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A model for predicting small firm performance

Increasing the probability of entrepreneurial success in Chile

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Abstract

Purpose – This study aims to develop an ordered probit model to explain and predict small business relative performance in Chile, South America.

Design/methodology/approach – The design is survey research. The sample includes 403 small businesses classified as 158 failed firms, 101 mediocre firms and 144 successful firms within all economic sectors. The model variables are: internet, starting with adequate working capital, managing good financial and accounting records, planning, owner formal education, professional advice, having partners, parents owning a business, and marketing efforts.

Findings – The eight-variable model, tested with ordered probit, is a significant predictor of the level of performance at the 0.000 level. Also, six of the eight variables are significant predictors at the 0.05 level: internet, starting with adequate working capital, managing good financial and accounting records, owner, professional advice, having partners, parents owning a business, and marketing efforts. Two of the variables – i.e. planning and formal education – were not significant. ANOVA test of differences were run for each of the eight variables based on the level of performance were also run and results reported.

Practical implications – The model does in fact predict relative performance, so the model can be used to improve the probability of success. Thus, an entrepreneur can use the model to gain a better understanding of which resources are needed to increase the probability of success, and those who advise entrepreneurs can help them use the model. Investors and creditors can use the model to better assess a firm's potential for success. There is an extensive public policy implications discussion regarding how to use the model to assist entrepreneurial ventures so that society can benefit in direct and indirect ways via the allocation of limited resources toward higher potential businesses. Entrepreneurs and small business educators can use the model's variables to influence future business leaders, public policy makers, and their practices.

Originality/value – This study improves the Lussier 15 variable success versus failure prediction model by adding the use of the internet and taking out highly correlated variables. While Lussier and others ran logistic regression with only two levels of performance, this study uses the more robust ordered probit model with three levels of performance. It presents public policy with implications for Chilean institutions to promote entrepreneurship. Finally, it contributes to the literature because, to date, no empirical success versus failure studies have been found that were conducted in Chile or any small, open economies in Latin America

Keywords Small business, Success, Failure, Probit model

Paper type Research paper

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Introduction

There is no doubt that new business ventures introduce a dynamic element into the economy and can make an important contribution to development (Fritsch, 2008).

Entrepreneurship is the way to foster innovation and increase productivity, competitiveness and local and regional development (Reynolds *et al.*, 1994). And promoting entrepreneurship is perceived as a way to target unemployment and poverty (Robson *et al.*, 2009). Thus, entrepreneurs have a relevant function in the economy; they engender employment creation, productivity growth, and produce and commercialize productivity enhancing innovations. However, most firms fail in the first few years, so to increase the probability of creating a successful business is a main issue for those who dare to bear the risk of starting a new venture, and understanding why firms fail and succeed is crucial to the stability and health of the economy (Carter *et al.*, 1997; Pompe and Bilderbeek, 2005). In Chile, less than 42 percent of small businesses survive five years and less than 50 percent survive ten years (Cabrera *et al.*, 2002).

Supporting the need for entrepreneurial research in Chile is the fact that one of the world's leading entrepreneurship indicators, the TEA (Total Entrepreneurial Activity at an initial stage) is only 16.8 percent in Chile (Global Entrepreneurship Monitor, 2010). This measure represents the proportion of people between 18 and 64 who are actually involved in a new venture. There is still limited empirical entrepreneurial research. Although entrepreneurship research should be grounded in a national context, it can still be critiqued as almost exclusively focused on North American and European research sites, and research in other economic regions remains extremely limited (Welter and Lasch, 2008). In fact, it has been stated that research in Latin America has been unjustifiably ignored (Bruton *et al.*, 2008), and calls have been made for future enhancement of the economic development of regions including Latin America (West *et al.*, 2008). Chile is currently making contributions to development in the region and further research can guide entrepreneurial activities to continue this development.

Predicting entrepreneurial fate is an important area of research (Pompe and Bilderbeek, 2005) because performance prediction research benefits both would-be and current entrepreneurs, those who assist, train and advise them, those who provide capital for their ventures, their suppliers and creditors, researchers, and public policy makers. Thus, evidence providing insight for government and academic institutions may aid in their efforts to provide resources that may help reduce the incidence of bankruptcy or poor performance (Carter and Van Auken, 2006). With the need for empirical research in Chile, this study with its public policy implications can strengthen the small business sector, which would result in more jobs, better income distribution, greater social inclusion and could eventually lead to increased economic development.

Although understanding the causes of business success and failure is a cornerstone of entrepreneurship research (Michael and Combs, 2008), discovering which critical factors or practices lead to business success and measuring these effects is an unfulfilled purpose of small business research (Rogoff *et al.*, 2004). Thus, scholars seek further research to answer such questions as:

- Why does one person actually succeed in starting a business, while a second person gives up?
- Which variables explain success?
- Which business practices set successful firms apart from others?

- Which types of resources are most important to entrepreneurial development (West *et al.*, 2008)?
- Is there a global robust success versus failure prediction model (Lussier and Pfeifer, 2001; Lussier and Halabi, 2010)?

With so many unanswered questions, public policy cannot easily determine which firms to target in order to increase the odds of entrepreneurship success (Minniti, 2008).

