

Entrepreneurial Characteristics and the Size of the New Firm: A Model and an Econometric Test

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ABSTRACT. This paper examines entrepreneurial influences on the size of the new firm. Theory and previous empirical research indicate that the entrepreneurial attributes most likely to influence the characteristics and performance of new firms are motivation, workskills and information. The results of a regression analysis confirm these hypotheses when turnover and total assets are the dependent variables but are less conclusive when employment is the dependent variable. Possibly the most interesting finding is that the entrepreneurs who create the most jobs are those who are highly motivated, have managerial skills and whose firms are in the manufacturing sector.

Introduction

This paper examines the entrepreneurial influences on the size of the new firm. There are a number of reasons why this is an important area for research. Firstly, results reported in Barkham (1989) indicate that there are marked regional variations in the average size of new firms. Broadly, the economically leading South East region generates new firms which are larger in terms of assets, turnover and employment than other regions of the UK. The link between initial size and subsequent performance has not yet been firmly established. However there are good grounds for believing that larger start-ups are more technologically sophisticated (Barkham, 1987), growth orientated (Storey et al., 1987) and less likely to fail than their small and undercapitalised counterparts. Some researchers have

hypothesized that the concentration of large start-ups in the South East region is due to the concentration of high quality entrepreneurs in this region (Fothergill and Gudgin, 1982).

A second reason for examining the influences on the size of the new firm is the need to understand more fully the economic factors underlying the process of new business creation. There is considerable theoretical underpinning for the view that the skills and motivation of the entrepreneur are the most important influences on the characteristics of the new firm. Detailed empirical evidence for this proposition, however, is difficult to come by. This paper demonstrates that there is a strong relationship between the size of the new firm and the characteristics of the entrepreneur.

A third reason for examining the relationship between firm size and the characteristics of the entrepreneur is that large new firms have a much greater impact on the local economy in which they are situated than small new firms. The evidence suggests that most new firms do not continue to grow for a sustained period and that the size of the mature business is positively correlated with the size of the start up. Thus it is important to understand what determines the size of the new firm.

Entrepreneurial characteristics and firm size: a model

The size of the new firm is strongly influenced by the characteristics of the entrepreneur. The entrepreneurial variables which govern the characteristics and size of new firms, and perhaps their subsequent performance, are motivation, education, work skills and market information. We shall examine each of these to assess the way in which they influence the size of the new firm.

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Motivation

Much of the work on entrepreneurial motivation has been conducted by psychologists. Two personality traits are frequently hypothesized to characterise entrepreneurs: achievement motivation (McClelland, 1961; 1965) and power motivation (Collins and Moore, 1969). A number of studies claim to be able to measure power and achievement motivation and the precise impact of these on the growth of the business enterprise (see for instance Schrage, 1965; McClelland, 1961; Roberts and Wainer, 1968; Wainer and Rubin, 1969; Lippit and White, 1958; Gilmore, 1972; Perry, Meredith and Cunningham, 1988). However most neutral observers agree that the evidence on entrepreneurial motivation and, in particular, its psychological roots, is contradictory (Leff, 1979; Chell, 1986).

That it is difficult to identify the psychological foundations of motivation does not mean that it can be ignored as an influence on the owner-managed firm. Some economic theorists point to it having a crucial role in the growth of the enterprise (Penrose, 1959; Casson, 1982). It is quite clear from survey work that motivation to create a large business enterprise is a relatively rare trait amongst firm founders (Mayer and Goldstein, 1973). Economic independence seems to be a much more powerful motivator for most new firm founders. Indeed many entrepreneurs deliberately forgo growth so as to reduce the stress of being in business. Nevertheless there appears to be a small sub-category of entrepreneurs who are highly motivated towards growth and its pecuniary rewards.

