



**HAL**  
open science

## Management-to-staff ratio and a firm's exit

Nicolae Stef, Emmanuel Zenou

### ► To cite this version:

Nicolae Stef, Emmanuel Zenou. Management-to-staff ratio and a firm's exit. *Journal of Business Research*, 2021, 125, pp.252 - 260. <10.1016/j.jbusres.2020.12.027>. <hal-03492714>

**HAL Id: hal-03492714**

**<https://hal.science/hal-03492714v1>**

Submitted on 2 Jan 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire HAL, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons CC BY-NC 4.0 - Attribution - Non-commercial use - International License

## Management-to-staff ratio and a firm's exit

*Nicolae Stef*<sup>1</sup> and *Emmanuel Zenou*<sup>2</sup>

### ABSTRACT

We investigate the predictive ability of the management-to-staff ratio for the arbitration between liquidation and voluntary dissolution. Using a sample of 697 French firms covering the period from 2011 to 2017, our hazard model shows that firms with more managerial staff tend to have a lower probability of exiting through liquidation rather than through voluntary dissolution. Compared to liquidation, voluntary dissolution not only provides the opportunity to organize the liquidation of a firm's remaining assets, but it also better preserves managers' reputation.

Keywords: Management, Liquidation, Voluntary dissolution, Hazard model

### Acknowledgments

The authors acknowledge the support from the Bourgogne-Franche-Comté Regional Council (Conseil Régional de Bourgogne-Franche-Comté). They would also like to thank two anonymous reviewers for their insightful comments and the participants of the INEKA Conference 2019 for their useful comments and fruitful discussion.

### Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

---

<sup>1</sup> CEREN EA 7477, Burgundy School of Business, Université Bourgogne Franche-Comté, Department of Accounting, Finance & Law, 29 Rue Sambin, 21000 Dijon, France. e-mail: [nicolae.stef@bsb-education.com](mailto:nicolae.stef@bsb-education.com) (Corresponding author).

<sup>2</sup> CEREN EA 7477, Burgundy School of Business, Université Bourgogne Franche-Comté, Department of Accounting, Finance & Law, 29 Rue Sambin, 21000 Dijon, France. e-mail: [Emmanuel.Zenou@bsb-education.com](mailto:Emmanuel.Zenou@bsb-education.com)

## **Management-to-staff ratio and a firm's exit**

### **ABSTRACT**

We investigate the predictive ability of the management-to-staff ratio for the arbitration between liquidation and voluntary dissolution. Using a sample of 697 French firms covering the period from 2011 to 2017, our hazard model shows that firms with more managerial staff tend to have a lower probability of exiting through liquidation rather than through voluntary dissolution. Compared to liquidation, voluntary dissolution not only provides the opportunity to organize the liquidation of a firm's remaining assets, but it also better preserves managers' reputation.

Keywords: Management, Liquidation, Voluntary dissolution, Hazard model

### **Acknowledgments**

### **Funding**

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

## **1. Introduction**

The prediction of a firm's exit is often based on financial symptoms. In recent years, numerous studies have emerged that confirm the predictive power of nonfinancial aspects associated with business activity (Thornhill & Amit, 2003), management skills (Ooghe & De Prijcker, 2008), corporate governance (Iwasaki, 2014), corporate innovation (Cefis & Marsili, 2011; 2012; Ebert et al., 2018) or market competition (Stef & Ben Jabeur, 2018). The analysis of nonfinancial determinants is more necessary as many studies have shown that exit routes may follow multiple paths. For instance, bankruptcy and voluntary liquidation are fundamentally different exit routes (Balcaen et al., 2012). On the one hand, firms may settle creditors' claims in court. This legal approach is subject to bankruptcy costs that are usually covered by the firm (e.g., practitioner's fees, administrative costs, and loss of market share). On the other hand, firms may try to informally negotiate with creditors outside of the court and thus avoid bankruptcy costs.