This study helps to close the gap between theory and practice on predicting business performance by addressing some critical research questions. It develops a prediction ordered probit model that improves on the commonly used binary probit and logit models in that it permits a better understanding of small enterprises accomplishments, as suggested by Hanlon and Saunders (2007). It provides quantifiable implications as to how entrepreneurs can minimize the probability of poor performance and increase the likelihood of business success. It presents public policy with implications for Chilean institutions to promote entrepreneurship. Finally, it contributes to the literature because, to date, no empirical success versus failure studies have been found that were conducted in Chile, or any other small, open economy in Latin America.

This article proceeds as follows. The next section provides a literature review of entrepreneurship research in Chile. The third and fourth sections present the model, followed by the methods and results. The fifth section includes limitations and further research. The last section discusses the implications and conclusions.

The importance of a small business performance study in Chile

Chile has 16.9 million people, with a GDP of $203.3bn and a per capita GDP (PPP) of approximately $15,400. It is the world largest copper producer (Central Intelligence Agency, 2011). This per capita income is the largest in the region (Latin America, including Brazil and Mexico). Its growth policy has been based on deregulation and free markets in all economic sectors since the mid-1970s. Through entrepreneurship and the development of its firms in an unregulated environment (Cárcamo-Huechante, 2006), this economy grew quickly and became known as the Latin American Tiger.

Chile started economic and structural reforms one to two decades before other Latin-American countries (Ffrench-Davis, 2002), and it achieved the highest per capita income in the region (Interamerican Development Bank, 2009). However, its pace of growth has slowed in the last ten years. According to the Central Bank of Chile, the growth rate achieved by each of the four administrations of the democratic governments (1990-2010) has followed a decreasing trend from 7.7 percent (1990-1994), 5.5 percent (1994-2000), 4.3 percent (2000-2006), to less than 3 percent (2006-2010).

Growth through entrepreneurship and the development of private business was the building block of early growth (Cárcamo-Huechante, 2006). However, the Chilean economy, which was once recognized as the most competitive in Latin America, today is only ranked 55th out of 181 economies in the "Doing Business Index" of The World Bank (2009) for the "Starting a Business" category. This downward trend goes against the democratic government's search for growth with equity (Ffrench-Davis, 2002). Therefore, there is a need to reshuffle resources and output from less to more efficient producers (Pavenik, 2002).

Small and medium-sized firms are the main employers in Chile, accounting for over 80 percent of the labor force. However, this sector faces important challenges for its survival and development (Marshall, 2005). Small firms have a potential that to increase the country's growth and employment. Although supporting and strengthening small business is the desire of all Chilean political and economic sectors (Marshall, 2005), important differences exist in concrete proposals. Nevertheless, there is some common agreement among scholars that technology, innovation, entrepreneurship capacity, and education are relevant. It is also admitted that not only public policy is required, but there is also a need to develop a culture where people are willing to start a business – that is, to wake up the entrepreneurial spirit.

To date, research in Chile has focused only on certain economic sectors, or on the use and incorporation of a particular tool such as some specific technology. It is also possible to find some studies regarding small firm efficiency and in-depth studies regarding their characteristics (Cabrera *et al.*, 2002; Silva *et al.*, 2006), but no reference could be found to the specific causes that lead these companies to succeed and fail.

The model

There is no generally accepted list of variables distinguishing business success from failure. The literature list of performance variables in this study was based on Lussier (1995), who included the major variables identified in journal articles as contributing to performance. Lussier and Halabi (2008, 2010) updated the literature. The Lussier model used in this study is based on 25 prior studies.

Only six of the 15 variables had at least ten studies (40 percent) stating that the variable was a contributing factor to success versus failure. These are:

(1) working capital;

(2) record-keeping and financial control;

(3) industry experience;

(4) management experience;

(5) planning; and

(6) use of professional advice.

However, five of these variables (all except professional advice) had at least two studies (8 percent) stating that these same variables were not a contributing factor to success versus failure. Plus, all six of these variables had at least three studies (12 percent) that did not list the variable as being a contributing factor to success versus failure.

For a detailed comparison of the 25 studies, in Table I the reader can easily compare and contrast all the various studies without having to read an extensive narrative here. Table I shows a comparison of 25 studies that support, do not support, or do not mention each of these 15 variables as contributing factors to the success versus failure of small business.

Various success and failure (S/F) studies have been conducted (Carter and Van Auken, 2006; Cooper *et al.*, 1990; Pompe and Bilderbeek, 2005; Reynolds, 1987). The most extensive was the Lussier (1995) model because the study examined the efficacy of 15 variables identified from 20 prior studies, including Cooper *et al.* (1990) and Reynolds (1987).

