Working papers

New Trends in accounting and management

University of Lleida

Department of Business Administration

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ISSN 2013-4916

Number 12/2016

OBJECTIVES

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DL: L-427-2009

ISSN: 2013-4916

Impressió: Service Point
Disseny de coberta: cat & cas
Maquetació: Edicions i Publicacions de la UdL

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THE PREDICTABILITY OF FINANCIAL DATA ON POST-ENTRY SUCCESS OR FAILURE BEFORE AND DURING THE RECENT CRISIS

Abstract

This paper does research on the predictability of seven financial factors and one non-financial factor on the success or failure of entrants. It enriches the empirical study of the literature of predicting business success or failure and post-entry performance. Particularly chosen are the firms incorporated in 2000, 2001, 2008 and 2009 in manufacturing and distributive industries. Logistic model is used for analysis and comparison of the changes of the predictability in three dimensions: year after year versus just the first year, manufacturing versus distributive industries, and before versus during the recent crisis. The results show instability in the predictability of some financial factors especially in the year after year analysis. However, positive effects of firm size, profitability and corporate group on success are observed; besides, asset liquidity plays a more significant role in manufacturing industries. The predictability of liability-related factors seem to be particularly influenced by the crisis: in the year after year analysis, when stepping into the crisis the predictability of indebtedness is not as strong as it is in the pre-crisis period and the predictability of liability liquidity weakens more in manufacturing industries compared to distributive industries.

Keywords

Post-entry success; predictability; changes; manufacturing industries; distributive industries; crisis

1. INTRODUCTION

Business failure is a hot topic attracting many researchers in different countries (Dimitras et al., 1996); and it has also been researched for several decades: Balcaen and Ooghe (2006) list some important prediction models of business failure and the related comments since 1960s last century; what is more, Bellovary et al. (2007) record the literature regarding bankruptcy prediction dating back to 1930s. In fact, business failure is closely related to the topic of firm performance. Post-entry performance is an important branch of the research of new entrants and it has been discussed in depth especially in the research articles — like those written by Mata et al. (1995), Boeri and Bellmann (1995), and Audretsch et al. (1999) — published in industry organization journals.

Performance may include several factors and success or failure could be just one of them, for example being shown in the article of Murphy et al. (1996). However, there is no unique definition of failure (Mellahi and Wilkinson, 2004). In fact, just as Murphy et al. (1996) point out, business success or failure can be subjectively defined by scholars themselves. It can be interpreted as exit from the market (Mellahi and Wilkinson, 2004) or ceasing operation (Åstebro and Bernhardt, 2003). Research purpose can be one important factor making scholars choose their required definitions. For example, Headd (2001) does research on the factors for successful close of business, a concept being subjectively judged by owners, which is different to the traditional dichotomy of business success or failure.

In this research, success or failure is built on the foundation of firm survival. Some research papers identify the mark of new firms out of survival (or exiting) as two consecutive years without reporting information — like the research of Fotopoulos and Louri (2000) and Geroski et al. (2009). Here the identification would be adopted with a little change: one firm would be judged as failure when the event of two consecutive years without reporting operating revenues occurs; or else, it would be judged as success. As for the life-span of survival, it is measured since its incorporation till the year before the previously defined failure event (if happening); or, the life-span may go beyond the observed period if no failure event showing, but it dose not impact the research. The research of Scott and Bruce (1987) to some extent supplies the rationale for this identification: they believe that product and market are key in the inception stage. The classification standard of success or failure here (whether one firm can continuously generate and report operating revenues) is the very vinculum linking product and market.

However, this identification has its drawback: it cannot show the time point of one firm perpetually exiting from market and then the real lifetime from its entry to exit, as it neglects the future information after the defined two consecutive years. Nevertheless, it still has practical meanings, that is, it can measure the life-span before stopping to report operating revenues in a relatively not too short term (two consecutive years); and this may indicate a significant stoppage of operation, which could be viewed as the symbol of failure, because for instance Dimitras et al. (1996) point out that discontinuity of operation can be one mutual trait of miscellaneous definitions of failure in general.

The purpose of this paper is to record and compare the changes and differences of the predictability of eight factors (seven financial and one non-financial) on the success or failure of entrants, by way of separately testing the first three years data year by year and just the first year data for the whole observed period, before and during the recent crisis since 2008 between two different types of industry (manufacturing and distributive industries). It is not fresh to use financial information to explore the success or failure of new firms: for example Laitinen (1992) specially stresses three indicators of financial statements (indebtedness, revenue-generating capacity and start-up size) in the prediction of new firm failure. There are also plenty of research literature about the impacts of the recent crisis, among which however not too many focus on the impacts on the prediction of business success or failure.

It is necessary to observe and analyze the impacts of crisis because of the poor performance of Spanish economy during the recent crisis: for example, Xifré (2014) compares the average annual GDP growth rate between two periods (from 1999 to 2007 and from 2008 to 2011) in one table with the data sourced from Eurostat; and the result shows that the average growth is positive in pre-crisis period but negative during the crisis. Industry difference is also stressed in this research. Although the European Community generally categorizes industries into as many as 21 types in NACE Rev.2 which are encoded by sections from A to U in the publication of Eurostat (European Commission, 2008), researchers may only choose their required sections. For example, Saridakis et al. (2013) choose manufacture, construction, professional services and distribution as the targeting industries in their research. Here, in this paper manufacturing and distributive industries are selected — Section C (manufacturing) and Section G (wholesale and retail trade; repair of motor vehicles and motorcycles) of NACE Rev.2 in the publication of Eurostat (European Commission, 2008).

The followings are organized in this order: Section 2 reviews the literature that lays the foundation of this paper (that is, those highly related to the assumptions here are focused on) and the hypotheses are too formed in this section; Section 3 introduces the data and variables together with their selecting principles and criteria as well as logistic regression methods; Section 4 analyzes both the statistical results of the original data and the regression results of the chosen methods; and Section 5 concludes the research results of this paper and illustrates the limitation as well.

2. LITERATURE REVIEW AND HYPOTHESES

The impacts of initial resources and conditions on the performance of new entrants are the core or significant part of some research. Sharma and Kesner (1996) shed some light on the impact of scale of entry and find its impacts being different in different market conditions (highly concentrated or not). Huyghebaert and Gucht (2004) give weight to the impacts of initial firm size and initial leverage as well as industry conditions. Geroski et al. (2009) find initial conditions to a large extent impact the survival of new firms, but these impacts tend to decrease when firms ages; they further develop the research from just the initial conditions to both initial and current conditions. The thinking that explores the world behind initial conditions would be employed in this paper with some developments.

