The relationships between, on the hand, size, growth and age of the firm and, on the other hand, small business survival – a constructive critique and a proposal of a new framework

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19 June 2016

The relationships between, on the hand, size, growth and age of the firm and, on the other hand, small business survival – a constructive critique and a proposal of a new framework

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June 2016

Abstract

This article claims that the basic relationships between, on the one side, size, growth and age of the small firm and, on the other side, the small firm's hazard of exit is, apart from the "honeymoon" and the "liability of senescence" effects, non-linear, either U-shaped or inverted U-shaped. Variations from these patterns are dependent upon choices of different specifications and the presence or absence from the multivariate analysis of the real determinants for which size, growth and age of the firm proxy. The article also claims that the quadratic specification that has traditionally been fitted is rarely the most adequate, since other combinations of different pairs of exponents would certainly better capture nuances of the relationships being regressed. The article conclusively claims that these realizations explain findings in the extant literature that are awkward, unexpected, embarrassing and unacceptable and interpretations that are many times even more inapplicable.

Keywords: Small firms; Survival determinants; Size, growth and age; Cox regression

1. INTRODUCTION

According to Low and MacMillan (1988), it is ideal to stop from time to time to devote a reflective moment to a growing body of literature, in order to take inventory of the work that has been done, analyze contributions and shortcomings of past research and identify new directions and challenges for the future. All this should be done to derive the maximum benefit from future research. Inspired by these words and taking on this duty as its, this article aims to provide such a reflective moment for the field of investigation on the determinants of small business survival. As the field is very vast, it is intended to this step by step, dealing this time with only size, growth and age of the firm.

Size, growth and age of the firm have been, among all the postulated determinants of business survival, the most investigated ones, mainly with respect to the post-entry performance of new small firms. Findings from the first studies on the determinants of small business survival have been almost invariably of only one nature so that the relationship gained the title of "stylized fact", after it was in this way classified by Geroski (1995). Accordingly, size, growth and age of the firm are positively related to its survival probability, thus, the larger, the more growing and the

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older the enterprise the higher its chances of survival. Taymaz (2005), Frazer (2005), Geroski and Others (2010) and many other authors before and after them found size monotonically positively related to survival. Taymaz (2005) and Geroski and Others (2010) found growth monotonically positively related to survival. Buehler and others (2012) found age monotonically positively related to survival. Shiferaw (2009) found the same but using duration in place of age.

Reasons for size, growth and age being intensively and extensively studied are manifold. First, figures needed for their measurement are readily available in all institutional data sets, with the same ease of access as that to registration number is. Second, as the monotonic positive association between them and small business survival is indisputable, their presence in the analyses is a must, otherwise results will suffer from a misspecification error, that is, absence of an important variable. Third, size, growth and age are seen as proxies for many effects, but, as lack of data on the corresponding actual covariates is a problem in many instances, it is thought that they will play the role as well. Fourth and last, sometimes size, growth and age, more the last mentioned one, are included because they are understood to be real variables, with substance of their own. This might prove to be the worst reason.

A number of theories justify the traditional fitting. They suggest that hazard rates should vary with size, growth and age. The three more important ones are by Jovanovic (1982), Hopehayn (1992) and Ericson and Pakes (1998). Jovanovic (1982) proposed a theory of 'noisy' selection to explain empirical deviations from the proportional growth law, which was the main theory at the time, but that failed to hold when research started to investigate samples that included small firms and find that smaller firms have higher and more variable growth rates and also that smaller firms grow faster and are less likely to survive. According to the theory of 'noisy' selection, efficient firms grow and survive, whereas inefficient firms decline and fail. Firms differ in size because some discover that they are more efficient than others. Hopehayn (1992) presented a model where firms are subject each period to individual productivity shocks after which they decide whether to exit or not. According to this model, hazard rates are lower for older and larger firms. The theory by Ericson and Pakes (1998) differs from that by Jovanovic (1982) in that in the former the ability, or productivity, of each firm is not fixed but subject itself to a shock each period. Both models postulate that hazard rates depend on firm age and size. Larger firms rationally believe they are good quality firms and as a consequence refrain themselves from exiting. Older firms are surer about their attributes and as a consequence their future expectations of cost efficiency are less likely to be below the cost efficiency level that would make them decide to exit.

Despitefully, authors have started to fit specifications for size, growth and age diverging from the tradition above. Buehler and others (2006), Kosová and Lafontaine (2010) and Buehler and others (2012) reported finding an inverted U-shaped relationship between size and the hazard of exit. Strotmann (2007), Callejón and Ortún (2009), Shiferaw (2009) and Varum and others (2014) reported finding the U-shaped association. Kosová (2010) reported finding the inverted U-shaped association between age and "in-court" exit. Heshmati (2001), Frazer (2005) and Varum and others (2014) reported finding the U-shaped fashion. Ha (2013) found the U-shaped relationship between growth and the hazard of exit.

Reasons given for this change in approach have not shown to have much substance. Disney and Others (2003) say only that it seems reasonable to allow size to have a non-linear effect, since simple parametric specifications do not do justice to the problem of predicting exit. Most authors, however, are even more economic in saying that they are using a binomial quadratic specification for size to allow for non-linearities. Interpretations of the results are alike little substantive. In the case of the U-shaped relationship, the preferred interpretation is that the impact of size, growth and age of the firm upon the hazard of exit is overall negative, initially strong, but

that starts to weaken as from the minimum in the function (Frazer 2005, Strotmann 2007 and Ha 2013). However, this kind of behavior is normally functionally represented by regressing on the logarithm of the independent variable and not by the quadratic specification of the regressor. In case of this kind of relationship, the effect of the independent variable would be initially increasingly decreasing, then decreasingly decreasing and last asymptotically stable. It would be never finally increasing, which would be the case of a U-shaped relationship. In the case of the inverted U-shaped relationship with initial size, the preferred interpretation is that this result, counterintuitive at first glance, just states that, for firms that in a certain period are of a given size, those that have started smaller, and thus have experienced faster post-entry growth, face a higher probability of survival (Grossi and Gozzi 2006). The counterintuitive result would most probably be the expected U-shaped one, if, instead of specifying initial size and current size, the specification were at first hand initial size and growth. If the explanation is entirely in growth, there is no point for not specifying growth straightway.

This article offers a new view on the relationships between, on the one hand, size, growth and age of the firm, and, on the other hand, the small firm's hazard of exit. It claims that the relationships are non-linear, either U-shaped or inverted U-shaped, and has no substance of its own. This means that size, growth and age of the firm are not the real determinants of the small firms' probability of failure, but a number of other variables with which size, growth and age of the firm are also correlated. These variables are associated with the hazard of exit either monotonically, directly or inversely, or non-linearly. If non-linearly, the relationship may have a U-shape or an inverted U-shape, or, even, another kind of non-linear shape. Irrespective of the nature of the relationships between these real survival determinants and the hazard of exit, size, growth and age are alike associated with them or with terms of their binomial relationship with the hazard of exit in many different ways. All these shape the relationships between, on the one side, size, growth and age and, on the other side, small business survival either in the U-shape fashion or in inverted U-shape fashion. Monotonically direct relationships do not sum up with monotonically inverse relationships in an algebraic way to produce either a monotonically net direct relationship or a monotonically net inverse relationship. This is easy to imagine of size but not of growth. But this is only a question of recalling that positive growth is just an extension of size and negative growth is just a retraction from size. These realizations have many implications that will be dealt with in the remainder of the paper.

This paper makes the point that much can be gained from both a better understanding of the association between, on the one side, size, growth and age of the firm and, on the other side, small business survival and use to be made of a new framework for it. A hint that the interpretation of the relationship needs reformulation is given by studies that for reasons not well grounded fit a binomial specification of size, growth and age of the firm and the embarrassing reactions and awkward explanations by the authors to "unexpected" results, mainly in case of a finding of a U-shaped association with survival. The specification in which size, growth and age enter linearly the regression equation is the most popular and the one because of which the relationship gained the title of "stylized fact". Notwithstanding, results with it cause sometimes as much embarrassment as results with other specifications do. This happens when the estimated coefficient signalizes an inverse association or lack of statistical significance means that there is no association.

For example, Buehler and others (2006) and Buehler and others (2012) reported finding an inverted U-shaped relationship between size, measured by the natural logarithm of the number of employees, and the hazard of exit, the maximum in the function taking place as low in the scale of number of employees as 2.88 employees in the former study and 5.35 in the latter. Taking into consideration that size in these studies ranges up to 6,134 employees, it seems better to interpret such results as meaning that the relationship between size and the hazard of exit is a monotonic decreasing one. This appears to be the final interpretation by the very authors when in the second study they say that the finding is in line with the bulk of the exit literature. Bridges and Guariglia

(2008) reported finding an embarrassing positive and significant association between firms' age and their probability of failure. Holmes and Others (2010) came up with an intriguing result that size impacts positively the likelihood of survival for small- and medium-sized enterprises and negatively for microenterprises, that is, businesses with 10 or less employees. This may be seen as a U-shaped relationship. In the study by Cefis and Marsili (2005), size, in logs, enters six equations, but it is statistically highly significant only in two equations, interestingly when a quadratic term for lnsize enters the specification, although the quadratic term itself is statistically insignificant. Also, the authors inform that the presence of growth makes size lose all its explanatory power, although an intercorrelation matrix shows only very low correlation coefficients between age, size and growth. Bottazzi and Others (2011) reported finding direct monotonic relationships between, on the one side, size and growth, in terms of sales, and, on the other side, probability of default, which they apparently had difficulties in explaining once these positive relationships run against intuition and expectations.