For the purpose of this research it is hypothesized that entrepreneurial motivation does have a significant impact on firm size. Firstly, motivation will affect the ability of the entrepreneur to assemble resources. It is often very difficult for entrepreneurs to obtain loans for new firm formation. High motivation will increase the persistence of the entrepreneur in the capital markets and raise the chance that he or she will obtain loan finance. Secondly, an entrepreneur who is highly motivated to achieve growth in his firm will be more willing to accept the stress associated with managing a large enterprise. Indeed such entrepreneurs may regard the complex task of building a business as an invigorating challenge. Motivated

entrepreneurs therefore, are less likely to start small so as to test the market, or to restrain the early growth of the firm. Thirdly, it is possible that there is a link between motivation and confidence. Highly motivated entrepreneurs are likely to be confident of their own abilities and therefore willing to invest heavily in a new enterprise at its inception. Fourthly, entrepreneurs who wish to achieve financial rewards through the growth of their firms are likely to avoid those sectors of the economy where start-ups have low capital requirements, low profitability and face high competition, in which the majority of entrepreneurs start firms. A highly motivated entrepreneur is more likely to start up in a market where the initial capital requirements are high but the opportunities for profitable growth are much greater. All of these four factors provide reasons for hypothesizing that motivation to achieve growth and firm size are positively correlated.

Education and work skills

At a theoretical level there is considerable support for the view that education affects entrepreneurial ability. Schultz (1975; 1980) argues that educated entrepreneurs will react more quickly to disequilibrium than those with no education or poor education. From this it could be hypothesized that educated entrepreneurs would be associated with larger companies because they will enter markets where competition is, initially at least, relatively weak. Casson (1982) also stresses the importance of education in developing entrepreneurial ability. He states that entrepreneurial qualities such as knowledge, imagination, practical knowledge, search skill, foresight, computational skill and communication skill, the need for which increases as firm size increases, are capable of enhancement by education.

At an empirical level, evidence on the relationship between education and entrepreneurial ability is somewhat mixed. Some find no relationship between education and entrepreneurial performance (Storey, 1982; Watanabe, 1970). By contrast others find that entrepreneurs educated to degree level form firms which are larger (Fothergill and Gudgin, 1982) and better performing (Woodruff and Alexander, 1958). It seems quite clear that a higher degree is a prerequisite for successful

entrepreneurship in high technology (Roberts and Wainer, 1968; Cooper, 1971). Clearly the main impact of entrepreneurial education will be on firm growth but there are some grounds for believing that larger new firms are associated with entrepreneurs who are more highly educated.

The chief influence on the characteristics of the new firm will be the work skills the entrepreneur has gained in previous employment (McGuire, 1976; Cross, 1981). Starting and running a company is a complicated activity. The skills required are numerous and include negotiation, planning, organisation, problem-solving, production management, production and management. The individuals most likely to possess the broad range of skills required for firm formation are those who have been employed as private sector, general managers. There are a wide range of other occupations which give skills relevant to entrepreneurship though these are, perhaps, not quite as suitable as general management. These include management in one of the functional specialisations of business such as finance, production, personnel, marketing or sales. Certain professions such as law, banking or accountancy also provide general business experience and develop problem-solving ability. Work experience in sales is directly relevant to entrepreneurship because the putative entrepreneur will gain a general knowledge of production costs and prices. Where technology is advancing rapidly a knowledge of technology gained in a technical or scientific occupation is also directly relevant.

The corollary of this line of analysis is that entrepreneurs from a managerial, professional, technical/scientific or sales background will be in a position to found firms which are initially larger than non-white collar entrepreneurs and also grow more quickly. Larger initial size results from two factors. The first is that the white collar entrepreneur will have greater confidence to make a large initial investment because he or she has skills relevant to entrepreneurship. In other words this type of entrepreneur will have greater confidence in his or her ability to organise the factors of production. Thus, skilled entrepreneurs are more likely to take on the production of goods and services in sectors and sub-sectors where the minimum initial size is high. In addition the skilled entrepreneur will have more credibility in the

capital markets and so have greater access to loan capital. By contrast, the unskilled entrepreneur is more likely to start small so as to acquire skills on the job and to minimise the potential loss through failure.

Information

A consideration of information is crucial to the understanding of entrepreneurship and new firm formation. Neoclassical economics assumes perfect information and so trivialises entrepreneurship (Casson, 1982). Entrepreneurs initiate production or trading when information is imperfect. It follows that the most successful entrepreneurs will be those who possess the best market information. Entrepreneurs require information on factor costs, factor locations and production techniques, but the most important information required is on the location, tastes and budgets of the customer. Since information is scarce it can be argued that not all entrepreneurs will have the same level of information prior to start up. Some will have relatively poor information and will start a firm with the aim of obtaining information by market search during trading. Other entrepreneurs will thoroughly research the market prior to start up or will have information gifted to them by virtue of the position they hold in another organisation. The entrepreneur's previous employer is a vital source of information for firm formation (Casson, 1982). Those working in marketing or sales will be in a favorable position with regard to the acquisition of market information.