Table I.
Comparison of 15 variables identified as factors contributing to success versus failure

Senior author	Independent variables														
	Capt	Rkfc	Inex	Maex	Plan	Prad	Educ	Staf	Psti	Ecti	Age	Part	Pent	Mior	Mrkt
Barsley	F	–	F	F	F	F	–	–	–	–	–	–	–	–	–
Bruno	F	F	–	F	F	–	–	F	F	F	–	–	–	–	F
Cooper 90	F	–	N	N	F	F	N	–	F	F	F	F	–	F	–
Cooper 91	F	–	F	N	–	F	F	–	N	N	N	N	F	F	–
Crawford	–	–	F	–	–	F	F	–	–	N	N	–	–	–	–
D + B St	F	F	F	F	–	–	–	–	–	F	–	–	–	–	–
Flahvin	F	F	F	F	–	F	–	F	–	–	–	–	–	–	–
Gaskill	N	F	F	F	F	F	N	–	–	N	–	–	–	–	F
Hoad	–	–	F	N	N	F	F	–	–	–	–	–	–	–	–
Kennedy	F	–	–	F	F	–	–	–	–	F	–	–	–	–	–
Lauzen	F	F	–	F	F	–	–	F	–	–	–	–	–	–	–
Lussier 95	N	N	N	N	F	F	F	F	N	N	N	N	F	N	N
Lussier 96a	N	F	N	F	F	F	N	F	N	F	N	F	F	N	F
Lussier 96b	N	F	N	N	F	F	N	N	F	F	F	N	N	N	N
Lussier and C 96	F	F	F	N	F	F	F	F	N	F	N	N	F	F	N
Lussier and Pf 01	N	N	N	N	F	F	F	F	N	N	N	N	N	N	N
McQueen	F	–	F	F	–	–	–	–	–	–	–	–	–	–	F
Reynolds 87	F	F	–	–	F	–	–	N	F	–	–	–	–	–	N
Reynolds 89	F	F	–	–	F	–	N	N	F	–	N	F	–	–	–
Sage	F	–	–	F	–	–	F	–	–	–	–	–	–	–	–
Sommers	–	–	–	F	F	–	–	F	–	–	–	–	–	–	–
Thompson	N	–	–	F	F	–	–	F	F	–	–	–	–	–	F
Vesper	F	F	F	F	N	F	F	–	F	F	–	F	–	–	F
Wight	F	F	–	F	–	F	–	–	–	–	–	–	–	–	–
Wood	–	F	F	F	F	–	F	–	–	–	–	–	–	–	–
Total F	15	13	11	15	16	14	9	9	7	8	2	4	4	3	6
Total N	6	2	5	6	2	0	5	3	5	5	7	5	2	4	5
Total –	4	10	9	3	7	11	11	13	13	12	16	16	19	18	14

Notes: F, supports variable as a contributing factor; N, does not support variable as a contributing factor; –, does not mention variable as a contributing factor; Capt, working capital; Rkfc, record keeping and financial control; Inex, industry experience; Maex, management experience; Plan, planning; Prad, professional advice; Educ, formal education; Staf, staffing; Psti, product service timing; Ecti, economic activity; Age, age; Part, partners; Pent, parents; Mior, minority; Mrkt, marketing efforts

To be included in the Lussier (1995) S/F model, a variable had to have been included in a study that had at least three variables identified as contributing factors to success and failure. The model has been used to predict business performance cross-nationally in the USA, Croatia (Lussier and Pfeifer, 2001), and Chile (Lussier and Halabi, 2010).

It is also a non-financial model, which is more appropriate than financial models for small business research, particularly due to the lack of reliable information. Other models use sales as a predictor, and are thus not appropriate to use with startup business. Lussier also uses resource-based theory as entrepreneurs make judgments about which resources are more or less important, based on their expectations about the future of the venture (Lichtenstein and Brush, 2001).

To adapt the selected model, some changes were applied. The correlated variables were eliminated to correct for multicollinearity problems and the variable "Minority" was excluded from the study since it is not relevant in Chile, as there are so few minorities (less than 5 percent of the population; Central Intelligence Agency, 2011). Finally, since in the early 1990s the internet was not commonly used by small businesses, this variable was added to update the model as a measure of the use of elementary technology. See Table II for an explanation, hypothesis and measures of the independent variables utilized.

Methodology

Design and sample

Entrepreneurship journals tend to favor replication studies (Gamboa and Brouthers, 2008). Brush *et al.* (2008) called for the replication of research in other countries. To this end, the primary methodology of this study was to adapt and update the USA Lussier (1995) survey research study in Chile. Survey research, particularly mail surveys, has been a staple in quantitative research on small business and entrepreneurship (Brush *et al.*, 2008; Dennis, 2003). In fact, an examination of four journals (*ET&P*, *ISBJ*, *JBV*, *JSBM*) revealed that one-third of the articles were based on mail surveys (Newby *et al.*, 2003). Self-reporting questions were obtained from Lussier (1995) to collect data.

The commonly used firm level of analysis was employed with a random sample of 1,800 small businesses selected from the Chile National Chamber of Commerce database, and the survey instrument was emailed to the owner/CEO. There were 430 questionnaires answered and returned, resulting in a response rate of 24 percent. However, 27 had missing data, resulting in 403 usable questionnaires. All six major economic areas of Chile are included in the sample, making it a national sample. As a test of non-response bias, early and late responders were compared and no significant differences were found.

