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Factors Affecting New Firm Success and their Use in Venture Capital Financing

Timothy Bates
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Using a nationwide sample of 14,424 new firms, we find that attractive human capital traits at business entry for entrepreneurs include high educational attainment, owners who lie in the middle of—as opposed to the tails of—the age distribution, and family business background. Attractive firm traits are purchase of an existing firm rather than starting a firm de novo, and larger amounts of starting capital. Recent research has found that certain ethnic minorities are differentially restricted from obtaining commercial bank financing. Our statistical tests indicate that when we control for differences in human capital and firm traits, the venture capital market also differentially restricts minority entrepreneurs from obtaining venture capital. Thus public policy seeking to reduce the resulting financing gap for minority entrepreneurs may have economic justification. Except for the ethnic trait, the venture capital market's use of owner and firm information is consistent with selecting those firms which have more survival potential.

I. INTRODUCTION

Recent research Bates [6], Ando [3] has found that certain ethnic minorities are differentially restricted from obtaining commercial bank financing. However, for many firms venture capital financing can be a substitute for bank financing. To the extent that minority entrepreneurs are not differentially restricted in obtaining venture capital, financing impediments which may exist in banking markets are less onerous for minority entrepreneurs. Thus the major goal of this study is to determine if ethnic minorities are differentially restricted in their ability to obtain venture capital financing.

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An important prerequisite for reaching our major goal is to specify a set of owner and firm variables which can be used to statistically distinguish between new firms which will succeed and those which will not. Thus the second goal of this study is to determine the ability of a set of owner and firm variables to statistically separate successful from unsuccessful new businesses. The owner variables include age, education, management experience, family business background and ethnic category; the firm variables include starting capital, debt/equity ratio, ongoing status, and minority customer market. In order to delineate successful from unsuccessful firms, we utilize a unique nationwide sample of 14,424 firms whose owners entered self-employment in 1976-82. Each firm is traced through late 1986. Relationships between these variables and business success have not been previously tested on such a large set of data.

We then examine how venture capital firms use the owner and firm variables to determine which firms receive financing. Assuming that venture capital firms seek to select the most viable firms from the universe of new firms, variables which successfully explain business survival should be capable of identifying firms that are likely to receive venture capital. One of the variables in both models is the ethnicity of the owner. By comparing the coefficients for ethnicity in survival analysis and the venture capital financing analysis, we examine the consistency between ethnicity as affecting firm success, and ethnicity as affecting the ability to obtain venture capital financing.

Using discriminant analysis on the 14,424-firm sample to separate surviving firms from those which disappeared, we find that attractive human capital traits at business entry include high educational attainment, owners who lie in the middle of—as opposed to the tails of—the age distribution, and family business background. Attractive firm traits are purchase of an existing firm ("ongoing firm") rather than starting a firm de novo, and larger amounts of starting capital. Dependence upon minority customers is a negative firm trait. Management experience at business entry is not found to be associated with firm success. Finally, the ethnicity of the entrepreneur is not found to affect negatively the success of a business.

Of the 14,424-firm sample, 400, or 2.8% obtained venture capital financing at startup. We then use discriminant analysis and logit analysis to specify how the variables used to separate surviving from disappearing firms can be used to separate the 400 firms which received venture capital financing from the 14,024 which did not. The tests provide similar results. As expected, owner education and age, the amount of equity investment, and ongoing firm status are found to be positively related to the receipt of venture capital. Unlike the results for firm survival, management experience is positively related to obtaining venture capital financing, while family

business background is not found to be statistically significant. Finally, the major result of these tests is that membership in a minority group—Asian, black or Hispanic—is negatively related to obtaining venture capital financing.

We discuss three implications. First, the finding that the venture capital market does not efficiently provide capital to minority entrepreneurs may justify government programs which help to form venture capital pools for minority businesses. As mentioned above, previous studies have found that commercial banks lend less to certain ethnic minority groups after controlling for variables similar to those we include in this study. Based upon our results as well as these earlier studies, we conclude that neither the banking nor venture capital markets are race neutral. Thus public policy seeking to reduce the resulting financing gap to minority entrepreneurs certainly may have economic justification.