By using data and insights from a study that investigated the common determinants of the firm's capital structure and of small business survival (Barbosa 2009), it is possible to obtain findings of all sorts with which authors have come across in the specialized literature. This helps to appreciate the actual meaning of the relationship between size, growth and age of the firm and its survival probability and, thus, a better understanding of research results. This particular research work is uniquely suitable for such an end in view of the facts that it has dealt with a complete array of variables measured at the firm's operations level, besides including in the analyzes both industry and economy level covariates, made use of many non-linear specifications, and achieved a very high degree of explanation of the total variation in survival probability. A final result from this work is a proposal of a new framework for the relationships between, on the one hand, size, growth and age of the firm and the small firms' survival probabilities.

With the insights made possible by the above analysis, the "contradictory" and "awkward" findings reported in the literature on the determinants of business survival can be clarified, the better as more relevant information is provided by the respective research reports. Also, how these studies could produce "better" results, if they underwent a revision work, and how future similar research in the field should be designed and their data analyzed, in order to reach more accurate conclusions. Because these tasks are so successfully carried out by the use of the reference study, the revised works can be seen as lending support to its proposal of a new framework for the relationships between, on the one hand, size, growth and age of the firm and the small firms' survival probabilities.

Research on the determinants of small business survival has been extended far beyond the pioneering works on the influence of size, growth and age of the firm, encompassing nowadays the study of the influence of inheritance, innovation, agglomeration, global engagement, and the like. Size, growth and age of the firm are included in these studies because their absence configures a specification error, since they are proxies for a number of firm-specific factors. The importance of the present study then is that it is concerned with the correct specification of size, growth and age of the firm and, if size, growth and age of the firm are correctly specified, they will increase the quality of results pertaining to other individual effects.

This study is restricted to small firms first because these enterprises have been receiving particular attention by virtue of their unique nature and social and economic importance. However, given the scope of this study, it is also because large enterprises' survival probabilities do not seem to depend so much on variations on size, growth and age. There are some works that confirm this. Kimura and Fujii (2003) presented estimates of Cox regression equations for employment size bands 50-99, 100-199, 200-299, 300-499, 500-999 and 1000 and more, being that the coefficients of size were only statistically significant for the first two size bands and the last one. Bhattacharjee and Others (2009) reported fitting in Cox regressions quadratic binomial

specifications for size, defined as ln of real fixed capital, whose results show that in quoted firms the size impact is highly statistically significant in acquisitions but not in failures. Oh and others (2009) reported finding that plant size had a negative impact on the hazard rate only in the class of the SSEs, with 50 employees or less. For the classes MSEs, with more than 50 and less than 300 employees, and LSEs, with more than 300 employees, the variable size was not statistically significant. Kosová and Lafontaine (2010) found that, when focusing on mature franchised chains, neither chain age nor size had a statistically significant effect on exit rates. Disney and Others (2003) found through simulation that a graphic representation of the age/hazard relation for an average new group establishment remained fairly flat throughout the age continuum whereas that for an average new single establishment rose somewhat in the first three years but then fell sharply afterward. This signalizes that age impacts much more small firms, that is, independent new establishments, than their larger counterparts, multi-establishment enterprises.

The article does not deal with the “honeymoon” and the “liability of senescence” effects, since they stem from phenomena quite diverse from those that the new proposed framework posits that are behind the influence that size, growth and age of the firm exert upon small business survivorship. In the latter case, the factors are some components of the small firms’ financing, production and market strategies and some components of their risk and return matrix. In the former case, the forces are support by external constituents and initial endowments behind the “honeymoon” effect (Brüderl and Schüssler, 1990; Fichman and Levinthal, 1991) and internal inefficiencies, a growing external mismatch with the environment, and difficulties in finding a successor for the business behind the liability of senescence (Hannan, 1998; Carreira and Teixeira, 2011). Besides, the reference study, the main "anchor" to this article, has worked with only incumbent small enterprises, whereas the liability of adolescence (the “honeymoon’s effect) reveals itself in the study of new small firms. As to the liability of senescence, results from the reference study do not lend support to it, since the finding is that the association between the hazard of exit with the age of the firm follows an inverted U-shaped pattern.

The article proceeds by presenting, in Section 2, results from the reference study for size, growth and age of the firm, as determinants of small business survival. Also, the new framework for the relationships between, on the one side, size, growth and age of the firm is proposed in this section. In Section 3, a revision of previous studies on the determinants of business survival, which have worked with size, growth and age of the firm, is carried out in the light of the proposed framework. Also, reasons why these studies lend support to the new framework are stressed. Finally, Section 4 concludes by acknowledging limitations of the study, making suggestion for future research, identifying implications for theory, and making recommendations for small business development policy makers.

2. THE REFERENCE STUDY, RESULTS WITH SIZE, GROWTH AND AGE OF THE FIRM AND POSTULATION OF A REFERENCE FRAMEWORK FOR THE RELATIONSHIPS BETWEEN THESE COVARIATES AND SMALL BUSINESS SURVIVAL

The reference study is described in far more details, comparisons, explanations e justifications in Barbosa (2009). However, interested readers may find that, for the purposes of this article, the version presented in Barbosa (2016), which abbreviates the conventional analyses on the determinants of small business survival, may be sufficient as a reference.

Main equation (1) in the table on the determinants of small business survival next page is the main result from the conventional analyses presented in the reference study. It is reported here for comparison purposes.

From the conciliation analyses of the original study came out the subsidies for the writing of the present article. The remainder of this section deals with the findings with size, growth and age of the firm, not wholly reported in the research reports mentioned above. The section culminates with a proposal of a new framework for the relationships between, on the one hand, size, growth and age of the firm and, on the other hand, the small firms' survival probabilities.

Determinants of Small Business Survival

Total assets: Mean (Current Assets + Net Fixed Assets); **Sales**: Mean Annual Sales; **Employment**: Mean number of employees; **Age**: number of years since establishment; **Net working capital**: Mean [(Equity + medium- and long-term debt – long-term assets)/Current assets]; **Total financial leverage**: Mean (Total debt/Total assets); **Medium- and long-term financial leverage**: Mean (Up-to-one-year Repayable Bank Loans plus Beyond-one-year Repayable External Loans/Total Assets); **Profitability**: perceptual scale; **Operational Cycle**: average inventory age + average receivables collection period; **Machinery/fixed assets ratio**: Mean [Machinery/(Plant & Equipment + Real State + Investments)]; **Automation degree**: perceptual scale; **Corporate diversification**: percentage of sales turnover coming from other than the company's main product line; **Market concentration**: index; **Client concentration**: index; **Sales concentration in big clients**: percentage of sales to big firms, wholesalers and government; **Sales unpredictability**: perceptual scale; **Entrepreneur's Risk Tolerance**: perceptual scale; **GDP growth rate**: self-explaining; **1998 year dummy**: 0 if any year other than 1998, 1 if year 1998; **Growth**: Growth in employment level; **Sales Variability**: standard deviation of the first differences in annual sales, scaled by mean sales over the period.

Regressors/Independent Variables	COX PROPORTIONAL HAZARD MODEL									
	Main Equation (1)		Auxiliary Equations							
			(2)		(3)		(4)		(5) +	
Ln total assets	n.a.	n.a.	-0.40	(-2.71)**	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Ln sales	n.a.	n.a.	n.a.	n.a.	-0.88	(-3.38)***	n.a.	n.a.	n.a.	n.a.
Employment	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-1.29E-2	(-2.60)**	n.a.	n.a.
Age	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-0.05	(-2.58)**
Net working capital	-4.69	(-4.29)***	-4.00	(-3.99)***	-0.31	(-0.43)	-	-	-4.98	(-4.06)***
Total Financial Leverage	-10.06	(-5.25)***	-7.57	(-4.77)***	-	-	-2.34	(-1.95)	-11.29	(-5.25)***
Medium- and Long-term Financial Leverage	15.94	(4.28)***	8.37	(3.19)**	6.27	(2.20)*	5.544	(2.48)*	10.26	(3.06)**
Profitability	-0.67	(-3.38)***	-0.59	(-3.86)***	-0.58	(-3.64)***	-0.48	(-3.41)***	-1.03	(-4.85)***
Operational cycle$^{1/3}$	-30.10	(-4.36)***	-	-	-8.77	(-1.85)	-8.48	(-1.71)	-	-
Operational cycle$^{1/2}$	10.35	(4.63)***	0.36	(3.02)**	3.06	(2.07)*	2.85	(1.82)	0.46	(2.64)**
Machinery/fixed assets ratio^{4}	-67.59	(-4.60)***	-14.95	(-1.77)	-18.40	(-2.01)*	1.51	(1.86)	-40.07	(-3.70)***
Machinery/fixed assets ratio^{5}	77.48	(4.94)***	18.81	(2.17)*	21.45	(2.28)*	-	-	45.50	(4.01)***
Automation degree	-6.80	(-5.53)***	-	-	-	-	-2.08	(-2.46)*	-	-
Automation degree^{2}	1.30	(5.78)***	-	-	-	-	0.37	(2.71)**	0.11	(2.52)*
Corporate diversification	-0.03	(-3.54)***	-0.02	(-2.20)*	-	-	-0.02	(-2.77)**	-	-
Market concentration	-0.11	(-3.50)***	-	-	-	-	-	-	-0.11	(-3.61)***
Market concentration^{2}	1.16E-3	(3.52)***	-	-	-	-	-	-	1.30E-3	(4.25)***
Client concentration	0.05	(4.87)***	0.02	(2.60)**	0.01	(2.10)*	1.47E-2	(2.21)*	0.02	(2.61)**
Sales concentration in big clients	0.09	(6.28)***	0.05	(4.84)***	0.03	(3.53)***	-	-	0.06	(5.38)***
Sales unpredictability	0.46	(3.89)***	-	-	-	-	-	-	-	-
Entrepreneur's Risk Tolerance	2.12	(6.16)***	0.81	(4.30)***	0.57	(3.25)**	0.40	(2.41)*	1.40	(5.54)***
3-year-lagged GDP growth rate	-0.38	(-3.37)***	-0.41	(-4.49)***	-0.29	(-3.45)***	-0.26	(-2.87)**	-0.26	(-2.92)**
1998 year dummy	5.49	(4.41)***	4.80	(4.97)***	3.28	(3.82)***	3.15	(3.96)***	6.20	(5.17)***
Market concentration X Operational cycle	-4.35E-4	(-3.42)***	-9.95E-5	(-1.73)	-1.58E-4	(-2.55)*	-1.14E-4	(-1.94)	-1.39E-4	(-1.16)
Sales concentration in big clients X Machinery/fixed assets ratio	-0.09	(-4.53)***	-0.04	(-3.01)**	-0.02	(-1.61)	-2.99E-3	(-0.40)	-0.03	(-2.21)*
R^2_p	0.86		0.68		0.63		0.50		0.78	
LR chi2(21/16/15/16/18)	119.44***		69.55***		60.34***		42.74***		89.68***	

Auxiliary equations (2) to (5) report results with the measures of size and age in perfect accordance with the bulk of the literature that raised the positive association between, on the hand, business survival and, on the other hand, size and age of the firm to the status of "stylized fact".