It is hypothesized that the level of information held by the entrepreneur directly affects the size and initial growth of the new firm. Good information is defined as a detailed knowledge of customer tastes, location and spending power. Generally, the better the information the more confident the entrepreneur will be to invest, thus the greater the resources that will be committed to the new enterprise. The less knowledgeable entrepreneur will tend to proceed more slowly, investing only as knowledge of the market improves. The entrepreneur with good information will be able to generate growth more quickly because he or she can get straight on with selling the product. The poorly informed entrepreneur will have to use resources searching the market at a time when

these are limited. Poor information may be a major influence on the ability of the new firm to survive the first few years. Firms that appear to do well over a sustained period are those which place a high priority on obtaining market information (Peters and Waterman, 1982). Gibb and Dyson (1984) have shown that lack of new information tends to restrict growth in small firms. Another reason why entrepreneurs with good information may be expected to start larger firms and achieve better growth is that they can present a more convincing case to providers of loan finance. A well thought out business plan is usually a prerequisite for loan capital.

Other influences on new firm size

In the preceding sections a model of entrepreneurship and firm size has been put forward. However entrepreneurial characteristics are not the only factors which may influence the size of the new firm. Three further factors, sector, location and number of founders, are also influential. The minimum viable size of the new firm varies between manufacturing, services, construction and distribution. This is because the requirements for fixed capital, working capital and labour varies between sectors. Manufacturing firms require relatively large amounts of fixed and variable capital whereas in services labour is the major factor input. Construction firms are able to reduce the initial investment because little fixed capital is required for production and there is, at least in the UK, a very good network of builders merchants so that stocks can be kept to a minimum. Thus sector influences the size of the firm. It is also hypothesized that region of starting affects initial size. The size and early growth of the new firms will, in part be dependent on the level of demand in local markets. Most research indicates that new firms tend to be restricted to local and regional markets, thus larger new firms will be found in regions where consumer, industrial and public sector markets are buoyant. In the UK in the period of the study, the South East had the most buoyant markets. Finally, during data collection it was noticed that a large number of firms had more than one founder. Although it was always possible to identify a lead entrepreneur, on which this analysis is based, a variable, number of founders;

was included in the model to control for the influence on size of more than one founder.

Methodology

The hypotheses put forward in the previous section have been tested by means of a regression analysis. The variables identified above have been regressed against three measures of firm size to examine whether they independently and significantly affect firm size. The three measures of firm size are total assets, turnover and total employment. Three measures of firm size are used because no individual measure is suitable across a range of industrial sectors. For instance, in the service sector, employment may be an appropriate measure of size but in distribution, turnover is a better measure.

The data used in the analysis was gathered in a survey of accountants in three regions of the UK: the South East, the North East, and the West Midlands. Accountants were able to provide detailed financial information on new firms which were their clients. In addition accountants, who work closely with their clients, were able to provide a large amount of qualitative data on firm founders and non-financial aspects of the formation process. A further advantage of using accountants for information on new firms was that they could give data on non-incorporated business. The survey generated data on 304 new firms which were started between 1976 and 1986. These firms were in all sectors of the economy because the model is believed to be generally applicable.

The model tested is shown in Table I and the independent variables are explained in Table II. The dependent variables turnover, total assets and total employment are those recorded at the end of the third year of trading. This date is taken as being the end of the start up period. Inspection of the data indicated that the size variables were highly skewed in their distribution. To eliminate heteroskedasticity therefore the dependent variables were logged. This is a common procedure where the determinants of size are being examined. As many of the dependent variables are qualitative in nature they are represented in the model as dummy variables. However not all of the variables take binary form.