Second, in contrast to Sandberg and Hofer [27] our results confirm the concept that owner traits are important in the success of a new firm. Third, except for the ethnic trait as mentioned above, the venture capital market's use of owner and firm information is consistent with selecting those firms which have more survival potential. The market for venture capital is efficient in this respect.

This study is organized as follows. Section II provides background on the CBO Survey and the data used in the study. In Section III discriminant analysis models are used to determine the variables which are important in predicting firm survival. In Section IV, we determine the extent to which the variables in Section III can be used to separate those firms which received venture capital from those which did not.

II. RESEARCH DESIGN AND HYPOTHESIS ON FIRM SURVIVAL

Research Design

We assume that venture capital firms seek to select from financing applicants those firms which have the higher likelihood of survival. Thus we test the ability of the firm and owner variables (specified below) to separate those firms which were operating in 1986 from those which disappeared during the 1982-86 time period. If the variables can be used to distinguish between surviving and discontinued firms, we consider that venture capital firms can also utilize these variables to screen applicants for financing. Given verification of how these variables can be used to statistically separate surviving from disappearing firms, we determine how venture capital firms use these variables to select those who receive venture capital. Among the

owner variables in both the survival analysis and the venture capital financing analysis is the ethnicity of the entrepreneur. If ethnicity is (is not) important in determining success or failure of a new business given the other variables considered, it should (should not) be important in determining which firms do and do not receive venture capital financing.

Predicting Firm Success

Our basic concept is that successful business entry (*SBE*) is a function of owner traits and firm traits: $SBE = f$(Owner Traits, Firm Traits). We will use discriminant analysis models to examine the relationship between owner and firm traits and the success of a new business. The discriminant analysis dependent variable measure of firm viability is, by definition, whether or not the business is still operating in late 1986. Businesses that are still operating are active firms; those that have closed down are discontinued, by definition. The objective of the discriminant analysis exercise is to weight and combine the explanatory variables in a fashion that forces the two groups—active and discontinued firms—to be as statistically distinct as possible.

We first discuss owner variables. Recent studies are not unanimous concerning the importance of owner characteristics in business success. Van de Ven et. al. [34] in their study of 13 software firms, and Stuart and Abetti's [33] study of 24 new technical ventures find that owner variables are important in the success of a firm. But Sandberg and Hofer [27] conclude in their study of 17 ventures that (p. 6) "The biographical characteristics of the entrepreneur had little impact on new venture performance." We will examine the relationship between the owner variables and success in our 14,000-plus firm sample. The owner variables included in the discriminant model are defined and discussed below:

Family self-employment: for owners whose close relatives (mother, father, brothers, sisters, others with whom frequent contact was maintained) either owned a business or were self-employed in professional practice, Family = 1, otherwise Family = 0.

Management Experience: Number of years in a managerial capacity (table 1). If the owner had worked in a managerial capacity prior to owning the business he owned in 1982, Management = 1; otherwise = 0 (tables 2 and 3).

Education: *Ed*2: for owners completing four years of high school,*Ed*2 = 1; otherwise *Ed*2 = 0. *Ed*3: for owners completing at least one but less than four years of college, *Ed*3 = 1; otherwise *Ed*3 = 0. *Ed*4: for owners completing four or more years of college, *Ed*4 = 1; otherwise *Ed*4 = 0.

Age: Age2: for owners $35 \leq$ Age < 45, Age2 $= 1$; otherwise Age2 $= 0$. Age3: for owners $45 \leq$ Age < 55, Age3 $= 1$; otherwise Age3 $= 0$. Age4: for owners $55 \leq$ Age, Age4 $= 1$; otherwise Age4 $= 0$.
Ethnic Minority Group: Asian = 1 if yes, Asian = 0 if no. Black = 1 if yes, black = 0 if no. Hispanic = 1 if yes, Hispanic = 0 if no.

