes of bank managers. In particular, the first two years' performance and the associated prospects for growth in the form of outstanding orders are often critical for obtaining bank funding.

Although it is not possible to distinguish clearly which of the interpretations is driving the results noted in this paper, it is evident that concern should be expressed over the access to and the use of funds by small new firms. There is a clear need for further research to try and establish why bank finance seems to earn higher rates of return than other forms of finance in the small new firm sector. However, the general conclusions of this study add support to the anecdotal evidence that different forms of finance are associated with different rates of return for small new firms. In addition, the results are in line with those of Baumol *et al.* (1970, 1973) that externally raised finance is associated with higher rates of return than internal finance.

Appendix

Univariate statistics and correlation matrix for differenced variables scaled by total assets

a. Univariate statistics

	Mean	S.D
$Y_3 - Y_2$	-0.560	0.286
$B_2 - B_1$	-0.020	0.076
$BS_2 - BS_1$	-0.008	0.146
$C_2 - C_1$	-0.001	0.204
$D_2 - D_1$	0.001	0.175
$G_2 - G_1$	0.000	0.018
$S_2 - S_1$	0.012	0.174

b. Pearson correlation coefficients

	$Y_3 - Y_2$	$B_2 - B_1$	$BS_2 - BS_1$	$C_2 - C_1$	$D_2 - D_1$	$G_2 - G_1$
$Y_3 - Y_2$						
$B_2 - B_1$	0.159					
$BS_2 - BS_1$	0.352	-0.030				
$C_2 - C_1$	-0.020	-0.183	-0.202			
$D_2 - D_1$	-0.057	-0.112	-0.171	-0.424		
$G_2 - G_1$	0.006	0.165	0.078	-0.031	-0.040	
$S_2 - S_1$	-0.249	-0.068	-0.336	-0.400	-0.240	-0.036

Notes

¹ One further consideration here is the portfolio of finance sources that may be used in an investment project. Given a mix of finance it may be difficult to allot pure returns to particular finance sources.

² Chapter two of Storey *et al.* (1987) makes a comparison in terms of size, profitability, growth and balance sheet structure of Northern Companies with smaller companies from four other sources: Wilson Committee (1979), Business Monitor (MA3), ICFC 1983 and the unquoted companies of Hay and Morris (1984).

³ Nine industry dummy variables were used and these comprised the following broad 1968 SIC groupings: 1. food, drink and tobacco; 2. chemicals and allied; 3. mechanical engineering; 4. instrument and electrical engineering; 5. other metal goods; 6. clothing and footwear; 7. timber, furniture, etc.; 8. paper, printing and publishing; 9. and other manufacturing industries.

⁴ Scaling of the dependent variable takes the form of

$$\frac{Y_3 - Y_2}{TA_i}$$

and scaling of the independent variables utilises TA , where TA refers to total assets and the subscript $i = 1, 2, 3$ refers to the first, second and third years of operation respectively.

⁵ Given the problems with defining the lag structure, some experimentation was carried out. Lag structures of two and three years were examined using correspondingly reduced data sets. The lag structure employed (earnings lagging finance variables by one year) performed the best in terms of R^2 values and the significance of the estimated coefficients.

⁶ To see how Equation 1 minimizes the influence of such errors on the estimates, write Equation 1 as

$$Y_3 = X_2\psi + U_2$$

and let $\hat{X}_2 = X_2 + E$ where $\hat{X}_2$ is the observed vector of independent variables and E is the measurement error. Then the OLS estimate of ψ will be inconsistent.

Now consider the change version

$$Y_3 - Y_2 = (\hat{X}_2 - \hat{X}_1) + U_2 - U_1 - (E_2 - E_1).$$

If

$$E_2 = \rho E_1 + v_2$$

that is, there is an autocorrelation in measurement errors, then

$$\text{Plim}(\hat{\psi}) = \frac{\psi}{1 + (1 - \rho) \text{var}(E)} \frac{\text{var}(X_2) + \text{var}(X_1) - 2 \text{cov}(X_2, X_1)}$$

where $\hat{\psi}$ is the OLS estimate of ψ . In the case of "perfect" autocorrelation, $\rho = 1$, $\hat{\psi}$ is a consistent estimate of ψ . More generally, autocorrelation in measurement errors reduces the impact of $\text{var}(E)$. If $\text{var}(X_1) = 2 \text{cov}(X_1, X_2)$ then the importance of measurement errors is less than that for a level equation since the corresponding term in $\text{plim}(\hat{\psi})$ is $\text{var}(E)/\text{var}(X_2)$.

On the other hand, the change equation features serial correlation which does not bias ψ but may reduce efficiency.

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