It should be noted that the model in which

TABLE I
The models

The models that were run were therefore:

$$\begin{aligned}
 \text{TU}^* &= \alpha + \beta_1 \text{FOUND} + \beta_2 \text{DMAF} + \beta_3 \text{3DDIST} + \beta_4 \text{4DSERV} + \beta_5 \text{5SDOU} + \beta_6 \text{DNOR} + \beta_7 \text{DDEG} + \beta_8 \text{DTEC} + \beta_9 \text{DMAG} \\
 &\quad + \beta_{10} \text{DPROF} + \beta_{11} \text{DSALE} + \beta_{12} \text{DMOT} + \beta_{13} \text{DINF} \\
 \text{TOT}^* &= \alpha + \beta_1 \text{FOUND} + \beta_2 \text{DMAF} + \beta_3 \text{3DDIST} + \beta_4 \text{4DSERV} + \beta_5 \text{5SDOU} + \beta_6 \text{DNOR} + \beta_7 \text{DDEG} + \beta_8 \text{DTEC} + \beta_9 \text{DMAG} \\
 &\quad + \beta_{10} \text{DPROF} + \beta_{11} \text{DSALE} + \beta_{12} \text{DMOT} + \beta_{13} \text{DINF} \\
 \text{EMP}^* &= \alpha + \beta_1 \text{DMAF} + \beta_2 \text{DDIST} + \beta_3 \text{SERV} + \beta_4 \text{DSOU} + \beta_5 \text{DNOR} + \beta_6 \text{DDEG} + \beta_7 \text{DTEC} + \beta_8 \text{DMAG} \\
 &\quad + \beta_9 \text{DPROF} + \beta_{10} \text{DSALE} + \beta_{11} \text{DMOT} + \beta_{12} \text{DINF} \\
 \text{TU}^* &= \text{Log turnover (Year Three)} \\
 \text{TOT}^* &= \text{Log total Assets (Year Three)} \\
 \text{EMP}^* &= \text{Log Employ} \\
 (\text{Employ} &= \text{No. founders employed} + \text{No. full time workers} + \text{No part-time workers} \times 0.5).
 \end{aligned}$$

employment is the dependent variable has one fewer independent variables than the other two regressions. This is because number of founders was added to employees to obtain a figure for total employment in the firm. It is theoretically correct to make this adjustment because firm founders frequently create firms simply to provide an outlet for their own labour services.

Results

The results of the three regressions are contained in Table III. Broadly the statistical analysis confirms the hypotheses. Founder characteristics do have an impact on the size of the new firm. In the following interpretation of the results it should be noted that little attention is given to the coefficient values. Rather the regression is treated as an analysis of variance exercise with the main focus being on the direction and significance of the results.

The first thing to notice about the results is that the adjusted — R^2 is greater for the total assets and turnover models than the employment model. One reason for this is that the employment model contains one less independent variable than the other models. the employment variable is based on the number of founders added to the number of employees. The reason for this is, as has been said, is that new firms are frequently set up with the sole reason of providing the founder with a job. The employment figure for new firms must include the jobs of the founders. Notwithstanding this fact the greater adjusted — R^2 for the assets and turnover models is in line with the previous work. Fothergill

and Gudgin (1982) find that white collar entrepreneurs found firms which are larger in terms of assets and turnover than blue collar founders but that differences in employment between the two groups were not great. Storey *et al.* (1987) and Birley (1987) find little correlation in the short run between growth in turnover and assets and growth in employment. It is possible that the more highly qualified entrepreneurs found the more technologically sophisticated firms which have a higher ratio of capital to labour.

It is clear from the results that the number of founders is a significant influence on the size of the new firm. There are a number of reasons why this might be the case.

Firstly, as McGuire (1976) suggests, entrepreneurs can team up to increase the stock of skills available to the business. Secondly, entrepreneurs can come together to increase the supply of capital to the business. Many small firms are founded on the basis of the owner's equity. The more founders there are the greater the potential equity input. This is probably an important influence on the size of total assets. Thirdly, entrepreneurial teams may form to reduce the cost and labour in the start up period. Owners of the firm will work for below the opportunity cost of their labour so as to earn a capital reward at a later date. The result of this cheap labour input is increased turnover. Fourthly, multi-founder firms are likely to be attracted only to the large economic opportunities because they require a greater initial income. It is not possible on the basis of the data to say which is the most important factor.