With regard to *Owner Age*, in his recent study of entrepreneur earnings, Bates [4] found that "a 47 year old highly educated male has the greatest likelihood of being a high earner of self-employment income." The 35-55 bracket was found to be most strongly associated with business viability, which dropped off sharply for owners beyond age 60. *Family Self-Employment* has been repeatedly linked by sociologists and psychologists to entrepreneurial ability. Family (close relative) pursuit of self-employment is expected to encourage the development of entrepreneurial values within an individual as well as increasing one's familiarity with the small business milieu. "Close relatives" includes parents, brothers, sisters, spouse or other relative with which the owner had frequent contact. Shapiro [28] found that more than 50% of the entrepreneurs he studied had self-employed fathers. In his classic study of Harlem small business, Caplovitz [12] found that owners from a small business family were generally more successful, and that family business background was much more common among white than black owners. More recently, Dubini [14] found that one important motivation for becoming entrepreneurs is a family tradition of self-employment. Finally, *Owner Education* as well as *Owner Management Experience* are traits that have been associated with firm viability in previous studies such as Bates [8] and Van de Ven et. al.[34].

The *Minority Group* to which the entrepreneur belongs may affect the success of the business outside of the other variables considered here. We consider Asian, black and Hispanic group status separately in this set of variables. If there are socio-economic or political relationships which exist among the different minorities which affect firm viability not otherwise considered, these variables will so indicate.

The firm variables utilized in our statistical analyses are defined and discussed below:

Leverage: The ratio of debt to equity at business startup.
Log total capital: The log of (total debt + equity) at business startup.
Ongoing Firm: for owners entering a business already in operation, Ongoing = 1; if the owner was the original founder of the business, Ongoing = 0.
Minority Customers: Min = 1 if .75 or more of the firm's customers are minority, Min = 0 otherwise.

With regard to *leverage,* finance scholars have provided conflicting hypotheses about the impact of increasing the firm's leverage on its viability. Contemporary finance theory concludes that as debt increases there is a positive impact on firm value from the tax savings from interest Modigliani and Miller [24] but there are negative impacts from higher present values of bankruptcy costs Baxter [10] and agency costs Jensen and Meckling [18]. At low leverage firm value commonly increases as leverage increases, while at high leverage firm value declines as leverage increases, resulting in an interior optimal leverage ratio Van Horne [35], Ch. 9. Thus if firms' leverage ratios are systematically lower (higher) than optimal, the sign of the leverage variable coefficient should be positive (negative) as a predictor of firm survival. Research by Altman [2],[1] and others on large corporations find that higher leverage ratios are associated with firm failure. Finally, if firms are close to their optimal leverage or there is sufficient variability among firms about the actual leverage relative to optimal, the value of the leverage variable coefficient will be close to zero.

With regard to firms having lower than optimal leverage, Stiglitz [32] and Weiss have analyzed the supply of capital by examining the equilibrium amount of loans which a bank will grant. They assume that because of imperfect information, banks cannot distinguish the risk of individual borrowers. As the bank increases the rate it charges for loans, the quality of those who apply decreases, and at some point the maximum profits for the bank is specified at some rate and quantity of loans. But the profit maximizing interest rate and loan quantity will lead to demand for loans exceeding supply, thus creating an equilibrium in which credit rationing occurs. In such an equilibrium some or all firms in a specified group will have leverage ratios lower than optimal.[1]

With regard to *total capital,* most studies of the relationship between firm size and rate of return find that the rate of return either increases with firm size or is constant in firm size. This result can be related to economies and the expansion in opportunities as investment capital increases. See Scherer [29] for a review of the studies, and Bruno and Tyebjee [9] for a recent study. Although such studies defined performance in terms of profits and sales, we consider that as profits and sales increase, the rate of firm survival increases, thus the positive relationship between total capital and survival. Related reasoning is provided by Evans and Jovanovic [15], who conclude that the more capital held by an individual, the greater the ability to enter self-employment. In their model, liquidity (capital) requirements tend to screen out persons from business entry. We expand their concept to consider that post-entry profits and survival rates are also positively related to capital.

To the extent that *Minority Customers* are less able to provide the revenue stream which will support growth and viability, then the success of the business is negatively related to this variable. The lower per capita income of minority communities may result in the dependence on such communities to result in higher disappearance rates (Bates [5]).