Industry and industry-specific characteristics have played an important role in the research of new entrant performance for several decades — like in the research of Audretsch (1994), Mata et al. (1995), and Geroski et al. (2009). Some of those compare the impacts of same factors in different industries and record the difference: for example, the research of Fritsch et al. (2006) indicates that minimum efficient size does not show statistical significance in manufacturing sector but in services sector. Some others weigh the impacts of firm-related and industry-related characteristics: Sharma and Kesner (1996) using logistic regression find the impact of industry-related characteristics is stronger than that of firm-related characteristics on post-entry performance.

As for the research of the impacts of macro-economic environment, some researchers — for example Geroski et al. (2009) — use concrete macro-economic variables whereas others consider macro-economic environment as a whole. For instance, Fotopoulos and Louri (2000) believe economic downturn tends to cause more failure; on the contrary, as a non-traditional result, the research of Boeri and Bellmann (1995) manifests that exit dose not wave with economic cycle. However, there is not too much research targeting on the impacts of the crisis on the predictability of factors on success. A similar case in point is the research of Abildgren et al. (2013) that points out the protrudent effect of the soundness of bank on firm default during the crisis.

Firm size works as a considerable factor in survival analysis not just for new firms. For example, Pérez et al. (2004) analyze the impacting factors of firm survival in manufacturing industries with no special limitations on firm age, and their findings show that small firms are riskier than large ones. The theory that may explain this phenomenon is liability of smallness (Aldrich and Auster, 1986). Audretsch and Mahmood (1995) also point out the gap between size and minimum efficient scale would give rise to cost disadvantage. A lot of research confirms the positive effect of start-up size on survival, just as Colombo et al. (2004) said. In spite of that, Audretsch et al. (1999) reach an interesting result that start-up size is not related to survival.

Hypothesis 1: Firm size is positively related to success.

Because it is the commonsense that gaining profits is the main purpose for doing business, profitability, needless to say, should be an important indicator of business success or failure. Financial ratios related to profitability are employed by academicians — such as Sharma and Mahajan (1980) and Pompe and Bilderbeek (2005) — for predicting business failure and bankruptcy. The research of new firms also views profitability as one crucial impacting factor: for example, Fotopoulos and Louri (2000) find that profitability is negatively related to hazard, and Delmar et al. (2013) too observe positive effect of profitability on survival; both showing profitability being a positive factor.

Hypothesis 2: Profitability is positively related to success.

The frequency of appearance of indebtedness is quite high especially in the models and literature for predicting bankruptcy, like in the research of Ohlson (1980 cited Parnes, 2011) and Platt and Platt (1991); Altman and Lavallee (1981) too include indebtedness as one variable for analyzing business failure in manufacturing and retailing industries, which reflects the importance of solvency factor in prediction. Despite that, the impacts of indebtedness on firm survival may not be easily concluded. For example, Zingales (1998) dose survival analysis in trucking industry with the condition of deregulation, and finally negative relationship between high leverage and survival is found. By contrast, Huynh et al. (2012) analyze the impacts of initial financial conditions on firm hazard in Canadian manufacturing entrants; with a more complex conclusion, they find positive relationship between leverage and hazard in high leverage cases but negative relationship in other cases.

Hypothesis 3: Indebtedness is negatively related to success.

In 1977, Altman et al. (1977 cited Dambolena and Khoury, 1980) proposed a modified model in researching bankruptcy which included the ratio of current assets to current liabilities as the proxy of liquidity. However, this ratio is not the only one for indicating liquidity. For example, for measuring liquidity, Huyghebaert et al. (2000) choose three variables (the ratio of current assets to current liabilities, the ratio of cash and marketable securities to current liabilities, and the proportion of net working capital to total assets). In this paper, the ratio of current assets to current liabilities, known as general liquidity, is selected, since it portrays the general ability of one firm to cover its current liabilities.

Hypothesis 4: General liquidity is positively related to success.

The proportion of current assets to total assets as an indicator of asset structure is often employed when researching on business failure especially in the miscellaneous Z-Score and bankruptcy prediction models, for example in the research of Briggs and MacLennan (1983) and Pervan et al. (2011). In fact, the proportion of current assets to total assets also serves

for indicating liquidity, just like the role played in the research of Grünberg and Lukason (2014); so in this paper the proportion of current assets to total assets represents the liquidity of assets. Because Asimakopoulos et al. (2009) find negative effects of current assets on profitability, here asset liquidity is assumed to be a negative factor.

Hypothesis 5: Asset liquidity is negatively related to success.

The impacts of debt maturity on firm performance are too the main theme of some research: for example, the work of Schiantarelli and Sembenelli (1997) denies positive effects of short-term debt on some parts of firm performance, and they believe there is positive relationship between debt maturity and performance in some situations. Different to the above results, as a transnational study, Baum et al. (2007) find the existence of positive relationship between short-term liabilities and profitability in Germany, rather than in the United States. Therefore liability maturity structure should be taken into consideration. Here the proportion of current liabilities to total liabilities is chosen as the proxy of liability liquidity (measuring liability maturity structure from the opposite angle), because it also works as one indicator of liquidity for predicting failure, like in the research of Charitou et al. (2004).

Hypothesis 6: Liability liquidity is negatively related to success.

Asset rotation, usually as a proxy of efficiency or activity, is commonly chosen as a predicting factor especially in the research of bankruptcy prediction, like the widely cited Altman's Z-Score (Altman, 1968). In addition, the research of Altman and Lavallee (1981 cited Altman, 1984) reveals the existence of strong sensitivity of asset rotation to industry effects in some situations. Fairfield and Yohn (2001) state the theoretically positive relationship between the increase in asset turnover and profitability; and Santosuosso (2014) finds positive and significant relationships (albeit at different significant levels) between total asset turnover and several profitability indicators. Notwithstanding that, it still deserves to be further explored as to the question that to what extent it can predict failure: for example, Charitou et al. (2004) do not observe asset rotation working as a significant variable in their univariate analysis.

Hypothesis 7: Asset rotation is positively related to success.