Auxiliary equations (6) to (9) report results when the variables measuring size and age of the firm enter the regression equations in a binomial specification that is the preferred by all researchers when they intend to check for non-linear effects. They are all statistically significant in both terms. However, the results with employment and age are of a nature that researchers see as unexpected.

Determinants of Small Business Survival
Continued

Regressors/Independent Variables	COX PROPORTIONAL HAZARD MODEL							
	Auxiliary Equations							
	(6)		(7)		(8)		(9)+	
Ln total assets	-1.71	(-3.11)**	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
(Ln total assets)^2	0.13	(2.62)**	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Ln sales	n.a.	n.a.	-19.75	(-3.59)***	n.a.	n.a.	n.a.	n.a.
(Ln sales)^2	n.a.	n.a.	0.45	(3.50)***	n.a.	n.a.	n.a.	n.a.
employment	n.a.	n.a.	n.a.	n.a.	0.04	(2.15)*	n.a.	n.a.
employment^2	n.a.	n.a.	n.a.	n.a.	-2.51E-4	(-2.14)*	n.a.	n.a.
Age	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.15	(2.20)*
Age^2	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-3.25E-3	(-2.32)*
Net working capital	-4.21	(-4.03)***	-	-	-	-	1.23	(1.22)
Total Financial Leverage	-7.27	(-4.39)***	-2.64	(-2.17)*	-2.54	(-2.41)*	-	-
Medium- and Long-term Financial Leverage	5.93	(2.41)*	-	-	7.43	(2.96)**	11.82	(3.38)***
Profitability	-0.33	(-2.29)*	-0.63	(-3.93)***	-0.50	(-3.32)***	-0.48	(-2.73)**
Operational cycle$^{1/3}$	-9.15	(-1.77)	-12.34	(-2.27)*	-	-	-21.84	(-3.74)***
Operational cycle$^{1/2}$	3.04	(1.91)	4.43	(2.59)**	-	-	7.28	(3.92)***
Machinery/fixed assets ratio^4	-	-	-18.02	(-2.02)*	-24.17	(-2.76)**	-43.15	(-3.79)***
Machinery/fixed assets ratio^5	3.71	(3.97)***	23.37	(2.51)*	27.44	(3.00)**	49.24	(4.10)***
Automation degree	-	-	-2.85	(-3.17)**	-2.34	(-2.91)**	-3.76	(-3.94)***
Automation degree^2	-	-	0.66	(4.03)***	0.39	(2.99)**	0.73	(4.27)***
Corporate diversification	-	-	-	-	-	-	-	-
Market concentration	-0.01	(-1.37)	-	-	-	-	-0.06	(-2.32)*
Market concentration^2	-	-	-	-	-	-	6.79E-4	(2.70)**
Client concentration	-	-	0.03	(3.80)***	0.02	(2.87)**	0.03	(3.33)***
Sales concentration in big clients	0.06	(5.40)***	0.06	(5.06)***	0.03	(3.86)***	0.06	(4.76)***
Sales unpredictability	0.19	(2.48)*	0.37	(3.38)***	-	-	0.40	(3.56)***
Entrepreneur's Risk Tolerance	0.76	(4.12)***	1.37	(5.20)***	0.80	(4.32)***	1.46	(5.28)***
3-year-lagged GDP growth rate	-0.349	(-3.92)***	-0.26	(-2.70)**	-0.29	(-3.35)***	-0.21	(-2.15)*
1998 year dummy	2.69	(3.03)**	2.75	(2.61)**	3.25	(3.92)***	2.61	(2.80)***
Market concentration X Operational cycle	-	-	-1.68E-4	(-2.47)*	-	-	-2.43E-4	(-2.19)*
Sales concentration in big clients X Machinery/fixed assets ratio	-0.06	(-4.27)***	-0.08	(-4.03)***	-0.03	(-2.27)*	-0.05	(-2.71)***
R^2_p	0.67		0.74		0.61		0.76	
LR chi2(16/18/15/21)	67.08***		83.20***		57.64***		87.66***	

Auxiliary equations (10) to (13) report results with binomial specifications that reach best results in terms of fitting, that is, statistical significance of coefficients and overall explanatory

power. An inspection of these equations shows that they are the best ones even in relation to the ones where size and age of the firm enter the specification linearly. They are not the best only in relation to the main equation (1).

Determinants of Small Business Survival
Continued

Regressors/Independent Variables	COX PROPORTIONAL HAZARD MODEL							
	Auxiliary Equations							
	(10)		(11)		(12)		(13)+	
(Ln total assets)^4	-4.97E-3	(-3.37)***	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
(Ln total assets)^5	5.30E-4	(3.37)***	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
(Ln sales)^4	n.a.	n.a.	-2.07E-5	(-3.68)***	n.a.	n.a.	n.a.	n.a.
(Ln sales)^5	n.a.	n.a.	7.81E-07	(3.64)***	n.a.	n.a.	n.a.	n.a.
Employment$^{1/3}$	n.a.	n.a.	n.a.	n.a.	12.05	(2.60)**	n.a.	n.a.
employment$^{1/2}$	n.a.	n.a.	n.a.	n.a.	-4.14	(-2.60)**	n.a.	n.a.
Age^2	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	5.44E-3	(2.72)**
Age^3	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-1.13E-4	(-2.61)**
Net working capital	-4.35	(-3.84)***	-	-	-	-	0.34	(0.33)
Total Financial Leverage	-8.06	(-4.44)***	-2.60	(-2.14)*	-5.57	(-3.79)***	-	-
Medium- and Long-term Financial Leverage	2.44	(0.90)	-	-	12.84	(4.23)***	13.12	(3.82)***
Profitability	-0.59	(-3.40)***	-0.65	(-3.98)***	-0.82	(-3.98)***	-0.44	(-2.59)*
Operational cycle$^{1/3}$	-12.24	(-2.28)*	-11.84	(-2.15)*	-14.56	(-2.89)**	-30.81	(-4.41)***
Operational cycle$^{1/2}$	4.31	(2.57)**	4.29	(2.48)*	5.24	(3.25)**	10.25	(4.55)***
Machinery/fixed assets ratio^4	5.18	(4.51)***	-17.38	(-1.93)	-53.07	(-4.24)***	-48.34	(-4.04)***
Machinery/fixed assets ratio^5	-	-	22.67	(2.42)*	58.77	(4.48)***	55.75	(4.39)***
Automation degree	-3.35	(-3.65)***	-2.84	(-3.19)**	-3.81	(-4.11)***	-5.56	(-4.53)***
Automation degree^2	0.68	(4.04)***	0.66	(4.00)***	0.69	(4.38)***	1.01	(4.76)***
Corporate diversification	-	-	-	-	-	-	-0.03	(-2.52)*
Market concentration	-0.02	(-1.31)	-1.11E-3	(-0.08)	-0.07	(-2.32)*	-0.05	(-1.94)
Market concentration^2	-	-	-	-	1.08E-3	(3.59)***	5.70E-4	(2.05)*
Client concentration	0.03	(3.16)**	0.03	(3.59)***	0.04	(3.71)***	0.04	(3.67)***
Sales concentration in big clients	0.09	(5.76)***	0.06	(5.03)***	0.05	(4.59)***	0.07	(5.00)***
Sales unpredictability	0.39	(3.51)***	0.36	(3.20)**	-	-	0.46	(3.86)***
Entrepreneur's Risk Tolerance	1.26	(4.89)***	1.32	(5.13)***	1.45	(5.37)***	1.56	(5.18)***
3-year-lagged GDP growth rate	-0.43	(-4.36)***	-0.26	(-2.66)**	-0.18	(-1.99)*	-0.35	(-3.09)**
1998 year dummy	3.94	(3.71)***	2.69	(2.49)*	4.30	(3.74)***	3.05	(3.18)**
Market concentration X Operational cycle	-2.52E-5	(-0.21)	-1.74E-4	(-1.67)	-4.71E-4	(-3.79)***	-3.49E-4	(-3.07)**
Sales concentration in big clients X Machinery/fixed assets ratio	-0.11	(-5.05)***	-0.08	(-4.00)***	-0.03	(-1.77)	-0.07	(-3.25)**
R^2_p	0.74		0.74		0.76		0.80	
LR chi2(20/19/20/22)	82.05***		81.64***		87.43***		97.33***	

Auxiliary equations (14) to (16) report results with growth separately because its measurement and specification differ substantially from the respective choices in the related literature. First, in the reference study growth is past growth whereas the great majority of authors use current growth, even when specify current size in place of current growth. Only in Cefis and Marsili (2005)'s work was growth measured in a similar way. Second, in the reference study growth is interacted with sales variability and entrepreneur's risk tolerance. Past growth by itself

never reaches statistical significance in any specification in the full length version of the follow-up period. Few authors make use of interactions of growth with other covariates.