The choice of an *Ongoing Firm* is hypothesized to be positively associated with firm viability. Holmes and Schmitz [16] develop a model of self-employment in the spirit of Schultz [30]. Their model leads to inferences about ongoing firms from the perspective of the quality of the firms in the transaction moreso than the quality of the entrepreneur who buys the business. In their model, a business transfer indicates that the developer has high entrepreneurial ability and is shifting resources to another opportunity. Thus they conclude that in a cohort of new businesses developed at a certain date, those that are subsequently involved in a transfer will on average be of higher "quality" and also survive longer than those that are not transferred. In this regard, Ravenscraft and Scherer [25] and Churchill [13] have previously concluded that transferred firms generally experience superior performance. Reynolds [26] found that the age of a firm increased its survival probability. Since ongoing firms are older than firms started *de novo*, one implication is that ongoing firms should also experience higher survival rates.

III. DATA AND RESULTS OF FIRM SURVIVAL

Data[2]

The samples of business owners analyzed in this study include males only; they are drawn from the 1982 Characteristics of Business Owners (CBO) Survey. This data source describes small businesses (self-employed persons) in a manner unlike any previous large scale survey. The public use samples from the population census data (1980, 1970, ...) describe self-employed people as individuals. The periodic business census data (1982, 1977, ...) describe businesses. The CBO data base, in contrast, is the first data base of national scope that describes self-employed people as individuals as well as describing traits of businesses these people own, such as sales, earnings, employees, capital inputs, etc. The CBO data are geared toward minorities: explicit subsamples consist of over 10,000 each of blacks, Hispanics, and other minorities, while other panels focus upon 1) women and 2) white males.

The definition of a "small business" is not clearcut. The CBO survey drew its small business universe from individuals who filed in 1982 one of the following types of federal income tax forms: 1) Schedule C, form 1040 (sole proprietor); 2) Form 1065 (owners of partnerships); 3) Form 1120S (owners of subchapter S business corporations). From the universe of persons filing one or more of these forms, 125,000 were selected for further data collection. Census questionnaires covering both owner traits and business traits were sent out to these 125,000 observations, and nearly 80 percent of the questionnaires were returned. In some cases, one owner of several firms is picked up in the sample; in other cases, multiple owners of one firm are encountered. In this study each firm has a unique owner; multiple owners are not permitted. Among persons filing Schedule C forms, many are not small business owners according to the commonly understood meaning of the term. For purposes of this study, small business owners are the subset of the sample where owners 1) had a financial capital investment in the business that was greater than zero, and 2) annual sales of at least $5,000 in 1982. Observations not meeting these criteria are dropped from further consideration. Because of the nature of the firm data, for consistency purposes only male-owned firms are analyzed in this study.

Among the business entering self-employment between 1976 and 1982 our sample consists of 14,424 observations for which 1) the financial capital investment was greater than zero, 2) missing variable problems were not severe, and 3) total sales of at least $5,000. This sample is representative—regarding industry mix and geographic location—of all small business proprietorships, partnerships, and small business corporations that file tax returns, subject to the constraints that they 1) were operating in 1982 and 2) produced total annual sales of at least $5,000 in that calendar year.[3]

Results of the Discriminant Analysis of Firm Survival

Table 1 reports the results of the discriminant analysis test for the 14,424 firms in the sample. The exercise is successful in the sense that the active and discontinued firms are shown to be statistically distinct. In addition, all of the independent variables hold the hypothesized sign except for management experience. The variable coefficients—in standardized form—permit comparisons of the relative explanatory power of the independent variables.

The Ed4 variable is the most successful at delineating active from discontinued firms. Capital input, Age3, and the minority customers are also important variables in the discriminant analysis, with the latter having a negative impact on firm viability. Family business background and ongoing firm are also found to be positively related to firm viability, as hypothesized.

Table 1
Discriminant Analysis, Active (1) Versus Discontinued (0) Firms as of 1986: Entrepreneurs Entering Business in 1978-82.