Cuervo et al. (2007) in their book identify two types of entrepreneurship: individual entrepreneurship and corporate entrepreneurship. However, the exploration of the impact of these two types of entrepreneurship on entrant performance has been long-lasting. Audretsch and Mahmood (1995) illustrate the rational for the expectation of corporate entrepreneurship: the experience of the already existing firms would help their subsidiaries against failure. Nevertheless, empirical results may deviate from the expectations. Fox instance, the research results of Jensen et al. (2008) do not support the view that compared to de alio firms de novo firms tend to underperform in survival. Here corporate group

(measuring whether an entrant belongs to a corporate group) is used as the proxy of corporate entrepreneurship.

Hypothesis 8: Corporate group is positively related to success.

3. DATA, VARIABLES AND METHODOLOGY

It is common that past research chose a series of cohorts established in a certain time period as researching sample. And this time span can be as long as more than one decade — fox example, from 1984 to 1998 including 15 cohorts in the research of Fritsch et al. (2006); or, on the contrary, Audretsch and Mahmood (1995) just chose one cohort (founded in 1976) but it is tracked for ten years. In this paper, four cohorts are selected from the Iberian Balance sheet Analysis System (SABI) database, namely the firms incorporated in 2000, 2001, 2008, and 2009; furthermore, 2000 and 2001 cohorts as well as 2008 and 2009 cohorts are separately bound together as the upturn group and downturn group, because Spain was in economically booming period from 2000 to 2007 (Petrovic el al., 2016) and was hit by the crisis since 2008 according to the data comparison of Xifré (2014). By virtue of combining two cohorts into one group, the sample size of each group can be enlarged and the bias of year difference can be weakened to some extent.

Because of the dispersion of the incorporation date and in order to get data in completely financial year, the first year of one firm is defined as the year after the incorporation year. For instance, if one firm is incorporated in October 2008, 2009 is its first year. Thus, 2001, 2002, 2009, and 2010 are the targeted first years of the four cohorts. The sample only includes the firms that report operating revenues in their first year. All the firms in the sample are tracked for five years after the incorporation (for example, the 2000 cohort is tracked from 2001 to 2005), which is similar to the selecting method in the research of Fritsch et al. (2006). In fact, it is the importance and the traits of survival that make five-year period after incorporation be chosen. According to the research of Calvino et al. (2015) on different countries, since founding, the survival rate would decline to around 60 percent after three years and to about 50 and 40 percent after five and seven years separately; in addition, they further find age two is a significant time node with regard to hazard, which is already contained in the five-year period.

The selection of factors and variables are based on the research of Murphy et al. (1996) which points out eight facets in measuring the performance of entrepreneurship: efficiency, growth, profit, size, liquidity, success or failure, market share, and leverage. In this paper, success or failure works at the side of dependent variable: success is attached to the firms that do not show the failure event during the observed five-year period; failure is tagged to those showing the failure event (defined as the event of two consecutive years without reporting operating revenues). Market share is dropped in that the database does not proffer the total sales of the whole industries in 2000 and 2001. Growth is also abandoned. Therefore, five dimensions of performance measurement are remained for comprising independent variables: size (total assets), profit (economic profitability), leverage

(indebtedness), liquidity (general liquidity), and efficiency (asset rotation). Additionally, asset liquidity, liability liquidity and corporate group join in as independent variables. Table 1.1 and 1.2 show the details of the definitions and measurements of variables.

Here in order to reduce the collinearity between some variables, transformations are made to some variables — just as Taffler (1983 cited Balcaen and Ooghe, 2006) dose — such as reciprocal and logarithm; besides, the method of categorizing profitability into two types does appear in the literature, for example the research of Ohlson (1980 cited Parnes, 2011). In particular, natural logarithm is calculated for total assets; the reciprocals of indebtedness and general liquidity are used as the proxies of leverage and liquidity; profitability (profit factor) is subdivided into two levels: one with positive economic profitability, and, the other with null or negative economic profitability; corporate group is too categorized into two levels: one with the number of companies in the corporate group being more than zero, and, the other with zero in this number.

Table 1.1

Definition of dependent variable

Dependent variable	Definition	Measurement
Success or failure	Whether or not showing the failure event: two consecutive years without reporting operating revenues during the first five-year period	It equals 1 if not showing the defined failure event during the observed period, meaning success; equals 0 if showing the defined failure event during the observed period, meaning failure.

Table 1.2
Definitions of independent variables

Factors	Independent variables	Definitions	Measurements in regression
Firm size	Total assets	Total assets in thousands of Euros	Natural logarithm of one plus total assets: Ln (1+total assets in thousands of Euros)
Profitability (or profit)	Economic profitability	Profits before tax/Total assets	Profitability, equals 1 if the economic profitability of one firm is positive figure; equals 0 if the economic profitability of one firm

			is zero or negative figure.
Leverage	Indebtedness	(Total shareholders funds and liabilities—Shareholders equity)/Total shareholders funds and liabilities	Reciprocal of indebtedness: 1/indebtedness
Liquidity	General liquidity	Current assets/Current liabilities	Reciprocal of general liquidity: 1/general liquidity
Efficiency	Asset rotation	Sales/Total assets	Sales/Total assets
Asset liquidity	Proportion of current assets to total assets	Current assets/Total assets	Current assets/Total assets
Liability liquidity	Proportion of current liabilities to total liabilities	Current liabilities/Total liabilities	Current liabilities/Total liabilities
Corporate group	Corporate group	Number of companies in corporate group	Corporate group, equals 1 if the number of companies in corporate group is more than zero; equals 0 if the number of companies in corporate group is zero.

An important guidance in this research for selecting variables is that the value of the variable selected should be available in most of the firms in each cohort. The purpose of this is to reduce the number of dropped cases, for the sake of overcoming the small sample problem (Brüderl et al., 1992). Because of that, some variables are not chosen here. For example, number of employees is not suitable for working as the proxy of firm size — albeit prevalently used in the literature, such as the research of Wagner (1999) and the research of Tveterås and Eide (2000) — because part of firms does not report this information in SABI database.

Logistic regression is operated several times separately on the sample that is sorted twice: the first (shown in Figure 1) is to decompose the sample according to the life-span (or years of survival), just as Persson (2004) does in her research; the second (shown in Figure 2) is to generally classify the sample within the whole five-year period. In particular, these two classifications would be explained as follows. In the first detailed classification, regressions would be operated respectively on the firms with the life-span of 1 year and those with more than 1 year, the firms with the life-span of 2 years and those with more than 2 years, and the firms with the life-span of 3 years and those with more than 3 years. In the second general classification, the firms showing the failure event during the whole five-year period would be regressed with those not showing. Here considering the imbalance of the number of cases in the dichotomous groups of dependent variable, cases are weighted by their relative frequency in order to roughly equal the number of cases in the paired success and failure groups.