Measures and the model

There are various ways of measuring performance. Much of the literature uses a traditional view of success as being related to a positive financial performance. However, there is a recent trend which measures success according to business owners own objectives rather than an imposed "one size fits all benchmark" (Castillo and Wakefield, 2006). Brush *et al.* (2008) also stated that the narrow focus on financial and economic measures should be reconsidered. The dependent variable measures of relative performance was more subjective than financial performance, as in Escribá-Esteve *et al.* (2008), Jennings *et al.* (2003) and Poon *et al.* (2006). Small firms

Internet (INT)	Dummy variable that proxies the use of elementary technology by the entrepreneur Hypothesis: Businesses that use the internet will have a greater chance of success (nominal level data: 1 = uses internet and 0 = does not use internet)
Working capital (WC)	Variable that proxies the degree on which the business was started with sufficient working capital Hypothesis: Businesses that start with adequate working capital have a greater chance of success than firms that start under-capitalized (Likert scale: 1 = inadequate capital, 7 = adequate capital)
Financial and accounting information (INF)	Degree of clear and complete financial and accounting information management Hypothesis: Businesses that keep updated and accurate records with adequate financial controls have a greater chance of success than firms that do not (Likert scale: 1 = poor financial and accounting information, 7 = good financial and accounting information)
Planning (PLAN)	Variable that measures the specific degree of business planning Hypothesis: Firms that develop specific business plans have a greater chance of success than firms that do not (Likert scale: 1 = no planning, 7 = very specific planning)
Education (EDU)	Years of owner formal education Hypothesis: People who start a business with a higher level of education have a greater chance of success (Likert scale: 1 = elementary school, 6 = graduate school)
Partners (PART)	Dummy variable which asserts whether the business was started with partners Hypothesis: A business started by partners has a greater chance of success than a firm started by one person (nominal: 1 = started with partners, 0 = started without partners)
Parents (PARN)	Dummy variable which asserts whether business owners' parents own(ed) a business as well Hypothesis: If they do (did), they have a greater chance of success than owners whose parents did not own a business (nominal: 1 = parents owned a business, 0 = parents did not own a business)
Marketing (MARK)	Variable which describes the owner's sales and marketing efforts Hypothesis: Business owners who make marketing and sales efforts have a greater chance of success than owners who do not (Likert scale: 1 = little marketing, 7 = great use of marketing)

Table II.
Explanation, hypothesis and measures of independent variables in the probit model

are usually reluctant to disclose financial information; thus, a more subjective dimension is more feasible to obtain and a more uniform measure across the sample. Previous studies that have used both subjective and objective measurements have found a high correlation between the objective and the subjective magnitudes (Escribá-Esteve *et al.*, 2008).

Assuming that owners manage detailed and accurate information, perception becomes reality with business performance. In addition, when working with privately owned small businesses, it is very difficult to access their financial statements, since

entrepreneurs are not willing to disclose private information. Indeed, with survey research, a high percentage of respondents do not answer questions regarding their financial performance (Lussier, 1995; Lussier and Halabi, 2008, 2010). Thus, measuring profitability on a Likert scale is commonly used in entrepreneurship research (Wang, 2008).

The dependent variable relative performance was measured on three levels as success, mediocre, or failure. Performance measurement was a two-step process. The questionnaire asked owners/CEOs to identify their firm's level of profits compared to industry average. The answer ranked between 1 and 7, with 1 identifying profits as much lower than industry average profits and 7 being much higher than industry average profits. This 1-7 scale is not totally subjective because the scale is a standard objective measure in Chile. One passes a school or university class with greater than 4, and one is only successful with a grade that is greater than 5. To get a "1-3" is poor performance, "4" is a mediocre performance everywhere. A good performance is "5", very good is "6", and "7" stands for excellent.

As shown in Table II, eight independent variables are included to explain and predict relative business performance. It also lists the measurement level of each variable and the expected relation with performance. Five of the variables are measured on a seven-point Likert scale and all are ranked 1-low and 7 = high: adequate (sufficient) working capital (WC), clear and complete financial and accounting information (INF), specific business planning (PLAN), higher levels of owner education (EDU), and degree of marketing efforts (MRKT). Three of the variables were nominal level measures labeled 1 or 0: 1 = use of internet (INT), 0 = do not use Internet; 1 = partners (PART), 0 = no partners; and 1 = parents owned a business (PARN), 0 = parents did not own a business.

Regression is the commonly used statistical analysis of entrepreneur research (Brush *et al.*, 2008). Most studies use a bivariate logistic regression to test the model, as in Lussier (1995), Lussier and Pfeifer (2001), Cooper *et al.* (1990), Carter and Van Auken (2006) and Reynolds (1987), and Reynolds and Miller (1989). This study utilizes an ordered probit regression analysis. Whereas bivariate logit/probit analyses arbitrarily categorize a firm's result into one of two groups, thus deviating mediocre performances to either failure or success, an ordered model permits one to further classify the dependent variable. In this sense, a multinomial model would be fine in the same way. However, multinomial logit/probit models have the disadvantage of what is well known as the "independence of irrelevant alternatives" property (Greene, 2000), overestimating the probabilities. Moreover, a multinomial model ignores that the dependent variable categories have a preferred order, therefore losing efficiency of the estimators. Indeed, if one disregards that the dependent variable categories have an order, the mistake of not utilizing part of the available information is unavoidable and the parameters estimation, still unbiased, will have higher standard errors.

Consequently, an ordered probit technique is more appropriate for analyzing this data. The main idea is that under this ordered response there exists a latent random variable that is continuously distributed and is represented by these interval values. The distribution parameters of the subjacent latent variable are estimated by maximum likelihood methods.

The model to estimate (based on Table II variable labels) is:

$$\text{Firm's relative performance} = \beta_1\text{*INT} + \beta_2\text{*WC} + \beta_3\text{*INF} + \beta_4\text{*PLAN} + \beta_5\text{*EDU} + \beta_6\text{*PART} + \beta_7\text{*PARN} + \beta_8\text{*MRKT}.$$

The maximum likelihood estimation method accounts for the heteroskedasticity of variance (y/x) since it is based in the distribution conditional to x. With the slope parameters β_i and the threshold parameters κ_i it is possible to estimate the likelihood of a relative performance of 1, 2 or 3.