Variable	*Standardized Discriminant Function Coefficients*	*Group Mean Vectors*	
		3728 Discon	*10697 Active*
Ed2	.301	.328	.315
Ed3	.082	.239	.203
Ed4	.699	.287	.363
Management	−.206	5.960	5.990
Age2	.227	.315	.331
Age3	.339	.182	.211
Age4	.066	.126	.116
Ongoing	.075	.227	.253
Lnkptl	.591	9.027	9.300
Leverage	−.010	3.336	3.609
Min. Customers	−.316	.131	.102
Family	.169	.373	.411
Asian	.061	.023	.030
Black	.001	.023	.020
Hispanic	.063	.031	.030

Notes: *Canonical correlation* = .1261. Approx. standard error = .008. Likelihood ratio = .9826. F = 15.51 which indicates that the group differences are statistically significant. Alpha = .01.

The finding that firm leverage is trivial for delineating active from discontinued businesses must be interpreted in view of the fact that the active firms are more highly levered than the discontinued firms. Reliance upon debt capital at the point of business startup is clearly not associated with business weakness or heightened risk of failure. With regard to the earlier discussion our results indicate that for our sample of firms (i) there are interior capital structure ratios which maximize firm viability and (ii) debt capital is available such that optimal capital structures are attained. The former is implied through the result that the more successful firms have higher leverage ratios. The latter is implied in that given firms' leverage ratios, more debt did not lead to greater or lower firm disappearance.

The model also indicates that the ethnicity of the owner does not negatively affect success when we account for the other variables. This finding holds for each of the three ethnic groups observed. Management experience is found to be negatively associated with firm viability. The failure of this variable to perform as expected may be due to the fact that it is highly correlated with age of owner. A different functional form which reduces the problem of the management experience—age correlation is used in tables 2 and 3.

In summary, the results of the discriminant analysis indicate that attractive human capital traits at business entry include high educational attainment, owners who lie in the middle of—as opposed to the tails of—the age distribution and family business background. Attractive firm traits are ongoing firm (instead of de novo) and larger amounts of starting capital. Dependence upon minority customers is a negative business trait. Management experience at business entry is not found to be associated with firm viability.

IV. EXPLAINING VENTURE CAPITAL INPUT

As mentioned earlier, 400 of the 14,424 firms in the sample received venture capital financing at business entry.[4] The 2.8% of the firms receiving venture capital financing in this sample is roughly equal to the proportion of requests which are funded as reported in Maier and Walker's [23] survey of 92 venture capital firms.

We now determine how the venture capital market utilized the variables above to choose which firms received venture capital. Direct relationships are hypothesized to exist between the receipt of venture capital financing and human capital and demographic traits that are associated with business survival. Considerations of both supply by the venture capital market and demand by the owner are relevant to the receipt of venture capital. The receipt of venture capital is assumed to be a supply side dominated decision in the case of small business startups. Venture capitalists are hypothesized to invest in those firms whose owners possess human capital and demographic traits that are associated positively with business viability.

We recognize that the securities of small firms are sold in a market which differs from that of publicly traded firms. In this regard, finance theory has derived conclusions about business financing that are elegant in their simplicity. In perfect markets, when an investment opportunity becomes available the owner/manager need only announce publicly the information relevant to the valuation of the project. If the project is expected to result in a positive market value (new firm) or an increased market value (existing firm) the firm will be able to sell securities which equal the total market value of the firm after the securities have been sold and new investment undertaken.

This process has impediments in the securities markets for small business startups. In such a market information is less perfect and potential investors may more easily form beliefs that are different from those of the owner. Relative transactions costs are high, which reduces the incentive for lenders to invest and for owners to seek outside financing. The value of the

small firm often hinges upon something that cannot readily be bought and sold (lacking personal indenture contracts): the efforts of a single owner/manager. The small business owner often finds it impossible to persuade potential suppliers of equity capital to share his subjective beliefs regarding future returns from investment in the firm (Steigum [31]).

But venture capital firms specialize in smaller security transactions in financial markets. Venture capital firms are considered as specialists in small business markets, in the sense that they seek out business opportunities which are typically smaller and riskier than those in publicly traded securities markets. But even the venture capital market must operate under investment criteria which are consistent with economic rationality. While weaker firms may have a greater demand for venture capital—particularly to overcome capital deficiencies—supply side limitations are expected to limit the access to venture capital for the less attractive owners. Venture capital firms are assumed to prefer to lend to the active business subset. This is the set which will be available for profitable security resale to other investors.