As for the first classification method, it is designed to observe the changes of impacts with time for year after year analysis — just like the method used by Yazdanfar and Nilsson (2008) in which factors are observed one, two and three years separately before bankruptcy. Particularly, the data of the first, second and third year are regressed respectively, as long as these can be covered by the life-span. (Because the observed period is five years and the time span of failure event is two consecutive years, here the

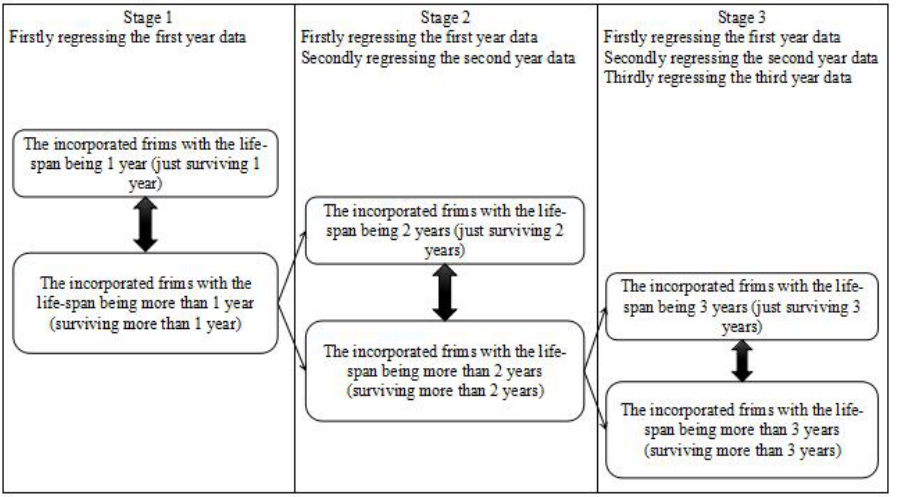

Figure 1. The first detailed classification for year after year analysis

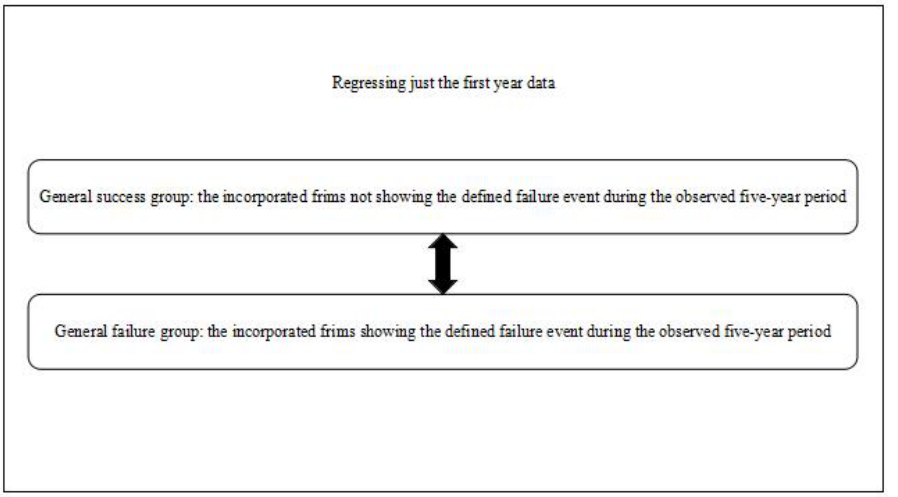

Figure 2. The second general classification for just the first year analysis

maximum life-span of the failure is three years, thus the third year data being the utmost.) The advantage of this method is that it can find, say, which factor showing significant impacts in all the first three years and which factor not.

The target of the second classification here is to explore the impacts of the first year data on post-entry success or failure (for just the first year analysis). That is, doing logistic regressions with the first year data on all the firms reporting revenues in their first year which are identified as success or failure by observing if showing the failure event in the whole five-year period after incorporation. In fact, this type of method (confining a fixed time after the start of firms for tracing their status with self-made standards for identifying survival or failure) can be found in the past research of some scholars, like Åstebro and Bernhardt (2003). The importance of the first year of trading is also highlighted by Saridakis et al. (2013).

4. STATISTICAL DESCRIPTIONS AND REGRESSION RESULTS

4.1. Statistical descriptions

The statistical description part summarizes the results of independent-samples T-test of means in both two classifications. Comparisons are operated between the paired success and failure subgroups in the same group and the same condition. In concrete, the means of seven variables (original data) would be compared: total assets, economic profitability, general

liquidity, indebtedness, the proportion of current assets, the proportion of current liabilities, and asset rotation. Mathematical variations (like logarithm and reciprocal) are not used in these comparisons.

A. Mean-comparison results of the first detailed classification (Table A1.1 ⟶ *A1.4*)

Generally speaking, as for some variables, it is easy to observe some commonly existing results. Notwithstanding that, time-related, industry-related, and macro-economy-related characteristics still shape the results with different features. One concept introduced is year of age (here representing the first year, second year or third year after the incorporating year of firms) which works as the time mark for capturing the traits in different subgroups being in the same year ranking after incorporation.

In all the paired subgroup cases, success ones show more average total assets than failure ones. Both the success and failure subgroups surviving at least three years and more show more average total assets than those surviving less than three years in the same year of age after incorporation; however, this trend does not always hold during the crisis. Besides, just from the angle of success subgroups, those surviving more than three years show more average total assets than those surviving more than two years; and those surviving more than two years show more average total assets than those surviving more than one year.

Regarding the means of economic profitability, rarely do positive figures appear, which signifies that all the failure subgroups and most success subgroups suffer losses on average. However, even if in loss, success subgroups still perform better than their paired failure ones, because of getting less losses on average. The sequencing trend in accordance with years of survival again emerges except for in the first year of the manufacturing failure subgroups during the crisis: the more years the subgroups surviving, the better performance in average economic profitability they show, no matter for the survival or the failure ones.

There is no obvious trend in comparing the means of general liquidity between the paired success and failure subgroups. On the other hand, in the success subgroups, those with longer life-span tend to show less average general liquidity in the same year of age; and this tendency can also be observed in the failure subgroups before the crisis.