Determinants of Small Business Survival
Continued

Regressors/Independent Variables	COX PROPORTIONAL HAZARD MODEL							
	Auxiliary Equations							
	(14)		(15)		(16)		(17)+	
(Ln total assets)[4]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-7.51E-3	(-3.77)***
(Ln total assets)[5]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	7.66E-4	(3.69)***
Age[2]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	9.69E-3	(3.42)***
Age[3]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-2.17E-4	(-3.61)***
[(GrowthXSales VariabilityXEntrepreneur's Risk Tolerance)+100][(1) (1) (1/2) (2) +++]	-0.23E-1	(-3.20)**	-0.89E-1	(-3.54)***	-2.54	(-3.68)***	-0.65E-3	(-3.43)***
[(GrowthXSales VariabilityXEntrepreneur's Risk Tolerance)+100][(na) (2) (1) (3) +++]	n.a.	n.a.	0.32E-3	(3.42)***	0.11	(3.37)***	0.26E-5	(3.41)***
Net working capital	-1.22	(-1.55)	-5.32	(-4.56)***	-5.40	(-4.66)***	-2.14	(-1.77)
Total Financial Leverage	-	-	-8.96	(-5.04)***	-9.33	(-5.23)***	-	-
Medium- and Long-term Financial Leverage	-	-	20.59	(5.13)***	21.64	(5.22)***	7.95	(2.29)*
Profitability	-	-	-	-	-	-	-0.14	(-0.78)
Operational cycle[1/3]	1.10	(2.11)*	-29.58	(-3.93)***	-28.52	(-3.81)***	-10.10	(-1.61)
Operational cycle[1/2]	-	-	10.15	(4.18)***	9.86	(4.07)***	3.60	(1.83)
Machinery/fixed assets ratio[4]	-17.99	(-2.25)*	-72.00	(-4.99)***	-76.83	(-5.12)***	5.63	(4.10)***
Machinery/fixed assets ratio[5]	20.60	(2.48)*	81.14	(5.25)***	86.06	(5.37)***	-	-
Automation degree	-	-	-7.32	(-5.36)***	-7.66	(-5.54)***	-3.34	(-3.16)**
Automation degree[2]	0.36E-1	(1.00)	1.37	(5.68)***	1.42	(5.83)***	0.62	(3.42)***
Corporate diversification	-0.01	(-1.20)	-0.04	(-3.76)***	-0.04	(-3.66)***	-	-
Market concentration	-0.04	(-1.49)	-0.11	(-3.63)***	-0.12	(-3.70)***	-0.04	(-2.23)*
Market concentration[2]	4.85E-4	(2.29)*	9.86E-4	(3.22)**	1.06E-3	(3.34)***	-	-
Client concentration	0.02	(2.11)*	0.05	(4.85)***	0.06	(5.02)***	0.03	(3.31)***
Sales concentration in big clients	0.03	(3.35)***	0.10	(6.43)***	0.10	(6.42)***	0.09	(5.23)***
Sales unpredictability	-	-	0.60	(4.79)***	0.61	(4.84)***	0.56	(4.06)***
Entrepreneur's Risk Tolerance	0.83	(4.01)***	2.02	(5.81)***	2.06	(5.81)***	1.22	(4.64)***
3-year-lagged GDP growth rate	-	-	-0.43	(-3.67)***	-0.45	(-3.80)***	-0.48	(-4.39)***
1998 year dummy	1.07	(1.81)	3.97	(4.18)***	4.21	(4.33)***	2.74	(2.73)**
Market concentration X Operational cycle	-1.53E-4	(-1.38)	-3.82E-4	(-3.00)**	-3.99E-4	(-3.08)**	0.18E-4	(0.15)
Sales concentration in big clients X Machinery/fixed assets ratio	-0.02	(-1.75)	-0.10	(-5.06)***	-0.10	(-4.96)***	-0.10	(-4.25)***
R^2_p	0.48		0.85		0.86		0.75	
LR chi2(15/22/22/23)	39.31***		117.58***		119.09***		84.07***	

Obs: 1) First values in the main body of the table are coefficient estimates; 2) numbers in parentheses are z-statistics; 3) *, **, and *** denote statistical significance at the 5%, 1%, and 0.1% levels, respectively; 4) Number of observations (firms): 61; 5) + without case 29, which is an influential outlier. 6) +++ Adding 100 was necessary in order to make it possible to extract the square root for the originally negative values of this interaction and numbers in parentheses are exponents for equations (14) to (17) respectively; 7) Mean means average over up to 6 years, but over 3 years in most cases. 8) Growth was obtained from a compound model of growth regressed on time over a 6-year period for the majority of cases.

As the interaction produces results that are expected for the growth variable, the interaction is included in the present study in the hope its results mirror to some extent the results for current

growth, for which there are not data. This might well be the case, since the interaction finds fundaments in a widely accepted interpretation of the business reality espoused by the corporate strategy academic discipline. First, there is past growth and the past has been normally used to predict future outcomes, that is, opportunities. Second, there is sales variability which might tell how risky the firm's environment is, that is, threats. As for the strengths and weaknesses of the company, the variable entrepreneur's risk tolerance can be measuring them, since it seems reasonable to assume that the small entrepreneur has evaluated as how bold he/she would be having in mind the strengths and weaknesses of his/her enterprise.

Past growth, interacted with sales variability and entrepreneur's risk tolerance, is associated with the hazard of exit linearly and in a U-shaped manner. Auxiliary equation (14) reports results for the linear specification, which are in line with most findings in the literature. Auxiliary equation (15) reports results for the quadratic specification, which is the preferred specification of all authors when fitting size, growth and age binomially. Auxiliary equation (16) reports results for the specification yielding the best results. When profitability is put back into equations (15) and (16) significance drops to the 1% level.

Although uncovering the very special manner in which growth relates to the hazard of exit has been one of the most pleasing unfoldings provided by the working in the reference research, it brought with it the concern that the multiplying between the variables may have ended up emptying the resulting interaction from growth contents. There are two outcomes that may prove that this is not the case. First, the variable entrepreneur's risk tolerance, which was already in the main regression equation, does not lose much of its explanatory power when the interaction is added on. This signalizes that the interaction does not carry much of the contents of the variable entrepreneur's risk tolerance. Second, the Pearson correlation coefficients of the interaction are $r = 0.88$ with growth, $r = 0.23$ with sales variability and $r = 0.27$ with entrepreneur's risk tolerance. These correlations without any doubt signalize that the interaction is basically growth, slightly modified by the other two variables.

The regression results as a whole provide so many insights that they may be classified into two groups. The first group comprises those insights that are either self-explainable or explainable by parameters generated by the regression model. The second group comprises those insights that need interpretation. The first insight in the first group is that firm size, growth and age capture many effects that in reality belong to the variables that are missing in each of these equations as compared to the main equation (1), since if any of these missing variables is put back into the respective auxiliary equation, firm size, growth and age lose either all or considerable amounts of their explanatory power. Sometimes the captured effect concerns only one of the terms of a missing variable binomially specified in main equation (1). The second insight is that these effects impact the hazard of exit either positively or inversely and size, growth and age are alike positively or inversely correlated with the respective variables, in either a bivariate or a multivariate correlation analysis. The third and last insight in the first group is that the power-adjusted equations correspond to the best fitting in the sense that they have fewer missing variables at the same time the coefficients of the variables size, growth and age reach higher levels of statistical significance. They are seen as the best fit also because overall explanatory power is the highest.

The first insight of the second group is that the missing variables vary from equation to equation and also from one measure of size to another, but in many instances they are the same or closely related. The second insight is that the missing variables are all related to the financing, production and market strategies of the firm and to the measure of risk, that is, sales unpredictability. The only exception is the 3-year-lagged GDP growth rate in the linear specification of the growth interaction. The third insight is that the regressed binomial relationship

varies between U-shaped and inverted U-shaped depending on the particular proxy. The fourth and last insight in the second group is that, in spite of the order of the signs of the fitted binomial specifications, the signs in the fitted linear specifications are all negative.

The first insight of the second group is consistent with the idea that the measures of size, growth and age are correlated in varying ways with the real determinants of the hazard rate. Thus, total assets would be positively correlated with operational cycle and consequently correlated in a U-shaped way with the hazard of exit, since this is the way operational cycle is associated with the hazard of exit. In other words, greater amounts of investment in average stocks and credit to clients would enlarge the company and either raise or decrease the probability of exit, depending on the previous size of the firm's working capital, operationalized in the reference study by operational cycle. Also, the probability of exit might diminish via reduction of business risk, if the additional investment in working capital was due to the company's decision to expand market diversification, which is believed to reduce sales unpredictability, with which size is monotonically negatively correlated. As to the fact that the missing variables vary from one measure of size to another, it is noteworthy that the variables measuring the firm's financing strategy are not absent from any equations that total assets enter without the other measures of size, growth and age, although the coefficient of the bivariate correlation between total assets and medium- and long-term financial leverage is very high. This does not happen to any other measure of size, growth and age. The result obtained for total assets is much unexpected also because medium- and long-term debt is usually used to finance long-term capital goods, which enlarge the enterprise's size.