Regarding the cut point or threshold parameters interpretation, Daykin and Moffatt (2002) suggested that if the dependent variable measure shows that most firms are in either one extreme or the other (for example, very poor relative performance or very good relative performance), one would expect that the thresholds would be tightly bunched in the middle of the distribution, very close to one another. If, on the other hand, firms appear to be more balanced, it would be expected that the cut points would be widely dispersed.

In addition, it could happen that the cut points adjust to the questionnaire wording, in order to obtain the dependent variable, and might be doubtful and hard to understand. If this is the case, one would expect the middle thresholds to be far apart, reflecting an indifference on the part of the respondents who may not understand the question. This is important, as the questionnaire wording can be improved between studies, and a contraction toward the middle might be a sign of improvement.

In addition to 0robit regression analysis, descriptive statistics and test of mean and proportion differences between relative successful, mediocre and failed firms were also run.

Results

Control variables

Control variables that affect relative performance include firm size (number of employees), firm age, and industry (Escribá-Esteve *et al.*, 2008; Lussier and Pfeifer, 2001; Reynolds, 1987). Small firms are more likely than large firms to fail (Reynolds, 1987). In the sample, the average size, as measured by the number of employees, of the failed firms was 17 employees (SD 31); this was 17 for mediocre firms (SD 25), and 30 (SD 51) for successful firms. The sample was based on small businesses and the means of successful, mediocre, and failed firms is not significantly different at the .05 level. Therefore, firm size should not bias the results.

The age of a business also affects relative performance because new firms have a higher probability of experiencing a poor relative performance than established businesses, and new businesses often lose money. However, the mean age, with similar medians, of failed businesses were 14.24 (SD 11.3) years, 15.2 (SD 13.7) years for mediocre firms and 15.16 (SD 13) for successful companies. Therefore, all groups are mature and the mean difference is not significant at the 0.05 level. Thus, age should not bias the results.

Industry can also affect success, as service and retail firms tend to have higher failure rates (Lussier, 1996a, b). However, all industry sectors were included in the sample; χ^2 testing found no significant differences between successful, mediocre, and

failed businesses by industry. Thus, there are relatively equal numbers of firms that performed well, mediocrely or poorly by industry, and industry should not bias the results.

Descriptive statistics and test of differences

In addition to testing the model, the 8 variables in the model were tested for statistical differences. Table III provides the descriptive statistics for each variable. To test for differences, successful, mediocre, and failed relative performance were used as the independent variables and each of the eight variables in the model were used as the dependent variables. A χ^2 test was run for the three variables with dummy values. A one-way ANOVA was run to compare mean differences between successful, mediocre, and failed firms for the other five interval level variables. The results of the test of differences between successful, mediocre, and failed businesses support the model. For all but three of the variables (i.e. education, partners, and parents) the mean or proportion percentage differences were significant, as can be seen in Table III. Successful firms had a higher proportion using the internet, started with more working capital, kept updated and accurate financial and accounting information, developed more detailed plans, and pursued marketing efforts.

Although not statistically different, the successful business owners have a higher level of education. The lack of significant difference may be due to the fact that there is no straight correlation between entrepreneurship and education. This finding is consisting with Escribá-Esteve *et al.* (2008), in contrast with most literature, in not finding a moderating effect of the educational level of the owner or manager on the performance relationship.

Examining the descriptive statistics, the entrepreneurs sampled had an average of 2.9 years of college when starting a business. Most respondents had undertaken entrepreneurial and management activities before starting their new venture. Those who worked at the employee level previously did so for an average of 8.5 years before starting their own business at the age of 34. Education variability among entrepreneurs is high. Some started a business with just an elementary school education, whereas others had completed graduate studies. That there are exceptions with low levels of education does not mean that education is not important. Further research is required on this point.

Ordered probit regression model test results

Ordered probit regression model test results are presented in Table IV. As shown, the model is significant and all the parameter estimates' β coefficients, except for education, are significant; five of the eight variables are significant at the 0.01 level. The ordered probit regression result from testing the model (LL test) was -805.15 and the χ^2 was 66.65, with the model significance level at $p = 0.000$.

The classification results show that, for a typical firm that adopts sample mean values for all the exogenous variables' X vector, the expected probability of relative success is 34 percent, the odds of showing a mediocre relative performance are 28 percent, and those of pursuing an unsuccessful venture are 38 percent. The model is also useful at predicting the probability of success of any firm. For example, if one takes the sample median values for the X vector instead of taking the mean values, the estimated probabilities are, respectively, 52 percent, 26 percent and 22 percent.