Success subgroups show less indebtedness on average in all the cases compared to their paired failure ones. Moreover, in most cases, the means of success subgroups are less than 100 percent whereas those of failure subgroups are beyond 100 percent. When observing the data separately in the success and failure subgroups, those surviving longer tend to show less indebtedness on average in the same year of age, except for the manufacturing failure subgroups during the crisis.

The comparison stories of asset liquidity and liability liquidity are similar: the trend that success subgroups show less average proportions of current assets and current liabilities commonly exist except in the distributive industries where the average proportion of current assets displays multiple results; in addition, the averages of both the two proportions (especially the proportion of current liabilities) tend to stay stable in the success subgroups compared to the failure ones in the same year of age.

The comparing results of asset rotation are still regular: in most cases success subgroups show less average asset rotation; and, in the same year of age, decreasing trend is manifest in the success subgroups and the pre-crisis failure subgroups, when life-span increases.

B. Mean-comparison results of the second general classification (Table A2.1 ── *A2.4*)

In this part, there are four subgroups: the upturn and downturn subgroups in manufacturing industries and the upturn and downturn ones in distributive industries. Only the means of the first year data are compared.

Successful subgroups show more total assets, and less losses (with all the success and failure subgroups showing negative figures in average economic profitability), general liquidity, indebtedness, the proportion of current assets (not in distributive industries), the proportion of current liabilities, and asset rotation on average. Furthermore, all the failure subgroups show average indebtedness being more than 100 percent; by contrast, all the success subgroups show average indebtedness being less than 100 percent. Both the failure and success subgroups increase their average proportions of current assets, when stepping into the crisis.

4.2. Regression results

A. Regression results of the first detailed classification with the transformed variables (Table A3.1 ── *A3.5*)

This section describes the results of logistic regressions. For each group, three stages of regression are operated: stage 1 deals with the subgroups surviving just one year and those more than one year; stage 2 copes with the subgroups surviving just two years and those more than two years; stage 3 deals with the subgroups surviving just three years and those more than three years. In stage 1 only the first year data are regressed; in stage 2, the data in both the first year and second year are regressed separately; in stage 3, the data in the first year, second year and third year are regressed in order. And further two-step regression is operated in each stage with the data in one particular year: step 1 regressing all the eight variables one by one; step 2 regressing only the variables that are significant at the confidence level of 95 percent in step 1. Finally recorded in the tables are the variables being significant at the confidence level of 95 percent in step 2. Note that, thanks to the reciprocal transformations, the effects of general liquidity and indebtedness in the regressions are opposite to their originals: for example, when saying that general liquidity or indebtedness shows positive effect on success, it means that the coefficient sign of its reciprocal in the regression is negative.

In the upturn group of manufacturing industries, total assets, profitability, and corporate group are strong and positive indicators for success in the regressions of all the three stages. On the other hand, indebtedness, the proportion of current liabilities, and asset rotation (albeit some of them show significance frequently) are weak indicators, for the reason that they show opposite signs of coefficient in different stages. The proportion of current assets (as a negative indicator) tends to appear more in the regressions of the first year whereas

general liquidity may perform as a positive indicator in the regressions of the second or third year.

In the downturn group of manufacturing industries, strong and positive predictive effects on success are kept in total assets and profitability in all the regressions. The proportion of current assets (negative effects) as well as corporate group (positive effects) can be classified as secondary strong predictors. Others should be classified as weak indicators showing relatively lower frequency of significance, especially the proportion of current liabilities also due to its change of coefficient sign.

In the upturn group of distributive industries, total assets, profitability, and corporate group are still the top three strongly positive indicators for success. General liquidity and the proportion of current liabilities are ranked as the second class indicator, displaying positive and negative effects respectively. Indebtedness and asset rotation are unstable in the sign of coefficient; besides, the proportion of current assets only show significance (negative effect) once.

In the downturn group of distributive industries, total assets, profitability, and corporate group keep on working as the top class positive indicators. General liquidity (positive effects) and the proportion of current liabilities (negative effects) show significance not as commonly as that of the above three. Indebtedness and the proportion of current assets are weak indicators from the angle of the frequency of significance, separately with positive and negative relationships to success. Here asset rotation is the weakest because of never showing significance.

B. Regression results of the second general classification with the transformed variables (Table A4.1 ── *A4.4*)

Total assets, profitability and corporate group are positively related to success with significance in all the regressions. Negative and significant effects of the proportion of current assets are too found in manufacturing industries; similarly, the proportion of current liabilities exerts negative and significant effects on both the manufacturing and distributive industries only in the pre-crisis period. General liquidity and indebtedness occasionally perform positive and significant effects. No significant effect is observed as for asset rotation.

It also seems that, compared to in manufacturing industries, the predictability of factors in distributive industries tends to be impacted more by the crisis. This is because, with the advent of the crisis, the number of significant predictable factors in distributive industries halves (from six to three) whereas that number in manufacturing industries keeps stable at five (though with general liquidity replacing the proportion of current liabilities).

5, CONCLUSION AND LIMITATION

By comparing the regressing results of the first detailed (for year after year analysis) and the second general (for just the first year analysis) classifications, it is easy to find that the results of the second do not challenge those of the first much. In fact, the majority is maintained: positive effects of firm size, profitability, and corporate group as well as negative effects of the proportion of current assets in manufacturing industries; and the weakness of asset rotation as predictor maintaining in both the first and second classifications. However, compared to the results of the first, more steady results are generated in the second, like positive effect of indebtedness as well as negative effects of the proportion of current liabilities though not always showing significance. Ergo, as the main body, the followings are concluded for the first detailed classifications.

No matter in manufacturing or distributive industries, firm size and profitability are the most powerful two factors in the prediction of post-entry success or failure, and both are positively related to success. The positive effects of firm size and profitability also correspond to most past literature; and the appearance of significance in all the regressions means that the impacts of these two factors penetrate all the first three years.

Corporate group performs its positive effects in all the regressions in distributive industries rather than in manufacturing industries; even if so, it should still be seen as a reliable predictive factor with long-lasting influence (at least for the first three years). This supports the theoretical expectation of corporate entrepreneurship: the assistance of the experience of existing firms to their subsidiaries (Audretsch and Mahmood 1995).