The second insight of the second group is what would be expected if size, growth and age are actual proxies for the firm-specific determinants of the heterogeneity in hazard rates. As to the only one exception, the 3-year-lagged GDP growth rate, which is not a firm-specific determinant, the explanation is that it is spuriously correlated with the growth interaction. This is evident, since the growth interaction concerns a period taking place before the beginning of the follow-up period, whereas the 3-year-lagged GDP growth rate concerns points in time happening through the follow-up period. Thus there is no reason for them to be correlated to each other. However, the happening of such a spurious correlation would not be surprising for a piece of research that has dealt with so many measurements for so many postulated determinants of small business survival. In any case, the impact of fitting back the 3-year-lagged GDP growth rate to auxiliary equation (14) upon the explanatory power of the growth interaction would not be so strong. In fact, it would bring down the z-statistics for the coefficient of the interaction from –3.20 to –2.88, not altering the statistical significance level of 1%.

The third insight of the second group, that is, that the regressed binomial relationship varies between U-shaped and inverted U-shaped depending on the particular proxy, seems to be a result for which there is not a general interpretation that accommodates each and all of the individual differences in specifications. For age, it appears that the explanation is that age is proxying for the financing strategy, since further scrutiny has revealed that age is bivariately negatively correlated with total financial leverage and positively with medium- and long-term financial leverage. In the best fitted equation, the only missing variable is exactly total financial leverage. Such findings are consistent with the idea that small manufacturing firms adopt very risky financing strategies, mainly when growing, but, with maturity and after a long-lasting process of good reputation building, they become able to adopt more beneficial financing options. This would start at the ages of 23, 32, and 29 years according to equations (9), (13) and (17), respectively. As for the inverted U-shaped relationship between employment and the hazard of exit, there does not appear to be a specific explanation for it. In any case, a possible general interpretation for the fact that the regressed binomial relationship varies between U-shaped and inverted U-shaped depending on the particular proxy is that they are either proxying different

components of the firm's strategies or the same components but with different weights or, even, both. Getting deeper into the case of the reference study escapes the scope of the present work. It is a task left for the future.

Interpretation of the fourth and last insight of the second group, that is, that, in spite of the order of the signals of the fitted binomial specifications, the signals in the corresponding fitted linear specifications are all negative, may sound tautological. Notwithstanding, it does seem that the best understanding is that choices of strategies that imply larger company size have in general the net effect of enhancing the small firms' survival probability. These choices of strategies may imply U-shaped and inverted U-shaped strategy-hazard relationships whose positive-signed "legs" are much longer than the negative ones, producing accordingly a positive net effect on the hazard of exit. On the other hand, this would be more than offset by other non-linear conversely shaped relationships or even by negative-signed linear relationships, generating an overall positive-signed linear relationship between size and small business survival.

Although the explanation for the fact that, in spite of the order of the signs of the fitted binomial specifications, the signs in the fitted linear specifications are all negative is that it is conditional on many aspects of the relationships, there is a general rule. This is that, as a rule, an indication of the net effect to be found in the linear specification is given by the z-statistics of the terms in the quadratic fit. If the z-statistic of the first term, that is, the term with unit power, is bigger than the z-statistic of the quadratic term, then, the sign in the estimated coefficient in the linear specification will have the same sign as that of the first term of the binomial specification. The opposite is true if the z-statistic of the quadratic term in the binomial specification is the larger one. If the z-statistics are equal or very near one another, the sign in the linear fit will be either negative or positive. In this last case, the coefficient of the linear relationship may be even statistically insignificant, meaning that a linear fit is being attempted in a non-linear quadratic relationship that is symmetrically perfect or almost symmetrically perfect. Notwithstanding the foregoing, it is worth stressing both that there are exceptions to the general rule and that for the present work fitting a linear specification is highly artificial.

An overall interpretation of the findings of the reference study goes like this: 1) Many elements of the running of a small manufacturing enterprise change in magnitude the extent to which the small business owner decides whether to increase or decrease the investment in operations and how to finance them. These elements are components of the firm's financing, production and market strategy. 2) The changing in magnitude of the components of the small firm's strategies alter in varying ways, that is, linearly or binomially, directly or inversely, U-shaped or inverted U-shaped, the likelihood of the enterprise to exit the market, conditionally on: 2.1) the shape of the individual influence exerted by each of the components; 2.2) on which point of the scale of each of the individual components of the small firm's strategies the particular small manufacturing enterprise was before the change in its business policies and; 2.3) on which point of the scale of each of the individual components of the small firm's strategies the particular small manufacturing enterprise is after the change in corporate policies. 3) The changing in magnitude of the components of the small firm's strategies either raises or decreases the size of the firm's total assets (a measure of firm size, perhaps the main one), because most of them are components of the firm's monetary-expressed assets. Human capital and the work force are components of the firm's strategies but are not monetarily expressed. 4) Closing the cycle, then, variations in total assets then alter the probability of the firm to exit the market. 5) In a multivariate regression analysis size and growth will be associated with the hazard of exit in a U-shaped relationship, which is an algebraic adding up of the varying relationships between the hazard of exit and the components of the firm's strategies, depending on: 5.1) which strategy-related real determinants of the hazard of exit are already present in the multivariate analysis and 5.2) the size of each of the powers of the two terms of the binomial specification for size and growth.

Initial total assets and current growth in total assets are made up from the same substance and therefore the explanation is the same as above. As to the other proxies for size, mainly, employment and sales, they are correlated with total assets and, so, interpretation goes more or less along the same lines. However, as correlation is not perfect, they may proxy either for different components of the firm's strategies or in varying degrees with a same one of these components, or, even, both. Age, on its turn, is correlated with total assets and with the other proxies of size and the interpretation is that size changes in magnitude as time goes by, so that, the interpretation for the relationship between age and the hazard of exit is that most of the times it has much to do with the relationship between size and the hazard of exit. There seems to be exceptions, as might be the case of building up of a good credit reputation, which in principle does not appear that the enterprise has to grow to achieve it. Inspection of all auxiliary equations on the table on the determinants of small business survival shows that, out of the strategy-related variables and risk-related variables that are missing in the auxiliary equations, only profitability, client concentration and sales concentration in big clients are missing only once, what might mean that only the corresponding size, growth or age proxy in the equation proxies for them individually. All the others miss more than once across either the proxies of size, growth or age or across at the same time the proxies and their different specifications.

All the foregoing allows the postulation of a framework that best represents the relationships between, on the one hand, size, growth and age and, on the other hand, small business survival, which is proposed for investigating, analyzing and interpreting the relationships, being them either central to the study or included only as controls. Such framework is built upon three realizations. The first one is that size, growth and age are not the real determinants of small business survival. The real determinants are the components of the small firm's financing, production and market strategies and business risk. Size, growth and age proxy for these determinants because they are determined by them or correlated with them. The second one is that the relationships between, on the one side, size, growth and age and, on the other side, small business survival is binomial, either U-shaped or inverted U-shaped. This is so because the many actual determinants are individually associated with small business survival linearly, directly or inversely, or non-linearly, U-shaped or inverted U-shaped, and being size, growth and age determined by the many real determinants, their relationships with the small business survival are a summing up of many diversified effects, and this is, as a rule, a U-shaped or a inverted U-shaped relationship. A linear fitting is artificial, although, as a rule, produces a negative relationship. The third and last realization is that a quadratic specification is not always the best fit for the relationship. This is so because the relationships between the many components of the small firm's strategies and business risk and small business survival are not linearly directly and inversely symmetrical and, also, not symmetrically U-shaped or inverted U-shaped. It is so much so that this is the reason why the linear fitting produces, as a rule, a negative relationship. A binomial specification with a combination of powers either smaller than the unit or greater than the square may fit better the regression.

Such a theoretical framework is important in that compliance with it in studies that involve the relationships between, on the one hand, size, growth and age and, on the other hand, small business survival, promises the obtaining of more realistic overall results. The obtaining of better overall results can be attributable to 1) a more correct econometric representation of the relationships between size, growth and age and the survival of small businesses and also 2) to the fact that such more correct specification can greatly increase the quality of the results pertaining to all other studied effects.

3. REVISION OF PREVIOUS WORKS AND CORROBORATIVE EVIDENCE FROM THE EXTANT LITERATURE

Some studies provide corroborative evidence in favor of the frame of reference postulated in Section 2, since they have proceeded methodologically in line, by chance or not, with it. Others, although proceeding in blatant opposition to the established in the frame of reference, also provide evidence supporting it, since their weird results signalize that correction is needed in accordance with the postulated frame of reference. These works are revised in this section, although space restrictions allow contemplating only a sample of them.

3.1 REAL DETERMINANTS PROXIED BY SIZE, GROWTH AND AGE OF THE FIRM

There are some ways through which the literature lends support to the proposition that size, growth and age of the firm are not the real determinants of small business survival. The first one concerns the studies that theoretically allege this. Klepper and Thompson (2006) note that the well documented patterns of the probability of exit declining with both firm size and age have been difficult to explain, implying that there must be fundamental determinants behind firm size and age, and that, remarkably, few theories try to identify what these missing factors may be. Taymaz and Köksal (2006) suggest that the impact of startup size found in survival models could arise due to an endogeneity bias. In other words, a positive correlation between start-up size and survival probability is observed, but these two variables are determined by a common set of parameters. After controlling for endogeneity, the start-up size itself would not have a statistically significant impact on survival. Jensen and Others (2008) argue that there is no intrinsic reason why firm survival should be related to age. It would not be age per se that determines survival, but other factors which may be correlated with age, such as managerial experience, ownership structure and capital constraints. Kosová and Lafontaine (2010) review the literature and list a number of authors that believe the effects of size and age on survival in fact belong to other factors omitted in the empirical models. Varum and others (2014) note that, according to the literature, firm size is a main regressor potentially suffering from endogeneity problems, that is, there may be unobservable factors that affect firm hazard rates and that also impact on firm size.