Table III.
Descriptive statistics and test of differences

Model variables ($n = 403$)	Failed (F, $n = 158$) Performance mean	SD	Mediocre (M, $n = 101$) Performance mean	SD	Successful (S, $n = 144$) Performance mean	SD
1. Use of internet[a]	42.41 (F-S)*		48.51		63.89 (S-F)*	
2. Working capital (1-7 adequate)	3.72 (F-S)*	1.48	3.94 (M-S)*	1.59	4.42 (S-F)*, (S-M)*	1.60
3. Financial and accounting info (1-7 good)	3.24 (F-M)*, (F-S)*	1.72	3.72 (M-F)*, (M-S)*	1.61	4.26 (S-F)*, (S-M)*	1.75
4. Planning (1-7 specific)	3.19 (F-S)*	1.87	3.41 (M-S)*	1.90	4.34 (S-F)*, (S-M)*	1.86
5. Education (1 = elementary, 6 = graduate)	3.89 (F-S)	1.18	4.02	1.19	4.29 (S-F)	1.19
6. Partners[a]	44.94		42.57		40.97	
7. Parents owned a business[a]	37.97		39.60		33.33	
8. Marketing (1-7 used)	3.38 (F-S)*	1.92	3.75 (M-S)*	1.84	4.51 (S-F)*, (S-M)*	1.87

Notes: [a]Figures shown are percentages; *mean difference/proportion is significant at the 0.05 level

Model parameter estimate[a] variables ($n = 403$)	β	SE[b]
1. Internet	0.364	(0.135)***
2. Working capital	0.094	(0.041)***
3. Financial and accounting information	0.087	(0.039)***
4. Planning	0.059	(0.037)*
5. Education	0.059	(0.056)
6. Partners	−0.317	(0.131)***
7. Parents	−0.238	(0.125)**
8. Marketing	0.086	(0.038)***
Threshold parameters		
K1	1.140	(0.264)***
K2	1.857	(0.269)***
Model test results		
−2 log likelihood	805.15	
LR (zero slopes)	66.653	
Model p-value	0.000	
Classification results		
$P(y = 1/X)$ (percent)	37.9	Failure
$P(y = 2/X)$ (percent)	27.9	Mediocre
$P(y = 3/X)$ (percent)	34.2	Success

Notes: [a]Coefficient significance levels are denoted by * (0.10), ** (0.05), and *** (0.01); [b]QML (Huber/White) standard errors and covariance

Table IV.
Ordered probit regression model test results

From the ordered probit regression results one can obtain the marginal effects of the interval and dummy explanatory variables. The results are shown in Tables V and VI.

Inspection of these tables indicates, for example, that as planning increases by one point, probabilities of obtaining a failed performance are expected to drop 2.2 percent, the probability of showing a mediocre performance would drop 1.7 percent, and the probability of successful performance would increase 3.9 percent. Boosting the amount of working capital would diminish the probability of failing 3.6 percent, would decrease the odds of a mediocre performance 2.6 percent, and would increase the likelihood of a successful venture by 6.2 percent. The same analysis has to be done for the rest of the interval variables. A complete set of calculations of these values is available upon request. Marginal effects on dummy variables are shown as well. A

	Failed relative performance	Mediocre relative performance	Successful relative performance
Working capital	−0.036	−0.026	0.062
Financial and accounting information	−0.033	−0.024	0.057
Planning	−0.022	−0.017	0.039
Education	−0.022	−0.016	0.038
Marketing	−0.033	−0.024	0.057

Table V.
Marginal effects on interval variables

	$P(y = 1)$ Failed	$P(y = 2)$ Mediocre	$P(y = 3)$ Successful
Internet			
Does not use internet = 0	0.471	0.269	0.260
Uses internet = 1	0.416	0.277	0.307
Change	−0.054	0.008	0.047
Partners			
Did not have partner(s) = 0	0.410	0.278	0.312
Did have partner(s) = 1	0.485	0.267	0.248
Change	0.075	−0.011	−0.064
Parents			
Parents did not own a business = 0	0.428	0.276	0.296
Parents owned a business = 1	0.489	0.266	0.245
Change	0.061	−0.010	−0.051

Table VI.
Marginal effects on dummy variables

firm that uses the internet will increase the probability of succeeding by 4.7 percent and will decrease the risk of failing by 5.4 percent.

The model coefficient signs reveal that engaging in business planning activity, accessing adequate amounts of working capital, increasing marketing efforts and keeping clear and complete financial records and control can increase the probability of higher levels of relative performance. In particular, the results confirm the association between planning activity and relative performance that is evident in most of the literature, as in Gibson and Cassar (2005) and Woods and Joyce (2003), as well as the need for adequate working capital and good financial records and control (Carter and Van Auken, 2006).

Even though there is a generalized use of the internet in corporate environments, the extent of internet use still varies among small firms. Thus, a more current finding is the support for the need to use the internet to succeed in business ventures of all sizes. This is consistent with Carter and Van Auken's (2006) finding that bankrupt firms were less likely to use the internet in their business operations, and with Forth and Mason's (2006) finding that skill shortages in information and communication technology have an indirect negative impact on relative performance. There is enormous potential benefit from the use of the internet in the small business sector. Indeed, the small size of these businesses enables them to be more adaptable and responsive to changing conditions than larger organizations and to benefit further from the speed and flexibility that the electronic environment offers (Simmons *et al.*, 2008).

Two unexpected findings were "partners" and "parents who owned a business" having a significant negative effect (rather than positive) on the business venture. These two variables were not significant in the studies of Lussier (1995), Lussier and Pfeifer (2000) in the USA and Croatia, or in Lussier and Halabi (2010). The differences might be due to the development level of the country, but more research is needed to answer this question. On the one hand, having partners can be helpful to a new business, and 41 percent of successful firms did have partners. But having partners in Chile could also be a source of potential conflict.