The importance of sector as a determinant of

TABLE II
Specification of the independent variables

Name of variable	Classes	Abbreviated name	Variable specification
Number of founders		FOUND	Continuous variable, values 1–4
Industrial sector	manufacturing. distribution. services. construction.	DMAF DDIST DSERV	1 if manufacturing 1 if distribution 1 if services else 0 else 0 else 0
Region	South East. North East. West Midlands.	DSOU DNOR	1 if South East 1 if North East else 0 else 0
Founder education	higher degree. degree. A levels. O levels. none.	DDEG	1 if degree or higher degree else 0
Founder skill level	technical. scientific. managerial. professional. sales. skilled. semi-skilled. manual.	DTEC DMAG DPROF DSALE	1 if technical or scientific 1 if managerial 1 if professional 1 if sales else 0 else 0 else 0 else 0
Motivation to achieve growth	high. medium. low.	DMOT	1 if highly motivated else 0
Information (based on reason for start up)	knowledge of specific market. market. motivated by positive ideas. forced into ent. other.	DINF	1 if knowledge of specific market else 0

Source: Survey

size is also apparent in the results. However, sector may affect size in different ways. The significant sector variables in the total asset model are manufacturing and distribution. In manufacturing, large total assets probably relates to the need of these firms to invest in machinery and stocks. Distribution requires a large capital outlay because of the need for a minimum level of stocks and the ownership or tenancy of valuable retail premises. Sector does not seem to have a significant impact on new firm turnover. The data indicate that it is manufacturing start-ups which create the most employment. This has been

observed before and has led to the frequent and erroneous conclusion that public policy to create employment should focus on manufacturing firms. This is patently wrong if the rate of profit is falling in the manufacturing sector.

As hypothesised, region of start up has an influence on the size of the new firm. The influence is not as strong as expected and affects turnover and total assets only. The dummy variable indicating region gives no clue as to what the important regional influence is. Possibly the strength of regional markets is influential but variations in the availability of other factors of produc-

TABLE III
Results

(i) Dependent variable is log of total assets in year three.

Tot = 7.91	*** + 0.59 FOUND (0.11)	* + 0.5 DMAF (0.25)	* + 0.44 DDIST (0.22)	- 0.31 DSERV (0.23)
(SE)	5.67	2.01	2.0	- 1.37
tval	***	*	**	
	+ 0.70 DSOU (0.20)	+ 0.44 DNOR (0.19)	- 0.08 DDE (0.23)	+ 0.88 DTEC (0.30)
	3.47	2.36	- 0.34	2.96
	***	**	**	***
	+ 0.69 DMAG (0.21)	+ 1.01 DPROF (0.31)	+ 0.72 DSALE (0.24)	+ 0.83 DMOT (0.16)
	3.34	3.26	2.9	5.04
	*			
	+ 0.63 DINF (0.25)			
	2.54			

$R^2 = 0.44$ Fval 13.54 > Crit val F (0.001) 2.74
(13,226)

$R^2 = 0.41$

(ii) Dependent variable is log of turnover in year three.

TU = 9.08	*** + 0.61 FOUND (0.10)	+ 0.01 DMAF (0.23)	+ 0.34 DDIST (0.21)	* - 0.47 DSERV (0.21)
(SE)	6.13	0.04	1.64	- 2.21
tval	***	***	*	*
	+ 0.80 DSOU (0.19)	+ 0.47 DNOR (0.17)	- 0.022 DDEG (0.22)	+ 0.68 DTEC (0.28)
	4.24	2.70	- 0.07	2.46
	***	***	***	***
	+ 0.62 DMAG (0.19)	+ 0.77 DPROF (0.30)	+ 0.82 DSALE (0.23)	+ 0.73 DMOT (0.15)
	3.22	2.62	3.60	4.77
	**			
	+ 0.65 DINF (0.23)			
	2.81			

$R^2 = 0.45$ Fval 14.124 > Crit val (0.001) 2.74
(13,226)

$R^2 = 0.42$

(iii) Dependent variable EMP. EMP is log of EMPLOY. (EMPLOY = No founders jobs + no full time employees + 0.5 × No. part time employees).