A second way concerns studies in which other variables referred to in the literature as the rationale for a postulated relationship between size and business survival, mainly strategy ones, are present in the study, and because of their presence size loses its explanatory power, since the rationale variables are the real determinants of the hazard rates. Dunne and Others (1989) is a pioneering work that found that ownership type had a large impact on the relationship between size and survival. Becchetti and Sierra (2003) presented a table of variables significantly affecting the probability of bankruptcy in which their strategy variables customers' concentration and strength of local competitors exhibit a positive impact whereas size is either non-significant or associated in an unexpected direct manner with that probability. Mengistae (2006) clearly showed, in a series of Cox regression equations, that the strong negative impact of size upon the hazard rate diminished drastically to the extent that variables measuring competition, human capital and strategy were incrementally specified. Saridakis and others (2008) showed that variables measuring access to debt financing, financial constraints and competitive strategy robbed the explanatory power of size as a determinant of new firm survival. Carreira and Teixeira (2011) presented Cox regressions in which the introduction of labor productivity in place of total factor productivity drastically reduced the t-statistics for size and age, becoming both highly statistically insignificant. It is interesting to note that an intercorrelation matrix reported by the authors shows that age and size are by no means bivariately correlated to total factor productivity and labor productivity, but even so the multivariate survival analysis is strongly signalizing that these variables are most probably capturing the same effects. In Ha’s (2013) study, which included

many covariates at the level of the enterprise, initial size, measured by number of employees, is statistically insignificant in Cox regression equations encompassing also variables of the financing strategy that in the reference study take way explanatory power from size, measured in terms of number of employees. Fernandes and Paunov (2015) clearly showed in their table on main results that the coefficient of their variable size and its statistical significance level were drastically reduced when labor productivity was added on.

Fotopoulos and Louri (2000) apparently came across with results almost identical to the above ones, but decided not to report in a way size would be shown to be statistically non-significant. It is almost certain that the coefficient of firm size would become statistically non-significant if this variable entered their hazard rate regression equations at the same time with diversification and financial leverage, two other survival covariates with which these authors worked.

A third way concerns the studies that control for unobserved heterogeneity by using panel data techniques. Shiferaw (2009) provided evidence that controlling for unobserved heterogeneity reduced explanatory power from size, which was binomially specified by him. The same behavior was observed for duration, which was in Shiferaw's work substituting for age. This lost in explanatory power is represented by a dramatic reduction in the three t-statistics for the coefficients of these independent variables.

3.2 THE STANDARD BINOMIAL RELATIONSHIP BETWEEN, ON THE ONE HAND, SIZE, GROWTH AND AGE AND, ON THE OTHER HAND, SMALL BUSINESS SURVIVAL

It is not difficult to advocate that the standard relationship between, on the one hand, size, growth and age of the firm and, on the other hand, small business survival is binomial. For some time now many researchers have been successfully fitting binomial specifications for size, growth and age in small business survival regression analyses. These findings lend strong support to the main thesis of the present study.

Buehler and others (2006) and Buehler and others (2012) reported finding an inverted U-shaped relationship between size, measured as the ln of number of employees, and the hazard of exit. Kosová and Lafontaine (2010) reported finding in a sample of franchised chains the inverted U-shaped relationship between size, measured as the number of outlets, and exit either from franchising or from business. Strotmann (2007), Callejón and Ortún (2009), Shiferaw (2009) and Varum and others (2014) reported finding the U-shaped association. Kosová (2010) reported finding the U-shaped relationship between size, measured as sales, and "in-court" exit and the inverted U-shaped association for age.

Some studies have fitted current size in place of growth. This masks the binomial relationships and/or produce unexpected results, but algebraic transformations unveil the relationships for size and growth in accordance with the proposed new framework. This is the case of the work by Grossi and Gozzi (2006). As a result, the authors found for their full sample initial size associated with the hazard of exit in an "unexpected" inverted U shape. However, substituting (Initial Size + growth) for (Current size) in the authors' estimated equation, summing up the four terms, and carrying on the algebraic operations that are applicable to the case, obtain: (-0.13 Initial size + 0.015 Initial size^2) + (-0.51 Growth + 0.064 Growth^2) + (0.128 Initial size X Growth). Fitting initial size and growth instead of initial size and current size would not generate this last term. In any case, this result is more directly in accordance with the frame of reference constructed in Section 2, which postulates that the basic relationships between, on the one side,

size and growth and, on the other side, the hazard of exit are either U-shaped or inverted U-shaped. The proposed new framework considers current size as a misspecification.

The study by Fernandes and Paunov (2015) differs a little from the one above because, although it is the case of fitting current size in place of growth, initial size is specified linearly, instead of binomially. Proceeding in the same way as that followed for Grossi and Gozzi (2006)'s work, obtain: (-0.9 Initial size + 0.103 Initial size^2) + (-1.123 Growth + 0.103 Growth^2) + (0.206 Initial size X Growth). Conclusions are the same as those drawn for Grossi and Gozzi (2006)'s work.

Disney and Others (2003) also fitted current size in place of growth. They also added interactions between age and all the terms of initial size and current size. Substituting (Initial Size + growth) for (Current size) in the authors' estimated equation, summing up the four terms, and carrying on the algebraic operations that are applicable to the case, obtain: (-0.11 Initial size - 0.04 Initial size^2) + (-0.5 Growth + 0.13 Growth^2) + (0.26 Initial size X Growth) + (0.14 Initial size – 0.06 Initial size^2 + 0.17 Growth – 0.07 Growth^2) X Age – 0.14 Initial size X Age. The sign of the coefficient of the second term in the first parenthesis seems to contradict the main thesis advocated in the present study. However a correction to be proposed for Disney and Others (2003)'s work in the next subsection will eliminate such a contradiction.

The majority of studies showing a monotonic relationship between, on the one hand, size, growth and age and, on the other hand, survival, do not inform if a binomial specification has been tried. This makes it difficult the task of proving that the standard relationship is binomial but does not make it impossible. For one thing, the model predicts that, even the standard relationship being binomial, it is possible to specify monotonically the covariate and despitefully obtain a statistically highly significant coefficient estimate. In fact it is this that happens all the times when a monotonic relationship is reported. A scatterplot of residuals against the covariate of interest would show that the residuals cluster in such a way that suggest a nonlinear U-shaped relationship but also that the clustering around one of the "legs" of the U is so intense that a monotonic specification of the covariate would well fit it, producing a statistically highly significant coefficient.

Ha (2013) provides evidence in favor of the above main thesis with respect to growth. This author reported in tables that showed estimates of Cox proportional hazard model regression equations that growth entered the equations in two quadratic specifications, one for growth in employment and the other for growth in assets. Although entering contemporaneously both specifications were statistically highly significant, revealing U-shaped relationships with the hazard of exit.

Heshmati (2001), Frazer (2005) and Varum and others (2014) reported finding age to be associated with the firm's survival probability in an inverted U-shaped fashion. Kelly and Others (2015), in turn, reported finding the U-shaped relationship with time, which they informed to be the number of quarters since the birth of the company.

3.3 THE VARYING EXPONENT COMBINATIONS OF THE STANDARD BINOMIAL RELATIONSHIP BETWEEN, ON THE ONE HAND, SIZE, GROWTH AND AGE OF THE FIRM AND, ON THE OTHER HAND, SMALL BUSINESS SURVIVAL

As already said in the introduction, Buehler and others (2006) and Buehler and others (2012) reported finding an inverted U-shaped relationship between size and the hazard of exit, in which the maximum in the function takes place as low in the scale of number of employees as

2.88 employees in the former study and 5.35 in the latter and that, in face of the fact that size in their studies ranges up to 6,134 employees, the very authors appear to interpret such results as meaning that the real relationship between size and the hazard of exit is a monotonic decreasing one. Insisting in the findings as they stand makes the offering of a substantive explanation based upon the workings of a possible actual determinant for which size is proxying very difficult.

The point made here is that the question is more of methodology than of results. The problem with the studies under revision is that the second order binomial specification is not the best fit for the variable size, as can be ascertained by the large difference in the z-statistics between the two terms for both studies, which are 2.58 and –5.88 in the first study and 4.64 and –8.30 in the second one. This could be also shown by a scatterplot of martingale residuals against the values of the size variable. A combination of powers, say, either 2nd and 3rd or 3rd and 4th, or even others, lower or higher, would lead to better fits, the z-statistics would be higher for both terms and very near in size to one another. The maximum in the function would take place well above the values of employees found by the authors. Probably, the fit for other covariates also would be enhanced in terms of higher coefficients and statistical significance.

Shiferaw (2009), Varum and others (2014) and Fernandes and Paunov (2015) do not inform the number of employees of the largest manufacturing enterprises in their samples. Because of this, it is not possible to ascertain whether the minimum in the hazard function occurring at 166, 200 and 233 employees in the scale of size respectively for the three studies are reasonable or too high to be meaningful, at least as long as small firms are concerned. In any case, the differences in z-statistics for the linear term and the quadratic respectively of -3.33 and 2.42, -43.7 and 18.19, and –10.50 and 7.36, respectively for the three studies signalize that the second order binomial specification is not the best fit for the variable size in their studies either. Thus, most of the predictions made for a revision of the works of Buehler and others (2006) and Buehler and others (2012) are the same for theirs.

The work by Grossi and Gozzi (2006) does not generate minimum and maximum that stand out, but, even so, the second order binomial specification does not seem to be the best fit for the variables initial size and current size, as can be ascertained by the large difference in the t-statistics between their terms. They are 6.37 and –3.27 for initial size and squared initial size and –8.64 for current size and 4.57 for squared current size. Thus, most of the predictions made for a revision of the works of Buehler and others (2006) and Buehler and others (2012) are the same for theirs too.