Several studies have investigated the importance of owner and firm variables in venture capital firms' decisions to finance firms. In their study of business plans of applicants for venture capital financing, MacMillan and Subbanaramha [21] found that those firms which expected lower leverage ratios tended to be more favorably received by venture capital firms. MacMillan et. al. [22] also found that entrepreneur qualifications were important in venture capital firms' decisions to select funded firms.

The sample of owners for which the venture capital functions are estimated is identical to the owner sample used above. Table 2 contains discriminant analysis tests to separate those firms which received venture capital from those which did not. We conducted these tests using the variables in table one except capital and leverage. Model #1 in Table 2 includes the amount of equity capital of the owner as a variable, whereas Model #2 does not.

The results in Table 2 are generally consistent with those of Table 1. The receipt of venture capital is positively relate to most of those variables positively associated with firm viability in Table 1. Education, age (the middle range), equity (as a measure of firm scale) and ongoing firm status are consistent with the findings of Table 1. Size of equity investment by the owner, however, emerges as one of the weaker discriminating variables; variables measuring owner human capital—particularly college education (Ed4) and managerial experience—are quite powerful for delineating venture capital recipients from other firms.

Several variables are inconsistent with table one. Older owners, including those 55 and older (age4), are positively associated with receipt of venture capital, despite the weak association between age4 and firm

Table 2
Discriminant Analysis, Firms Receiving Venture Capital (1) Versus Non-Venture Capital (0) Firms: Entrepreneurs Entering Business in 1976-82.

	Standardized Discrmin. Function Coefficents		*Group Mean Vectors*	
Variable	*Model #1*	*Model #2*	*Yes VC*	*No VC*
Ed2	.358	.362	.311	.319
Ed3	.280	.282	.208	.212
Ed4	.481	.489	.395	.341
Age2	.105	.110	.292	.328
Age3	.491	.500	.281	.200
Age4	.485	.492	.178	.117
Min. Customers	.157	.161	.125	.110
Equity Cap.	.094	—	23,444	16,136
Family	−.007	−.003	.420	.400
Ongoing	.276	.280	.310	.244
Hispanic	−.067	−.069	.023	.031
Asian	−.169	−.167	.017	.028
Black	−.114	−.116	.013	.021
n			400	14,024

Note: *Model #1:*
Canonical correlation = .0952. Approx. standard error = 0.008. Likelihood ratio = .9909. F = 9.421 which indicates that the group differences are statistically significant.

Model #2:
Canonical correlation = .0948. Approx. standard error = .008. Likelihood ratio = .9910. F = 10.058 which indicates tha the group differences are statistically significant. Alpha = .01.

survival. Family business background is unimportant in obtaining venture capital but positively related to firm viability in Table 1. Managerial experience is highly related to venture capital financing in table two but not in predicting firm viability as shown in table one. It may be that for the 400 venture capital financed firms, managerial experience was associated with success, but not for the entire 14,424 firm sample.

Also, while minority customers is negatively related to viability in Table 1, it is positively related to venture capital financing in Table 2. Finally, both models in Table 2 indicate that minority group membership is negatively related to the receipt of venture capital financing. The result holds for each minority group: Asian, black and Hispanic. Blacks and Hispanics, in particular, are less likely to possess the managerial experience and the strong educational backgrounds—relative to nonminority owners—that open up access to venture capital. Yet table two demonstrates that minority group

status, by itself, is an additional barrier to accessing venture capital. One deficiency of the Table 2 discriminant analysis, however, is the absence of a test of the statistical significance of owner minority status as a determinant of venture capital access. This is remedied in Table 3.

Table 3
Logistic Regression, Venture Capital (1) Versus Non-Venture Capital (0) Firms: Enterpreneurs Entering Business in 1976-82.