These different exit strategies can be predicted not only by financial variables, but also by a firm's ownership. According to Greenaway (2009), foreign owners of distressed firms may have stronger incentives to exit than domestic owners. However, a firm's exit decision is not always made by owners. Leroy et al. (2015) argue that an exit decision is strategic and depends on entrepreneurs' individual attitudes. In this sense, voluntary liquidation is a procedure largely conducted at management's discretion and involves more preservation of intangible managerial assets, such as reputation and knowledge, compared to nonvoluntary (compulsory) liquidations that are decided by bankruptcy courts. Consequently, one may speculate a relationship between the number of managers and a firm's exit path. As shown by resource-based view theory, the survival of firms significantly depends on their ability to manage their resources and capabilities (Barney, 1991; Wernerfelt, 1984). Firms

generate their competitive advantages from resources that are valuable, rare and inimitable. However, the management of a firm's resources requires organizational and managerial processes (Teece et al., 1997; Castanias & Helfat, 1991). In this respect, the management staff is a crucial source of competitive advantages as long as resources are efficiently used according to a firm's strategy.

Therefore, a lack of managerial resources and knowledge may affect firms' ability to maintain their competitive advantages (Le et al., 2017). Some studies argue that when a firm is short of human capital in its managerial staff, the likelihood of financial failure tends to increase. For instance, Thornhill and Amit (2003) showed that firms' exit is generated not only by the deterioration of financial health, but also by deficiencies in management skills and knowledge. According to Cefis and Marsili (2012), firms can avoid failure by taking advantage of the innovative capabilities of their human capital. In addition, deficient management motivation, qualities and skills may be associated with the way a company is (mis)managed. Not surprisingly, numerous firms can go bankrupt as a consequence of the insufficient and inappropriate skills of their management staff (Blazy & Stef, 2020).

Our study aims to empirically examine the relationship between the distribution of managers per employee and the exit route of firms. We differentiate between two types of exit paths including the liquidation path and the voluntary dissolution path. First, the liquidation procedure permits firms to sell their assets in order to settle creditors' claims. Such a court-driven exit is managed by a trustee appointed by a judge. Second, voluntary dissolution is an out-of-court exit strategy that allows owners and/or managers to organize the liquidation of a firm's assets without incurring (excessive) bankruptcy costs. The empirical analysis relies on a sample of nonlisted French firms composed of 402 firms that followed a liquidation path and 295 firms that were voluntarily dissolved.

The research is innovative in two ways. First, we examine the relevance of the management-to-staff ratio to the choice of a firm's exit route for the first time (to the best of our knowledge). By using a hazard model approach with time-varying explanatory variables, this study expands the set of available nonfinancial variables that can matter for a firm's arbitration between different exit paths. Second, Balcaen et al. (2012) stressed the need for empirical analysis that captures the dynamic role of a firm's characteristics. Since our sample ranges from 2011 to 2017, it overcomes the criticism of a static approach.

The paper proceeds as follows. First, we shall formulate our hypotheses (section 2). Second, we will describe our sample and variables (section 3). Third, we will present our estimates and results (section 4). The last section (section 5) discusses the main contributions and implications of our findings, presents the major caveats of our empirical approach and provides some suggestions for further research.

## **2. Management staff size and the choice of a firm's exit path**

Among the various exit paths, voluntary dissolution is not necessarily explained by the same determinants as a bankruptcy procedure (Balcaen et al., 2012). On the one hand, a voluntary liquidation involves a procedure that is triggered neither by creditors nor by the court; thus, it results from 'entrepreneurial self-selection'. On the other hand, a court-driven exit is an 'external selection' exit mechanism as it involves judicial procedures that are usually initiated by external parties such as creditors. Nevertheless, an interesting question emerges for the bankruptcy literature, which is *how do managers arbitrate between court-driven exit and out-of-court exit?*