Disney and Others (2003) carried out a piece of research whose statistical analyses are very similar to those of the study Grossi and Gozzi (2006). However, in view of some specificities in their work, a contradiction was generated in the revision carried out in Section 3.2. This is that the algebraic transformation of initial and current size into initial size and growth failed to produce either a U-shaped or an inverted U-shaped relationship between initial size and the hazard of exit. Such a contradiction might be another product of the inapplicability of the second-order binomial specification used by the authors. The t-statistics in the Disney and Others (2003)'s study were 7.56 and -6.90 for initial size and –9.85 and 5.44 for current size. Given the differences in the t-statistics, mainly with respect to current size, it is highly probable that most of the predictions made for a revision of the works of Buehler and others (2006) and Buehler and others (2012) are also applicable to that by Disney and Others (2003).

The work by Kosová (2010) is another one that the use of a combination of powers different from the classic unit-square combination will most probably produce a better fit for both

age and size than that reported by the author. This would most probably solve also the problem that the minimum in the estimated binomial function corresponds in the scale of sales to a value too low as compared to its observed maximum sales figure, that interpretation is by force that the actual relationship with the hazard of exit is a monotonic increasing one for size. The estimated function has its minimum in the scale of sales of 5.20 in the Cox regression equation and 9.30 in the probit, whereas the maximum observed sales figure is 6,213,561,009.35, assuming that table figures reported by the author are ln transformed. T-statistics for the probit regression equation are -2.81 and 3.36. Such a difference in t-statistics signalizes that a combination of higher powers will drive the minimum in the estimated function to a much higher corresponding sales value, making the non-linear result more meaningful.

The above unexpected result from Kosová (2010)'s study would not be explainable by the proposed new framework only, but it is probably in great amount accountable also to the fact that the definition of exit in this study is either court liquidation/bankruptcy or deletion from the Business Registrar at the Czech Department of Justice. As many exits by small firms are not officially communicated, the estimated relationships are not then between, on the one side, size, and, on the other side, exit, but instead in-court exit, which is more probable the larger the company is. This suspicion makes all sense in view of the very small number of reported exits as compared to the total of enterprises (273 against 6,291), to the lengthy period of follow-up (seven year) and to the fact that the sample encompasses firms with as few as ten employees, which are more numerous. Ascertaining the exact weight of each of the two explanations, namely, the one furnished by the proposed new framework and the bias in the definition of exit, depends on reworking the original data.

The research by Strotmann (2007) is the only one that, having specified the classic quadratic binomial specification, produces, in two out of three Cox regression equations, estimates of U-shaped relationships between size and the hazard of exit in which the minimums take place at values in the scale of number of employees that are very acceptable, having in mind the maximum number of employees, that is around 37 and 50 respectively, and whose reported p-values do not differ significantly. In the third one, the minimum occurs in the scale of number of employees at around 42 and the use of power combinations other than the classical one would most probably produce estimates too near 50 that would lead to the conclusion that the real relationship is in fact linear.

The U-shaped relationships between, on the one side, growth in employment and growth in assets and, on the other side, the hazard of exit reported in the work by Ha (2013) have minimums that take place in the scales of growth at extremely too high values as compared to mean values also reported in the same study. There are also high differences between z-statistics. These facts are indicative that the quadratic binomial specification used by the author most probably does not correspond to power combination that will produce the best fit.

Cefis and Marsili (2005) report that age, in the logarithm form, is highly statistically significant in all six equations regressed by them and is monotonically positively related to survival. The authors also inform that adding a quadratic term for lnage results in a statistically insignificant coefficient. Size, in logs, enters all six equations, but it is statistically highly significant only in two equations, interestingly when a quadratic term for lnsize enters the specification. The quadratic term is itself statistically insignificant. The first term is positively signed and the quadratic is negatively signed. For both variables, more for the latter than for the former, the reported results are signaling that a specification combination other than the linear and quadratic would produce better fits, since what is reported logically implies a difference in z-statistics.

3.4 AWKWARD, UNEXPECTED, EMBARRASSING AND UNACCEPTABLE FINDINGS IN THE LITERATURE EXPLAINED IN THE LIGHT OF THE PROPOSED REFERENCE FRAMEWORK

Some results belonging to one or more of the unexpected, embarrassing, awkward, and unacceptable classes were already dealt with in the previous section. These are the results produced by the fitting of binomial specifications where either the minimum or the maximum in the inverted U-shaped or U-shaped function happens very near the extremes of the observed values of the independent variables, meaning that in fact the relationship is a monotonic either increasing or decreasing one. Other different ones are dealt with below.

Cefis and Marsili (2005) inform that the presence of growth makes size lose all its explanatory power. This is so in spite of the fact that a reported intercorrelation matrix shows only very low correlation coefficients between age, size and growth. The point is that size and growth are made up from the same substance and are in the reviewed study measured contemporaneously. Size is defined in terms of the number of employees as at the beginning of the time span 1996-2003. Growth in terms of the number of employees is also defined as at the beginning of the time span once it has been calculated as the rate of employment growth of a firm between 1994 and 1996, meaning past growth. Thus, results from the multivariate analysis are signaling that they are capturing the same effects, that is, they proxy for the same actual determinants of survival, and, as a consequence, one trouble the other in the regression analysis.

In Ha (2013)'s work, in direct opposition to what Cefis and Marsili (2005) inform, the additional introduction of growth in assets has the clear effect of enhancing the statistical significance of the coefficient of size measured in the same way. The contradiction is however only apparent, since in Ha's (2013) study the two covariates are measured at different times, that is, asset size is at initial time and asset growth is at one-year lagged from exit time or the time of the end of the follow-up time span. This piece of evidence brought about by Ha (2013) lends support to another thesis by the present work, that is, that, provided size, growth and age are measured and specified in accordance to its proposals, they may produce better fits and enhance the fits of other covariates and even of each other.

Bridges and Guariglia (2008) reported finding an embarrassing positive and significant association between the firms' age and their probability of failure. These authors inform that adding a quadratic term in age resulted in a poorly determined coefficient and did not alter the unexpected finding. The authors guess that their finding is likely to be driven by the fact that they only consider firms established over the short period 1996-2002. This explanation is consistent with a short period of follow-up of a sample of genuinely new firms and the existence of an inverted U-shaped relationship in a longer period of follow-up of this same sample of small firms. The observed monotonic relationship in the short term follow-up would be capturing the effects corresponding to the upward "arm" of the inverted U-shaped association, perhaps the "honeymoon" period effect, which might be statistically significantly revealed if the authors had used a pair of exponents for the binomial specification lower than the quadratic choice. Finally, the authors reported finding for a sample including firms born prior to 1996, having mean age of 21.3 years as opposed to 2.6 years for the first sample, the expected negative monotonic relationship. This is consistent with an inverted U-shaped relationship, only this time the monotonic age is capturing the effects associated with the descending part of the relationship. Unfortunately, the authors do not inform if a binomial specification has been tried for the second sample.

Bottazzi and Others (2011) reported finding direct monotonic relationships between, on the one side, size and growth, in terms of sales, and, on the other side, probability of default, which they apparently had difficulties in explaining once these positive relationships run against intuition and expectations. According to the authors, part of the explanation for their size finding can be attributed to data characteristics, as they record default events only for firms having established a formal credit relationship with a large commercial bank and these firms might be relatively big. However, still according to them, over-representation of small firms in the non-defaulting group is not observed. While the impact of size is, according to the authors, relatively big and persistent over time, growth is only significant in three out of twelve years/specifications for which probit regressions are performed, being that the coefficient sign varies from negative to positive.

Table results for the probit regressions and the above additional information reported by the authors are consistent with the existence of a real relationship along the lines with the standard binomial specification posited by the framework of reference. First, the authors do not inform whether or not they have tried a non-linear specification for size and growth, for example, a quadratic binomial specification. Thus, this possibility has not been eliminated. Second, the influence of an established formal credit relationship with a large commercial bank advanced by the authors as a partial explanation only reinforces consistency with the reference framework, since the first postulate of the framework of reference is that the financial strategy is one of the firm's strategy components that determines its size and probability of exit. Third and most important, the authors' information that they do not observe over-representation of small firms in the non-defaulting group is consistent with a relationship in which the extremes of the size range are associated with high probability of exit, that is, a binomial quadratic U-shaped relationship. Last, but far from being least, the behavior of the growth variable is completely consistent with the existence of a quasi-symmetrical either U-shaped or inverted U-shaped relationship. As already seen elsewhere, trying to fit a monotonic specification into an actual perfect or quasi-perfect binomial relationship will result in either a statistically non-significant coefficients or marginally statistically significant coefficients that change signs according to slightly varying specifications. Moreover, both size and growth are at current values and sales based, what may imply that they are capturing the same effects and, as a consequence, troubling one another because are contemporaneously entering the same regression equations.

4. CONCLUSIONS, STRENGHTS AND LIMITATIONS OF THE STUDY AND SUGGESTIONS FOR FUTURE RESEARCH AND SMALL BUSINESS DEVELOPMENT SUPPORT POLICIES

The present study has successfully demonstrated that its posited framework for research dealing with the relationships between, on the one side, small firm size, growth and age of the firm and, on the other side, small business survival is highly invaluable in face of strong support lent by three robust sources. Firstly, by an in-depth piece of research that investigated a very wide range of postulated determinants of small business survival. Secondly, by sound results from a large number of previous empirical works that has been thoroughly revised. Thirdly and last, but not least, by the power of the postulated framework of reference to explain a set of unexpected, embarrassing and unacceptable findings in the extant literature on small business survival.