Variable	*Parameter Estimate*	*Standard Error*	*Chi-Square*
Constant	3.226*	.031	10,918.3
Ed2	.222*	.008	751.8
Ed3	.192*	.008	495.5
Ed4	.278*	.006	1,179.5
Management	.358*	.005	5,081.6
Age2	.079*	.005	193.8
Age3	.311*	.006	2,877.4
Age4	.358*	.007	3,042.8
Min. Customers	.133*	.006	2,877.4
Family	−.002	.004	0.3
Ongoing	.158*	.005	1,216.0
Hispanic	−.123*	.014	76.8
Asian	−.312*	.016	374.5
Black	−.255*	.018	195.5

Notes: $n = 14.424$

Likelihood ratio 968
Chi-square 73,947.27
* alpha = .01

The tests of the logistic regression model are reported in table three. In the model, *VC* yes = 1 and *VC* no = 0. One advantage of the logit model is that we can test the statistical significance of each independent variable. The discriminant technique, however, is preferred to Table 3's logit model because multicollinearity problems potentially compromise the interpretation of the individual variable coefficients. Owner age, education and managerial experience, for example, are imperfect exogenous variables in the logit model because they are somewhat interrelated. Yet Table 3's logit findings are quite encouraging because they suggest that our model delineating venture capital recipients from others is robust. Either of these statistical techniques—logit or discriminant—produce highly consistent findings: venture capital most likely accrues to the older, highly educated owners who possess managerial experience. Owner age and human capital

notwithstanding, minorities are less likely to be venture capital recipients. The negative relationship between minority status and venture capital access, finally, is statistically quite significant.

V. SUMMARY

Using a nationwide sample of 14,424 new firms, we find that attractive human capital traits at business entry for entrepreneurs include high educational attainment, owners who lie in the middle of—as opposed to the tails of—the age distribution, and family business background. Attrative firm traits are purchase of an existing firm rather than starting a firm *de novo,* and larger amounts of starting capital. Dependence upon minority customers is a negative firm trait. Recent research has found that certain ethnic minorities are differentially restricted from obtaining commercial bank financing. Our statistical tests indicate that when we control for differences in human capital and firm traits, the venture capital market also differentially restricts minority entrepreneurs from obtaining venture capital. Thus public policy seeking to reduce the resulting financing gap for minority entrepreneurs may have economic justification. Except for the ethnic trait, the venture capital market's use of owner and firm information is consistent with selecting those firms which have more survival potential.

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NOTES

1. See Stiglitz [32] and the studies cited therein.
2. See Bates [7] for an extensive discussion of this data base.
3. Firms are weighted to adjust for oversampling of minority-owned businesses: see [7].
4. The table below provides additional date on venture capital (*VC*) and non-venture capital firms:

	Yes VC	*No VC*
Sales	$100,519	$94,568
Debt	22,428	20,074
% Alive	75.6	73.4
% Nonminority	94.6	91.5

REFERENCES

[1] Altman, E. 1983. *Corporate Financial Distress.* New York: John Wiley.

[2] Altman, E.,R. Haldeman and P. Narayanan. 1977. "Zeta Analysis: A New Model to Identify Bankruptcy Risk of Corporations." *Journal of Banking and Finance.* :29-54.

[3] Ando, F. 1988. "Capital Issues and Minority-Owned Businesses." *Review of Black Political Economy.* 16[2]: 77-109.

[4] Bates, T. 1987."Self-Employed Minorities: Traits and Trends." *Social Science Quarterly.* 68[3]: 539-51.

[5] Bates, T. 1989. "Small Business Viability in the Urban Ghetto." *Journal of Regional Science.* 29[4]: 625-43.

[6] Bates, T. 1990a. "Commercial Bank Financing of White and Black-Owned Small Business Startups." *Quarterly Review of Economics and Business. 31[1]: 64-80.*

[7] Bates, T. 1990b. "The Characteristics of Business Owners Data Base." *Journal of Human Resources.* 25[4]: 752-56.

[8] Bates, T. 1990c. "Entrepreneur Human Capital Inputs and Small Business Longevity." *Review of Economics and Statistics.* 72[4]: 551-59.

[9] Bruno, A. and T. Tyebjee. 1985. "The Entrepreneur's Search for Capital." *Journal of Business Venturing.* 1[1]: 61-74.

[10] Baxter, N. 1967. "Leverage, Risk of Ruin, and the Cost of Capital." *Journal of Finance.* 22[3]: 395-404.