A third of the sample's parents owned a business and could have been good or poor role models. Some of the parents may have been poor examples, such as not engaging in planning, or the heirs may have taken over a failing business from their parents, with little chance of making the business a success. Plus, entrepreneurs have no control over their parents owning a business. So in any case, these variables are less important than the others.

Limitations and further research

The results provide some insight into the area of entrepreneurial theories of market competition that leads to success. The current study supports the Lussier (1995) success versus failure prediction model because it uses the model variables and is also significant in Chile. However, the current model is more robust because it extends the Lussier's logistic regression model (success or failure) to an ordered probit regression model (failed, mediocre, or successful), and the model has been updated to include use of the internet. The model can be used to assess a firm's potential for success, and society can benefit in direct and indirect ways via the reallocation of limited resources toward businesses with higher potential. However, there are other variables that may influence business performance that are not in the model, and thus further research is needed to increase the explanatory power of the model, which could also increase its predictive power.

Since mostly subjective data was utilized for many key variables due to a lack of objective trustable information, the study may suffer some weaknesses associated with the use of perceptual data. In particular, in future studies the subjective measures of relative performance could be combined with some objective measures, such as accounting information.

With the trend toward increasing globalization, international global business performance prediction models become more valuable. However, the model needs to be tested in other countries to further validate the predictor variables on a global scale.

Prediction models are an aid to, and not a replacement for, existing business venture decision-making techniques. Also, the model does not provide numerical guidelines for variables distinguishing success from failure – for example, how much working capital is enough to improve the probability of success, and how detailed should plans be. Indeed, business planning can take a variety of forms, from the informal to formalized and carefully prepared plans (Richbell *et al.*, 2006). This study utilizes the variable "planning" without specifying its form. It would be relevant to assess further the impact of formal written plans or business plans on relative performance.

Judgment is needed when applying the model. When the business is strong on some variables and weak on others, the judgmental assignment of a probability of success is more subjective. With mixed strengths and weaknesses among the variables, the other decision criteria previously used by entrepreneurs, managers, investors, lenders, and suppliers become increasingly important when they assign a probability of success or failure to a business. Thus, further research that uses the model variables with more objective measures can improve the variables' ability to predict performance. Research can continue to develop the model further.

Implications and conclusions

This study bridges the gap between the theory and practice of small business and enterprise development by adding to the existing entrepreneurship literature in

understanding which variables to target in order to increase the odds of a new venture succeeding. Some important contributions to research into new businesses are made: critical variables for business success can be summarized in two groups. First, it is a necessary condition to obtain an adequate amount of working capital, and secondly, to possess entrepreneurial skills and management tools. These findings have relevant implications for those responsible for the management of small and medium-sized enterprises, as well as for policy makers. A discussion of the main findings that can aid public policy makers in Chile and the formulation, development, implementation and evaluation of enterprise policy follows.

Public policy and the macro environment

Public policy is recognized as a key tool that governments use to foster entrepreneurship and economic prosperity (Sousa and Bradley, 2009). In a summary of the literature, Minniti (2008) stated that it is clear that government policy shapes the institutional environment in which entrepreneurial decisions are made. However, despite much research, we still do not know for sure what policies are more conducive to productive entrepreneurship, but it is clear that government influence is not always necessarily desirable and that one size does not fit all (Sousa and Bradley, 2009). According to Robson *et al.* (2009), these macroeconomic factors tend to have an impact on entrepreneurial intentions or activity.

Although the policies needed vary across countries, three policies are critical for promoting growth in any country (Minniti, 2008):

(1) Policies should protect commercial freedom, property rights, and enforceable contracts.

(2) Given the vulnerability of monopoly power, fostering opportunities for grassroots entrepreneurship is important through an active supply-side competition policy, emphasizing access to essential business services and other required local inputs.

(3) Though it is generally agreed that innovation and entrepreneurship foster economic growth, the role of governments in fostering innovation and entrepreneurship is far less well understood and agreed upon.

In market economies, governments need to play a central role in correcting the market failures associated with innovation and entrepreneurship, particularly in reshaping the structure of capital markets and in providing the necessary incentives for economic actors to engage and manage innovation processes that are inherently subject to high uncertainty and information asymmetries. Given that generally new ventures have no credit history, financial institutions are not willing to lend funds to new ventures, and even if they are willing in principle, interest rates or the need to provide collateral in the form of tangible assets make innovation projects unfeasible. The evidence from successful regions of innovation and entrepreneurship shows that a combined role of the public and private sectors in creating the conditions for the emergence of a sound venture capital industry plays a pivotal role in the transition towards an innovation economy (Ferrary, 2009).

Small firms can contribute to de-monopolizing industry structures (Doern, 2009). Chile's policies do protect free enterprise and its anti-monopoly institutions work effectively. But there are still considerable barriers to entrepreneurship and many of its

policies have discriminatively helped large businesses, thus preventing the small business sector from achieving its potential. Therefore, public policy should be further developed to foster entrepreneurship and small business.

Barriers to entrepreneurship

This study results show that working capital is a necessary condition for success. Indeed, it is important to develop and apply key resources to ensure business success, and it is even more important for small firms because they have resource constraints that put them at a disadvantage when competing with large businesses as they often have difficulty obtaining access to resources (Hanlon and Saunders, 2007).