As for asset liquidity (showing negative relationship to success), its significance is more prevalently observed in manufacturing industries, other than in distributive industries. This phenomenon may not be quite surprising, because asset liquidity from the opposite side represents the impact of fixed assets which is negatively related to firm hazard (Fotopoulos and Louri 2000), and firms in manufacturing industries tend to hold higher proportion of tangible fixed assets than those in distributive industries. In the contrary, liability liquidity may be more predictable in distributive industries, because negative relationship of the proportion of current liabilities to success is held in distributive industries while in manufacturing industries both positive and negative effects are obtained in different regressions. In addition, the frequency of significance of the proportion of current liabilities obviously lowers down in manufacturing industries since driving into the crisis. This may indicate that the crisis imposes more impacts on the predictability of liability liquidity in manufacturing industries than in distributive industries.

Similar to the status of liability liquidity, indebtedness and asset rotation too have double-sided effects (positive and negative effects respectively shown in different regressions) to success in both manufacturing and distributive industries. In fact, the complexity of the impacts of liability liquidity and indebtedness are also supported by the scholars who find the impact of one factor could be different in different countries (Baum et al. 2007) or situations (Huynh et al. 2012); however the double-sided effects of asset rotation are beyond its theoretically positive expectation. This may means that asset rotation is not suitable for predicting entrant success or efficiency is not as significant as supposing here, which are relatively close to the literature showing the problem of the significance of asset rotation —

for example, Altman (1968) and Charitou et al. (2004) — or supporting the existence of living space for inefficient firms in some situations (Zingales, 1998).

In both the two types of industries, the frequency of the significance of indebtedness decreases during the crisis. Thus there seems to be a tendency that the crisis, to some extent, would weaken the predictability of liability-related factors (liability liquidity and indebtedness). In fact the crisis dose cause negative repercussions on financing Spanish business (Maudos 2015), so it should be reasonable to relate the reduction of the predictability of liability-related factors and the crisis. And manufacturing industries are more impacted by the crisis than distributive industries — according to the research of Fariñas and Martín-Marcos (2015) which points out construction and manufacturing industries are influenced by the crisis most strongly in Spain; thus one of the results would be the decrease of the predictability of liability liquidity in manufacturing industries.

Different to those factors that do not keep uniqueness in their signs of coefficient, liquidity (general liquidity) shows stable and positive relationships to success. It is in accord with the theoretically expectation of Huyghebaert et al. (2000) (who point out generally liquidity is an indicator for buffering current liabilities, notwithstanding that they do not find significance on this factor at 95 percent confidence level).

Though the above conclusions enrich the empirical research of post-entry performance from the angle of success (or failure) prediction, the research is still limited especially by the availability of information. For example, number of employee and the variables based on that cannot work here because of incompleteness of the related information (which is already stated earlier in this paper). Future research would be built on a more complete information database.

Appendix A

TA = total assets, EP = economic profitability, GL = general liquidity, IN = indebtedness, CA = the proportion of current assets to total assets, CL = the proportion of current liabilities to total liabilities, AR = asset rotation, LTA = Ln total assets, PR = dichotomous variable of profitability in regression, RGL = reciprocal of general liquidity, RIN = reciprocal of indebtedness, CG = dichotomous variable of corporate group in regression.

Table A1.1

Mean-comparison of the first detailed classification: the upturn group of manufacturing industries

Stage 1	Original variables	Failure (562 cases)	Success (7977 cases)	Significance
The first year	TA	618.37	1303.83	0.335
	EP	-1.03	-0.06	0.160
	GL	9.97	2.01	0.331
	IN	1.74	0.93	0.085
	CA	0.68	0.62	0.000
	CL	0.81	0.78	0.044
	AR	6.19	2.20	0.126
Stage 2		865 cases	6940 cases	
The first year	TA	391.67	1413.13	0.000
	EP	-0.26	-0.03	0.046
	GL	5.31	1.40	0.353

	IN	1.17	0.90	0.021
	CA	0.65	0.62	0.022
	CL	0.83	0.78	0.000
	AR	2.63	2.14	0.027
The second year	TA	410.63	1868.06	0.000
	EP	-0.33	-0.02	0.000
	GL	4.60	1.29	0.043
	IN	1.58	0.93	0.010
	CA	0.65	0.62	0.022
	CL	0.82	0.76	0.000
	AR	2.60	2.00	0.014
Stage 3		535 cases	6134 cases	
The first year	TA	852.27	1508.08	0.425
	EP	-0.10	-0.01	0.060
	GL	2.02	1.34	0.123
	IN	0.98	0.88	0.031

	CA	0.65	0.62	0.031
	CL	0.80	0.78	0.049
	AR	2.37	2.12	0.041
The second year	TA	1113.18	1997.20	0.555
	EP	-0.19	0.01	0.077
	GL	1.17	1.29	0.274
	IN	1.31	0.89	0.191
	CA	0.65	0.62	0.051
	CL	0.80	0.76	0.000
	AR	2.54	1.94	0.002
The third year	TA	1173.08	2157.55	0.523
	EP	-1.11	0.01	0.029
	GL	3.28	6.26	0.797
	IN	2.46	0.88	0.056
	CA	0.66	0.62	0.008
	CL	0.80	0.75	0.000

	AR	4.05	1.86	0.008

Table A1.2

Mean-comparison of the first detailed classification: the downturn group of manufacturing industries

Stage 1	Original variables	Failure (488 cases)	Success (4056 cases)	Significance
The first year	TA	409.64	999.12	0.000
	EP	-0.38	-0.13	0.000
	GL	2.32	4.92	0.565
	IN	1.26	0.98	0.008
	CA	0.71	0.71	0.925
	CL	0.84	0.80	0.013
	AR	2.51	2.43	0.845
Stage 2		506 cases	3463 cases	
The first year	TA	718.56	1057.36	0.076
	EP	-0.16	-0.09	0.532
	GL	10.17	3.81	0.422
	IN	1.03	0.96	0.606

	CA	0.73	0.70	0.013
	CL	0.81	0.80	0.531
	AR	2.32	2.31	0.995
The second year	TA	664.54	1200.98	0.001
	EP	-0.26	-0.05	0.000
	GL	9.41	3.32	0.130
	IN	1.22	0.93	0.000
	CA	0.71	0.69	0.233
	CL	0.80	0.78	0.067
	AR	2.21	2.07	0.394
Stage 3		457 cases	2943 cases	
The first year	TA	686.75	1132.23	0.016
	EP	-0.51	-0.03	0.082
	GL	5.25	3.57	0.680
	IN	1.48	0.87	0.116
	CA	0.72	0.70	0.207