[11] Bureau of the Census. 1987. *1982 Characteristics of Business Owners.* Washington, D.C.: Government Printing Office.

[12] Caplovitz, D. 1973. *The Merchants of Harlem: A Study of Small Business in the Black Community.* Beverly Hills: Sage.

[13] Churchill, B. 1955. "Age and Life Expectancy of Business Firms." *Survey of Current Business* 35[12]: 15-19, 24.

[14] Dubini, P. 1989. "The Influence of Motivations and Environment on Business Start-ups." *Journal of Business Venturing.* 4[1]: 11-26.

[15] Evans, D. and B. Jovanovic 1989. "An Estimated Model of Entrepreneurial Choice Under Liquidity Constraints." *Journal of Political Economy.* 97[4]: 808-827.

[16] Holmes, T. and J. Schmitz. 1990. "A Theory of Entrepreneurship and Its Application to the Study of Business Transfers." *Journal of Political Economy.* 98[2]: 265-294.

[17] Horvitz, P. 1983. "Problems in the Financing of Small Business." in *Problems in the Financing of Small Businesses* edited by Horovitz, P.and R. Pettit. Greenwich, CT: JAI.

[18] Jensen, M. and W. Meckling. 1976. "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure." *Journal of Financial Economics.* 3[3]: 305-360.

[19] Jovanovic, B. 1982. "Selection and Evolution of Industry." *Econometrica.* 50[2]: 649-70.

[20] Lucas, R. 1978. "On the Size Distribution of Business Firms." *The Bell Journal of Economics.* 9[3]: 510-8.

[21] MacMillan, I., L. Zemann and P. Subbanarasimha. 1987. "Criteria Distinguishing Successful from Unsuccessful Ventures in the Venture Screening Process." *Journal of Business Venturing.* 2[2]: 123-37.

[22] MacMillan, I. and P. Subbanarasimha 1987. "Characteristics Distinguishing Funded from Unfunded Business Plans Evaluated by Venture Capitalists." *Strategic Management Journal.* 8[6]: 579-85.

[23] Maier, J. and D. Walker. 1987. "The Role of Venture Capital in Financing Small Business." *Journal of Business Venturing.* 2[3]: 207-14.

[24] Modigliani, F. and M. Miller. 1963. "Taxes and the Cost of Capital: A Correction." *American Economic Review*. 53[2]: 433-43.

[25] Ravenscraft, D. and F. Scherer. 1987. *Mergers, Sell-offs, and Economic Efficiency*. Washinton, D.C.: Brookings.

[26] Reynolds, J. 1987. "New Firms: Societal Contribution Versus Survival Potential." *Journal of Business Venturing*. 2[3]: 231-46.

[27] Sandberg, W. and C. Hofer. 1987. "Improving New Venture Performance: The Role of Strategy, Industry Structure and the Entrepreneur." *Journal of Business Venturing*. 2[1]:5-28.

[28] Stuart, R. and P. Abetti. 1987. "Start-up Ventures: Toward the Prediction of Initial Success." *Journal of Business Venturing*. 2[3]:215-30.

[29] Shapiro, A. 1975. "The Displaced Uncomfortable Entrepreneur." *Psychology Today*.

[30] Scherer, F. 1980. *Industrial Market Structure and Economic Performance.*, 2d. ed. New York: Houghton Mifflin.

[31] Schultz, T. 1980. "Investment in Entrepreneurial Ability." *Scandinavian Journal of Economics*. 82[4]: 437-48.

[32] Steigum, E. 1983. "A Financial Theory of Investment Behavior." *Econometrica*.

[33] Stiglitz, J. 1987. "The Causes and Consequences of the Dependence of Quality on Price." *Journal of Economic Literature*. 25[1]: 1-48.

[34] Van de Ven, A., R. Hudson and D. Schroeder. 1984. "Designing New Business Start-ups: Entrepreneurial, Organizational and Ecological Considerations." *Journal of Management*. 10[1].

[35] Van Horne, J. 1989. *Financial Management and Policy*. Englewood Cliffs, N.J.: Prentice-Hall.