In this puzzle, we identify three main arguments that may explain why managers should favor the out-of-court exit of the business. First, previous studies argued that a

liquidation procedure generates a considerable loss of managers' reputation (Sutton & Callahan, 1987; D'Aveni, 1990). The triggering of a bankruptcy procedure in court can spoil the image of a firm's managers. Such a nonvoluntary liquidation (court-driven exit) can harm managers' reputation more than a voluntary dissolution (out-of-court exit). Thus, a nonvoluntary exit should usually be avoided as long as possible considering the loss of reputation that managers and directors have to incur (Balcaen et al., 2011). Second, a bankruptcy procedure implies the appointment of a trustee or an insolvency practitioner that coordinates and monitors the settlement of creditors' claims (Stef, 2015). However, voluntary dissolution provides managers the opportunity to organize and coordinate the liquidation of a firm's assets (Blazy & Combier, 1997). Consequently, managers may extract some private benefits by organizing the voluntary liquidation of a firm's assets (e.g., large sales commissions or severance packages).

Third, more management staff may increase the available slack resources of firms by conferring crucial managerial and cognitive resources. Balcaen et al. (2011) show that higher slack resources significantly improve a firm's capabilities to absorb changes and to resist market pressures, leading to an increase in the period during which a financially distressed firm is able to delay a court-driven exit. Hence, higher slack resources as provided by management skills may help firms pay off more debt prior to their exit, facilitating voluntary dissolution. According to Van Praag (2003), the compulsory exit of firms can be the result of a lack of financial opportunities. Following previous studies (Teece et al., 1997; Castanias & Helfat, 1991; Le et al., 2017; Thornhill & Amit, 2003), a lack of managerial resources and knowledge may affect firms' ability to maintain a competitive advantage. Therefore, more management staff may improve a firm's ability to seize financial opportunities that can diminish the amount of debt and thus favor an out-of-court exit.

In light of these arguments, we expect financially distressed firms that are able to keep more management staff have a lower probability of conducting a court-driven exit than an out-of-court exit (H1a).

**H1a.** Firms with more managerial staff should have a lower probability of exiting through liquidation rather than through voluntary dissolution.

Nevertheless, a court-driven exit has two major benefits for managers. First, a firm's assets are protected as creditors cannot seize an asset without the consent of the court. Hence, managers' due compensation can benefit from such legal protection of assets. Second, the bankruptcy court coordinates creditors by imposing an absolute priority order that defines the payment order of claims. In general, a firm's employees that act as creditors have a payment priority over the other classes of creditors (Stef, 2018). Therefore, managers may have strong incentives to drive a firm's exit in court whenever their due compensation is important. By benefiting from strong legal protection as employees, managers may be encouraged to trigger a bankruptcy procedure against their employer.

Moreover, the cost of reputation loss per individual may be lower in larger groups of managers. A decision-making process that shares responsibilities among different persons may induce a lower loss of individual reputation in the case of a firm's liquidation. This smaller cost may provide stronger managers' incentives to drive a firm's exit in court. In their study that addresses the negative effects of bankruptcy on management reputation, Sutton and Callahan (1987) also argue that a bankruptcy procedure may not always harm the reputation of managers. First, several aspects of the liquidation procedure may be concealed from some audiences, such as customers and suppliers. Second, individuals or organizations acting as creditors can often negotiate more favorable terms of their claims in court that may help

managers settle the firm's debt more easily with fewer repercussions on their reputation. As a result, we also propose an alternative hypothesis to H1a.

**H1b.** Firms with more managerial staff should have a higher probability of exiting through liquidation rather than through voluntary dissolution.

### **3. Description of the samples**

In this section, we will present the structure of our subsamples and the variables used to assess the arbitration between liquidation and voluntary dissolution.

#### *3.1. Data and variables*

Our sample is composed of 697 nonlisted French firms that were either liquidated (402 firms) or voluntarily dissolved (295 firms) from 2011 to 2017. The data were gathered from the *Diane* database of *Bureau Van Dijk*. The initial subsample of liquidated firms for the 2011-2017 period was composed of 1061 firms, and the subsample of voluntarily dissolved firms was composed of 412 firms. However, we excluded banks because their bankruptcy is regulated by different insolvency laws (a), firms for which the number of managers prior to the exit was not available (b) and firms for which no accounting data were available in the last two years prior to their exit (c). The firms in our sample were not sold as going concerns and were not involved in mergers and/or acquisitions. In addition, the *Diane* database provides a firm's number of managers only for the last 2 years prior to the exit. Consequently, the sample reports at least 1 year of complete data for a given firm from 2011 to 2017.