EMP = 1.08	*** + 0.62 DMAF (0.18)	+ 0.02 DDIST (0.15)	- 0.123 DSERV (0.16)	+ 0.23 DSOU (0.14)
(SE)	3.45	0.10	- 0.82	1.59
tval				**
	+ 0.17 DNOR (0.13)	- 0.06 DDEG (0.15)	+ 0.15 DTEC (0.20)	+ 0.36 DMAG (0.14)
	1.29	- 0.41	0.75	2.52

	+ 0.16 DPROF (0.21)	+ 0.05 DSALE (0.17)	+ 0.49 DMOT (0.12)	+ 0.19 DINF (0.17)
	0.75	0.29	4.29	1.13

$R^2 = 0.25$ Fval 5.30 > Crit val. (0.001) 2.74
(12,222)

$R^2 = 0.21$

Levels of significance: * 0.05
** 0.01
*** 0.001

tion cannot be discounted. Some researchers have indicated that the South East region of the UK presents an environment favourable to the formation and early growth of new firms (Mason, 1985; 1989). Mason (1985; 1989) indicates that there is evidence to suggest that capital, labour and information are all more accessible to the entrepreneur in the South East than elsewhere in the UK.

The models do not support the contention that education has a significant influence on firm size. Of course the variable, presence of a higher degree, is fairly crude and a more sophisticated analysis may be more revealing. However these results are in agreement with much of the empirical work on this issue.

By contrast the work-skill variables which indicate experience in a managerial, professional, technical/scientific or sales position do seem to influence firm size. All skill types affect turnover and total assets though only management experience affects employment. Some caution is required with these results. The hypothesis is that certain white collar jobs positively enhance entrepreneurial ability and therefore new firm size. Thus white collar entrepreneurs are more confident and competent in the early years of the firm. However there is an alternative hypothesis which is that white collar entrepreneurs are better able to obtain loans from the banking system. This research does not indicate which of these hypotheses is correct. In addition it should be noted that different occupations provide different skills. Thus the entrepreneurs from the backgrounds specified will have different strengths. Nevertheless the results support the hypothesis that the entrepreneurs' work experience affects the characteristics of the firm founded including its size. Thus an area which has a high proportion of entrepreneurs in professional, managerial, technical and sales occupations is likely to benefit from better quality, more highly capitalised new firms.

The finding that management experience is significantly related to employment size is not surprising. Personnel management is a skilled and potentially stressful task. Only those entrepreneurs with some experience in the management of people are likely to take on significant numbers of workers in the early years of the firm.

In the survey, entrepreneurs were ranked as low, medium or high with regard to desire to

achieve growth. There are some problems with this data but entrepreneurial motivation would seem to be an important influence on firm size. The DMOT variable is highly significant in all the models. Furthermore DMOT is one of the few variables significantly related to number of workers. While this variable is somewhat difficult to interpret the picture emerges of the highly motivated entrepreneurs being more willing to risk up front investment and working harder to achieve sales. DMOT probably affects employment size for the reasons mentioned previously, managing staff is a difficult and stressful process and is only likely to be undertaken by highly motivated entrepreneurs. Low motivated entrepreneurs, in business for independence only, may try to avoid employing workers.

DINF is a variable which indicates whether the entrepreneur has precise knowledge of customer's location and budgets prior to start up. DINF has a significant impact on turnover and total assets. There is a quite obvious link between good market information and sales but this may not be the only reason why DINF affects firm size. Good market information is an essential part of a business plan. Thus, those with good information may more easily obtain loan finance than entrepreneurs starting up on the basis of a hunch.

Conclusions

There are a number of reasons why it is important to examine the determinants of new firm size. Large new firms may be those which are the most likely to survive and grow. Large new firms contribute more than small new firms to the economy in terms of income generation. This research had the aim of assessing the impact of the characteristics of the entrepreneur on the size of the new firm. Theory and previous empirical research indicated that the entrepreneurial attributes most likely to influence the characteristics and performance of the firms were motivation, education, workskills and information. The results of the regression analysis confirm these hypotheses when turnover and total assets are the dependent variables but are less conclusive when employment is the dependent variable.

In terms of entrepreneurial influences on firm size the following statements can be made. New

firms will have larger total assets where they are started by multifounder teams where the lead founder has had a managerial, technical, professional or sales position, is highly motivated to achieve growth and possesses good market information. Similarly, the new firms with the largest turnover will be those started by a group of entrepreneurs where the prime mover is from one of the white collar backgrounds described, is highly motivated and possess good market information. Possibly the most interesting finding is that the entrepreneurs who create the most jobs are those who are highly motivated, have managerial skills and whose firms are in the manufacturing sector.

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