	CL	0.82	0.80	0.228
	AR	3.48	2.15	0.092
The second year	TA	865.84	1272.30	0.124
	EP	-0.13	-0.04	0.004
	GL	10.37	1.84	0.312
	IN	1.04	0.91	0.006
	CA	0.71	0.69	0.120
	CL	0.81	0.78	0.026
	AR	2.40	2.03	0.314
The third year	TA	860.19	1316.09	0.092
	EP	-0.52	-0.05	0.001
	GL	12.29	1.89	0.268
	IN	1.42	0.94	0.000
	CA	0.70	0.68	0.282
	CL	0.79	0.77	0.184
	AR	2.41	1.84	0.104

Table A1.3

Mean-comparison of the first detailed classification: the upturn group of distributive industries

Stage 1	Original variables	Failure (1428 cases)	Success (17181 cases)	Significance
The first year	TA	260.39	554.91	0.154
	EP	-0.83	-0.10	0.004
	GL	2.18	1.75	0.139
	IN	1.90	0.99	0.001
	CA	0.74	0.73	0.137
	CL	0.86	0.84	0.000
	AR	6.74	3.17	0.034
Stage 2		2278 cases	14534 cases	
The first year	TA	246.92	611.25	0.000
	EP	-0.21	-0.07	0.000
	GL	1.65	1.67	0.927
	IN	1.12	0.96	0.000
	CA	0.73	0.73	0.553

	CL	0.85	0.84	0.103
	AR	3.46	3.10	0.145
The second year	TA	251.48	728.37	0.000
	EP	-1.11	-0.01	0.005
	GL	8.05	1.59	0.108
	IN	2.49	0.98	0.003
	CA	0.73	0.73	0.736
	CL	0.84	0.83	0.026
	AR	4.85	3.00	0.011
Stage 3		1226 cases	12729 cases	
The first year	TA	333.25	641.79	0.231
	EP	-0.17	-0.05	0.000
	GL	1.46	1.67	0.435
	IN	1.07	0.95	0.000
	CA	0.73	0.73	0.798
	CL	0.86	0.84	0.004

	AR	3.40	3.07	0.418
The second year	TA	386.11	768.90	0.183
	EP	-0.095	0.001	0.000
	GL	1.27	1.55	0.180
	IN	1.16	0.95	0.000
	CA	0.73	0.73	0.733
	CL	0.85	0.82	0.000
	AR	3.37	2.96	0.383
The third year	TA	414.56	880.91	0.140
	EP	-0.96	-0.01	0.030
	GL	3.39	459.37	0.751
	IN	2.50	0.96	0.006
	CA	0.74	0.73	0.626
	CL	0.83	0.82	0.017
	AR	3.95	2.71	0.034

Table A1.4

Mean-comparison of the first detailed classification: the downturn group of distributive industries

Stage 1	Original variables	Failure (1639 cases)	Success (12165 cases)	Significance
The first year	TA	274.40	512.78	0.002
	EP	-0.69	-0.10	0.000
	GL	9.26	6.98	0.751
	IN	1.76	0.99	0.000
	CA	0.74	0.77	0.001
	CL	0.85	0.83	0.083
	AR	7.43	3.34	0.322
Stage 2		1579 cases	10340 cases	
The first year	TA	316.12	546.42	0.003
	EP	-0.25	-0.07	0.000
	GL	3.29	7.32	0.599
	IN	1.16	0.97	0.000
	CA	0.76	0.77	0.185
	CL	0.83	0.83	0.703

	AR	3.08	3.37	0.645
The second year	TA	305.85	650.79	0.000
	EP	-0.73	-0.04	0.000
	GL	29.13	2.77	0.234
	IN	2.07	0.99	0.000
	CA	0.73	0.76	0.000
	CL	0.83	0.82	0.131
	AR	4.48	2.85	0.040
Stage 3		1417 cases	8719 cases	
The first year	TA	295.50	592.10	0.000
	EP	-0.14	-0.06	0.158
	GL	20.75	5.22	0.411
	IN	1.13	0.94	0.000
	CA	0.77	0.77	0.769
	CL	0.85	0.83	0.010
	AR	3.33	3.35	0.978

The second year	TA	340.22	704.90	0.000
	EP	-0.14	-0.02	0.000
	GL	2.86	2.64	0.878
	IN	1.20	0.95	0.000
	CA	0.76	0.76	0.927
	CL	0.83	0.81	0.009
	AR	2.96	2.81	0.473
The third year	TA	327.19	777.51	0.000
	EP	-1.07	-0.04	0.016
	GL	6.43	2.39	0.023
	IN	2.45	1.05	0.005
	CA	0.74	0.75	0.349
	CL	0.82	0.81	0.051
	AR	4.44	2.93	0.077

Table A2.1

Mean-comparison of the second general classification: the upturn group of manufacturing industries

Original variables	Failure (2004 cases)	Success (6535 cases)	Significance
TA	572.94	1469.01	0.000
EP	-0.44	-0.02	0.038
GL	6.14	1.42	0.112
IN	1.29	0.89	0.005
CA	0.65	0.62	0.000
CL	0.82	0.77	0.000
AR	3.58	2.12	0.048

Table A2.2

Mean-comparison of the second general classification: the downturn group of manufacturing industries

Original variables	Failure (1476 cases)	Success (3068 cases)	Significance
TA	599.79	1097.47	0.000
EP	-0.39	-0.04	0.001
GL	5.92	4.02	0.525
IN	1.27	0.89	0.002
CA	0.72	0.70	0.029

CL	0.82	0.80	0.023
AR	2.98	2.18	0.026

Table A2.3

Mean-comparison of the second general classification: the upturn group of distributive industries

Original variables	Failure (5010 cases)	Success (13599 cases)	Significance
TA	269.76	629.04	0.000
EP	-0.38	-0.07	0.000
GL	2.00	1.70	0.138
IN	1.33	0.96	0.000
CA	0.73	0.73	0.778
CL	0.85	0.83	0.000
AR	4.39	3.09	0.010

Table A2.4

Mean-comparison of the second general classification: the downturn group of distributive industries

Original variables	Failure (4736 cases)	Success (9068 cases)	Significance
TA	291.23	585.40	0.000
EP	-0.37	-0.06	0.000

GL	10.76	5.42	0.384
IN	1.36	0.95	0.000
CA	0.75	0.77	0.007
CL	0.84	0.83	0.056
AR	4.71	3.36	0.352

Table A3.1

Regression results of the first detailed classification: the upturn group of manufacturing industries