Of course, it has to be acknowledged that the main limitation of this work is that it is partly based upon a piece of research that has dealt with a very small sample. This, in fact, has been duly done to the extent that recourse has been taken to the extant related literature to search for external support to its postulations. In general, research has been characterized by the use of samples of huge sizes. However, future research shall, on the other hand, make a remarkable effort to extend

investigation to many more firm-specific posited determinants than has until now been the case. After all, the reference study has as one of its main strengths the inclusion of many more variables measured at the enterprise level than at both the industry and economy levels, and this has made it possible achieving an amazingly very high level in the explaining of variations in the probability of small business survival.

Empirical research interested in understanding why size, growth and age of the firm are so strongly related to small business survival should give high priority to the study of firm-specific strategy-related variables, for they have been shown to be the most important determinants of small business survival and also of firm size and growth, and the source of strength behind the small firms that live longer. Also, this kind of research and research that seeks either to study the impact of firm size, growth and age on small business survival or use firm size, growth and age only as control variables should pursue more vigorously the use of non-linear specifications. Moreover, binomial specifications with pairs of powers different from the traditionally used unit and square combination should be preferred, since most strategy-related factors are associated with small business survival in asymmetrically U-shaped and inverted U-shaped relationships. Firm size, growth and age of the firm also behave in this same way in their relationships with small business survival.

Some suggestions for future research come from the revision work mainly because of technical difficulties faced in carrying out such a task. A first suggestion is that all studies dealing with either new small firms or incumbent ones, or even a mix of them, should present separate results for micro-, small-, medium- and large-sized enterprises. It is becoming clear that each of these categories of size has its own set of survivorship determinants, which in turn have individually a particular way of behaving, there being cases that the determinants behave differently depending on which category of size is under consideration. Treating all categories of size alike hinders the development of meaningful theories of small business survivorship. A second suggestion is that authors should report more fully summary statistics and correlations between the variables of their studies. This eases understanding and evaluation of their results. The value of this orientation is highlighted when it is recalled that science is an endless process of accumulation of knowledge carried out bit by bit through the contribution of new researchers that add on the achievements of previous ones.

The foregoing guides the focus of the analysis to the theories of the post-entry performance of small firms. Such theories draw upon both the learning process and productivity enhancement, both of which, as time passes by, pave the way to growth and survivorship, for the new small businesses that manage to master them. Empirical studies see the widely verified monotonic negative relationships between, on the one hand, size, growth and age and, on the other side, the new small firms' hazard of exit as a confirmation of these theories. Unless productivity enhancement takes up a very inclusive meaning, these theories are about to be challenged as to their capacity to hold in face of many findings of U-shaped and even inverted U-shaped relationships between, on the one hand, size, growth and age of the firm and, on the other hand, small business survival. The corresponding works seem to be neglecting interpretation of these divergent results, stating that they are equally in line with the theories and carelessly labeling them "liability of adolescence" or "the honeymoon effect", only because firm size, growth and age are not central to the studies but only controls. The present study has replicated these findings and state that they may be even wave-shaped. They are the result of the influence of a myriad of actual determinants associated with the hazard of exit, many linearly and many others non-linearly, but,

most importantly, in asymmetrical U-shaped and inverted U-shaped relationships, what makes the fitting of the "artificial" linear specification always produce an estimated negative coefficient with the hazard of exit. Many of the actual determinants of small business survival are also determinants of size, and as a consequence, of growth too and some exert their influence as time passes by, being then associated with the age of the small businesses.

Whether the post-entry performance of small businesses is a result of learning is not disputed here. What does need rethinking is the other part of the interpretation of the relationships between, on the one hand, size, growth and age of the firm and, on the other hand, small business survival. It is reasonable to believe that learning is the mainspring behind the post-entry performance of new small businesses, although they are many times started by former employees of other small-, medium- and large-sized enterprises. The emphasis on production productivity enhancement seems exaggerated, for, if labor productivity has been found to be a small business determinant, the reference study has shown elsewhere that it is by far not among the most important ones. The factors behind the small firms' size, growth and age are some components of the small firms' financing, production and market strategies and some components of their risk and return matrix.

Of course, the foregoing does not tell the whole story. It is necessary to state why, how, when and under what conditions these components of the small firms' financing, production and market strategies and of their risk and return matrix exert a net influence that almost always culminates in a negative linear relationship between, on the one side, the small firms' size, growth and age and, on the other side, the small business hazard of exit. The best conjecture is that such a result is due to a combination of fortunate wise strategy management and the workings of organizational population ecology, but going into details here is a task that is beyond the scope of the present study and so will be left for the future, as the last step of the commitment stated in the first paragraph of the introduction to this article.

If most of the heterogeneity across firms is attributable to factors specific to the industry, to its performance, to the aggregate economy, to economic cycles, business climate, and so on, there is little that public policy can do in reducing small firm failure rates. On the other hand, if firm-specific factors result in heterogeneity with respect to survival rates, an important implication is that public policy can have a positive impact in reducing the likelihood of failure. This study has shown by way of studying the relationships between, on the one hand, size, growth and age and, on the other hand, small business survival, that none of these three factors are the real determinants of the small business exit rates, but instead a range of firm-specific factors that are proxied by size, growth and age. The majority of these firm-specific real determinants are elements of the day-to-day operations of the small enterprises, many of which are under the control of the small business owner, or are affected by his/her decision making, or are dependent on the interests of outsiders, such as bank managers, suppliers and the government. All this means that public policy can do much in the field of small business development by giving support in the area of financing, production and market strategy devising.

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APPENDICES:

Appendix I Size, Growth, Age and Sales Variability Summary Statistics

(18)Total assets: Total assets; (19) Sales: Sales; (20) Number of employees: average number of employees; (21) Firm Age: number of years since establishment; (22) Growth: growth in employment level; (23) Sales variability: standard deviation of the first differences in annual sales, scaled by average sales over the period.

Variables	Mean	Standard Deviation	Minimum	Maximum
Total assets (Cr$) (18)	1,913,983.03	1,965,088.20	1,286.20	9,919,551.32
Sales (19)	3,616,509.39	3,498,883.93	85,203.97	19,796,611.87
Number of employees (20)	52.62	34.40	4.83	156.67
Firm age (21)	15.52	11.26	2.00	59.00
Growth (22)	3.74	17.60	-38.41	54.92
Sales variability (23)	0.45	0.22	0.07	0.95

Variables	Fractiles			Kurtosis*	Skewness
	0.10	0.50	0.90		
Total assets (Cr$) (18)	329,377.54	1,310,938.16	3,843,979.09	6.52	2.35
Sales (19)	652,450.30	2,592,671.51	7,372,064.18	7.10	2.42
Number of employees (20)	18.93	42.67	102.50	1.00	1.13
Firm age (21)	5.20	13.00	29.60	3.76	1.75
Growth (22)	-16.08	-0.08	25.92	0.92	0.59
Sales variability (23)	0.14	0.45	0.76	-0.40	0.20

Obs.: 1) Number of cases: 61; 2) Values in currency are in thousands and in 1992 prices, and the mean and year-end exchange rates for that year were Cr$4,516.74 and Cr$11,213.12 per US$ Dollar, respectively; 3) *According to Norušis (1992, p.167), in the SPSS the value of kurtosis for the normal distribution is, differently from many textbooks in statistics, 0 and not 3.

Appendix II Size, Growth, Age and Sales Variability Correlation Matrix

(18)Total assets: Total assets; (19) Sales: Sales; (20) Number of employees: average number of employees; (21) Firm Age: number of years since establishment; (22) Growth: growth in employment level; (23) Sales variability: standard deviation of the first differences in annual sales, scaled by average sales over the period.

	(18)	(19)	(20)	(21)	(22)	(23)
Duration (1)	-0.02	0.06	0.11	-0.03	0.06	0.01
Exit (2)	0.16	0.08	0.01	0.02	-0.20	-0.09
Net working capital (3)	-0.01	-0.09	-0.00	0.14	-0.24	-0.10
Total financial leverage (4)	0.07	0.32	0.12	-0.16	0.34	0.09
Medium- and long-term financial leverage(5)	0.34	0.26	0.09	0.27	0.04	0.16
Profitability (6)	-0.05	-0.03	-0.02	-0.03	0.22	-0.20
Operational cycle (7)	0.11	0.09	-0.03	0.27	0.00	-0.03
Machinery/fixed assets ratio (8)	-0.03	0.09	0.20	-0.18	-0.05	0.08
Automation degree (9)	0.02	0.07	0.25	0.11	0.09	0.09
Corporate diversification (10)	0.07	0.14	-0.10	-0.04	-0.07	0.04
Market concentration (11)	-0.34	-0.41	-0.30	0.09	-0.03	-0.09
Client concentration (12)	-0.03	-0.11	-0.08	-0.15	0.19	0.22
Sales concentration in big clients (13)	-0.10	-0.04	-0.14	0.18	0.05	-0.11
Sales unpredictability (14)	-0.16	-0.30	-0.19	0.03	-0.20	-0.15
Entrepreneur's risk tolerance (15)	0.01	0.06	0.07	-0.09	0.18	0.34
3-year-lagged GDP growth rate(16)	0.01	-0.00	-0.04	0.20	0.06	-0.04
1998 year dummy (17)	0.22	0.25	0.04	0.01	0.08	-0.21
Total assets (18)	1.00	0.83	0.59	0.28	-0.08	-0.08
Sales (19)	0.83	1.00	0.64	0.08	0.01	-0.14
Number of employees (20)	0.59	0.64	1.00	0.12	-0.27	-0.18
Firm age (21)	0.28	0.08	0.12	1.00	-0.28	-0.11
Growth (22)	-0.08	0.01	-0.27	-0.28	1.00	0.21
Sales variability (23)	-0.08	-0.14	-0.18	-0.11	0.21	1.00

Obs.: 1) Number of cases: 61; 2) Coefficients in absolute values higher than 0.20 are statistically significant at the 5% level, higher than 0.30 at the 1%, and higher than 0.40 at the 0.1%, in one-tail test.