Even though the Chilean legal and regulatory environment has improved substantially in recent years, the time and costs required to start a business in Chile are still high. Nine procedures must be followed to start a business, which take an average of 27 days, as compared to an average of six procedures and 15 days for OECD countries (Djankov *et al.*, 2002). This cost, as a percentage of the gross national per capita income, constitutes 8.6 percent in Chile, as compared to a lower 5 percent in OECD countries.

It is often the case that the need for working capital forces an entrepreneur to turn to partners, which, according to this study's results, seems not to always be in the firm's best interest. Reducing the time and costs would provide incentives for the creation of new ventures and would release resources that could be used to boost working capital, thus increasing the probability of success.

Any agency providing funding for new ventures or for the expansion of existing ones requires a business plan. Banks, venture capitalists and business angels need business plans before considering investment (Richbell *et al.*, 2006). There are some public resources available for new ventures in Chile, but targeted small businesses should be provided with assistance in developing proper business plans, which would also help to make the venture more successful. It is critical to simplify the information needed to be eligible for these benefits, and to reduce the paperwork required to obtain funds.

Best practices

Based on high-quality research, best practices are provided here. This study demonstrates that there are some managerial practices that have been shown to increase the odds of success, which should orient entrepreneurship public policy strategy. While most agree on the benefits of entrepreneurship, understanding of how and when governments intervene to assist entrepreneurs, as well as which, if any, entrepreneurs should receive assistance, still has substantial knowledge gaps, and remains controversial (Robson *et al.*, 2009).

Commonly used government policies include financing, taxation, regulations on trade, and encouragement of innovation activities. Among the most effective policies are providing risk capital, education and research, the development of entrepreneurial training programs, linkages between universities and entrepreneurs, incubators, chambers of commerce, networking, and most of all, science, technology, and research parks (Minniti, 2008).

Note that internet use by small firms is still low in Chile. Only 51 percent use the web to expand business opportunities, which means that there is still room to improve

the use of this technology. Therefore, it is of particular relevance that Chile's public policy helps small business by offering incentives to develop and use the internet and other technologies. Research supports that middle-income countries should focus on increasing human capital, upgrading the availability of technology, and promoting enterprise development (Acs and Szerb, 2007). Thus, when calling for bids regarding technology development funds, policy makers should inform the community, simplify complex paperwork, and increase these resources to promising entrepreneurs.

Most of the literature examined reveals that entrepreneurs need to engage in planning, as new ventures experience significant difficulties in finding a viable business model, and they often need to adapt their initial business plans (Andries and Debackere, 2007). Woods and Joyce (2003) found that those firms that were growing fast used more planning tools than those that were not, and declining firms used the fewest. But there is also a need to provide training to improve the chances of business success. A lack of knowledge is the obstacle in using planning tools rather than the value that small firm managers place on a tool that they have not heard about (Woods and Joyce, 2003).

Easier access to working capital would aid new ventures. However, working capital without adequate planning and administration of good accounting information and financial control would be a waste of resources. Thus, the government could supply more professional advice to small businesses at low or no cost to entrepreneurs through courses and advisors who can provide an understanding of the capital needed to start a business, how to keep records, and financial controls. Management training should include how to develop a business plan, how to conduct ongoing strategic planning, and how to market the small business. Unlike large firms, small firms tend to be reactive rather than proactive with respect to the labor pool, and are not likely to signal which specific skills they require, giving little priority in providing formal within-firm skills. A lack of appropriate skilled workers holds back investment, innovation and productivity (Bryan, 2006).

Finally, it is important to emphasize that the degree of clear and complete financial and accounting information is a critical variable in small business performance. In order to give businesses incentives to manage financial and accounting information better, thereby increasing the probability of success, public policy makers should align the requirements of tax information to the management needs of the firm. In Chile, firms provide the minimum information needed to comply with the requirements of the Internal Tax Revenue Service. A financial improvement would be for businesses to adopt the International Financial Reporting Standards (IFRS) as a gradual substitute of the current Generally Accepted Accounting Principles (GAAP).

Contributions to the literature and small business and enterprise development

In conclusion, and as a summary of the article, this study has value because it contributes to the literature by improving Lussier's 15-variable success versus failure prediction model by adding the use of the internet and taking out highly correlated variables. While Lussier and others ran logistic regression with only two levels of performance (success or failure), this study uses the more robust ordered probit model with three levels of performance (success, mediocre, failure). This research also contributes to the literature because, to date, no empirical success versus failure studies have been found that were conducted in Chile or any small, open economies in Latin America.

This research bridges the gap between theory and practice of small business and enterprise development because the probit ordered model does in fact predict relative performance, so the model can be used to improve the probability of success. Thus, an entrepreneur can use the model to better understand which resources are needed to increase the probability of success. Those who advise small business managers and entrepreneurs can help them to use the model. Investors and creditors can use the model to better assess a firm's potential for success in making decisions to provide venture capital and to extend credit to the firm. Entrepreneur and small business educators can use the model's variables to influence future business leaders, public policy makers, and their practices. This research also presents extensive public policy applications of best practices that Chilean institutions can implement to promote entrepreneurship. The article discusses how public policy makers can use the model to assist entrepreneurial ventures so that society can benefit in direct and indirect ways via the allocation of limited resources towards higher potential businesses.

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