Stage 1	Variables at the confidence level of 95 %	β coefficient
The first year (6 variables)	LTA	0.185
	PR	0.905
	CA	-0.832
	CL	0.369
	AR	-0.035
	CG	0.968
Stage 2		
The first year (5 variables)	LTA	0.318
	PR	0.570

	CL	-0.618
	AR	0.009
	CG	0.916
The second year (7 variables)	LTA	0.409
	PR	0.793
	RGL	-0.009
	RIN	-0.011
	CL	-0.453
	AR	0.011
	CG	0.810
Stage 3		
The first year (5 variables)	LTA	0.159
	PR	0.410
	RIN	-0.003
	CA	-0.444
	CG	1.110
The second year (6 variables)	LTA	0.187

	PR	0.641
	RIN	0.017
	CL	-0.574
	AR	-0.034
	CG	1.056
The third year (7 variables)	LTA	0.283
	PR	0.907
	RGL	-0.015
	CA	-0.365
	CL	-0.259
	AR	-0.022
	CG	0.990

Table A3.2

Regression results of the first detailed classification: the downturn group of manufacturing industries

Stage 1	Variables at the confidence level of 95 %	β coefficient
The first year (3 variables)	LTA	0.156

	PR	0.685
	CL	-0.321
Stage 2		
The first year (4 variables)	LTA	0.079
	PR	0.380
	CA	-0.520
	CG	0.248
The second year (6 variables)	LTA	0.138
	PR	0.782
	RGL	-0.018
	RIN	-0.007
	CA	-0.551
	CG	0.181
Stage 3		
The first year (6 variables)	LTA	0.084
	PR	0.359

	RGL	-0.030
	CA	-0.428
	AR	-0.010
	CG	0.155
The second year (5 variables)	LTA	0.117
	PR	0.537
	CA	-0.459
	AR	-0.011
	CG	0.130
The third year (6 variables)	LTA	0.197
	PR	0.993
	RGL	-0.009
	CA	-0.702
	CL	0.244
	AR	-0.016

Table A3.3

Regression results of the first detailed classification: the upturn group of distributive industries

Stage 1	Variables at the confidence level of 95 %	β coefficient
The first year (8 variables)	LTA	0.254
	PR	0.619
	RGL	-0.006
	RIN	-0.005
	CA	-0.344
	CL	-0.137
	AR	-0.003
	CG	0.679
Stage 2		
The first year (5 variables)	LTA	0.347
	PR	0.530
	RGL	-0.004
	AR	0.005

	CG	0.822
The second year (5 variables)	LTA	0.465
	PR	0.811
	RIN	-0.003
	AR	0.001
	CG	0.751
Stage 3		
The first year (5 variables)	LTA	0.195
	PR	0.483
	RGL	-0.008
	CL	-0.313
	CG	0.985
The second year (5 variables)	LTA	0.241
	PR	0.701
	RIN	0.008
	CL	-0.374

	CG	0.941
The third year (6 variables)	LTA	0.304
	PR	0.883
	RGL	-0.013
	RIN	-0.004
	CL	-0.108
	CG	0.828

Table A3.4

Regression results of the first detailed classification: the downturn group of distributive industries

Stage 1	Variables at the confidence level of 95 %	β coefficient
The first year (4 variables)	LTA	0.243
	PR	0.630
	RGL	-0.006
	CG	0.105
Stage 2		

The first year (3 variables)	LTA	0.167
	PR	0.531
	CG	0.231
The second year (5 variables)	LTA	0.245
	PR	0.858
	RGL	-0.021
	CA	-0.203
	CG	0.174
Stage 3		
The first year (4 variables)	LTA	0.166
	PR	0.485
	CL	-0.261
	CG	0.270
The second year (4 variables)	LTA	0.184

	PR	0.748
	CL	-0.285
	CG	0.248
The third year (6 variables)	LTA	0.266
	PR	1.097
	RGL	-0.006
	RIN	-0.002
	CL	-0.250
	CG	0.162

Table A3.5

Sum of the frequency of significance in the first detailed classification

Variables	Groups	The first year (maximum 3)	The second year (maximum 2)	The third year (maximum 1)
LTA	Upturn manufacturing	3	2	1
	Downturn manufacturing	3	2	1
	Upturn distributive	3	2	1

	Downturn distributive	3	2	1
PR	Upturn manufacturing	3	2	1
	Downturn manufacturing	3	2	1
	Upturn distributive	3	2	1
	Downturn distributive	3	2	1
RGL	Upturn manufacturing	0	1	1
	Downturn manufacturing	1	1	1
	Upturn distributive	3	0	1
	Downturn distributive	1	1	1
RIN	Upturn manufacturing	1	2	0
	Downturn manufacturing	0	1	0
	Upturn distributive	1	2	1
	Downturn distributive	0	0	1
CA	Upturn manufacturing	2	0	1
	Downturn manufacturing	2	2	1
	Upturn distributive	1	0	0
	Downturn distributive	0	1	0

CL	Upturn manufacturing	2	2	1
	Downturn manufacturing	1	0	1
	Upturn distributive	2	1	1
	Downturn distributive	1	1	1
AR	Upturn manufacturing	2	2	1
	Downturn manufacturing	1	1	1
	Upturn distributive	2	1	0
	Downturn distributive	0	0	0
CG	Upturn manufacturing	3	2	1
	Downturn manufacturing	2	2	0
	Upturn distributive	3	2	1
	Downturn distributive	3	2	1

Table A4.1

Regression results of the second general classification: the upturn group of manufacturing industries

Variables (5 variables at the confidence level of 95 %)	β coefficient
LTA	0.255
PR	0.656

CA	-0.341
CL	-0.270
CG	1.072

Table A4.2

Regression results of the second general classification: the downturn group of manufacturing industries

Variables (5 variables at the confidence level of 95 %)	β coefficient
LTA	0.110
PR	0.495
RGL	-0.052
CA	-0.561
CG	0.188

Table A4.3

Regression results of the second general classification: the upturn group of distributive industries

Variables (6 variables at the confidence level of 95 %)	β coefficient
LTA	0.303
PR	0.590

RGL	-0.003
RIN	-0.003
CL	-0.213
CG	0.905

Table A4.4

Regression results of the second general classification: the downturn group of distributive industries

Variables (3 variables at the confidence level of 95 %)	β coefficient
LTA	0.227
PR	0.625
CG	0.249

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