Nevertheless, a researcher should also be confident that the statistics of the subsamples are close to their corresponding population parameters (Trafimow, 2019a). In this sense, we shall use the a priori procedure (APP) that was initially developed by Trafimow (2017). Our study resides on two independent subsamples with different sizes for which the standard deviations of the populations are unknown. Following Trafimow et al. (2020), the necessary sample size must meet the following criterion:

$$t_{\alpha/2,q} \leq \sqrt{\frac{n}{k+1}}f \quad (1)$$

where  $1-\alpha$  is the confidence level,  $q$  is the degrees of freedom,  $n$  is the size of the smaller subsample,  $k$  is the ratio between  $n$  and the size of the larger group ( $m$ ) and  $f$  is the fraction of the standard deviation that the researcher must define as close to the mean population. In our case,  $n$  will be equal to 295 voluntarily dissolved firms and  $m$  to 402 liquidated firms (i.e.,  $k$  is equal to 0.7338). Assuming a confidence level of 95% that the subsample means are close to the population's parameters and a moderate precision  $f$  of 0.2, the left-hand term will be equal to 1.963, which is lower than the right-hand term that is equal to 2.609. In that case, our sample is suitable to accurately estimate the corresponding population parameters as the probability of obtaining a sample mean within 0.2 standard deviation is 95%.

Furthermore, we assess the distribution of managers per employee using the ratio between the number of managers and a firm's total number of employees (*Managers/Employees*)<sup>1</sup>. For statistical reasons, we also report a firm's total number of managers (*Managers*) and a firm's total number of employees (*Employees*). Moreover, we include a set of 5 financial ratios frequently used in the bankruptcy prediction literature.<sup>2</sup> *EBIT/TA* is the ratio between a firm's earnings before interest and taxes and the value of their

---

<sup>1</sup> The class of managers includes all the managers from the executive department; the general direction; the administrative department; the departments of finance, accounting and human resources; the commercial, marketing and advertising department; the research & development department; the production and manufacturing department and the department of technologies and information systems.

<sup>2</sup> In this sense, see Altman (1968), Ohlson (1980), Shumway (2001), Chava and Jarrow (2004), and Stef and Ben Jabeur (2018).

total assets. *Leverage* represents the ratio between total debt and total equity. *Size* measures the value of a firm's total assets. The ratio between current assets and current liabilities is assessed by *Liquidity*, and *Export* measures the percentage of export sales revenues with respect to total sales. We complete our list of variables with a set of nonfinancial covariates that are a firm's age (*Age*), a firm's type (*Legal Form*, i.e., a dummy variable that identifies partnership firms), activity sector (*Services, Trade, Construction, Industry and Other*) and the growth rate of the gross domestic product (*GDP*) per capita of a firm's region (*Growth Rate*). The last variable was gathered from the INSEE (French Institute of Statistics and Economic Studies). Detailed definitions of our variables are provided in table 1.

{Table 1 near here}

### 3.2. Summary statistics

Table 2 presents the averages and the medians of our variables for both subsamples. In terms of managerial structure, liquidated firms use, on average, fewer managers (*Managers*) and have fewer managers per employee (*Managers/Employees*). Nevertheless, voluntarily dissolved firms tend to operate with fewer employees than liquidated firms (*Employees*). In general, the French bankruptcy code provides strong protection of workers' interest. In the case of liquidation, the claims of employees are directly registered by the court. They also benefit from payment privileges of wages. In this sense, employees' claims are paid first before the other classes of creditors. Independent of the firm's exit strategy, half of the sample firms have more than 10 employees.

The financial structure seems to differ between the subsamples. On the one hand, firms that were liquidated have, on average, poorer performance (*EBIT/TA*) despite having larger export sales revenues (*Export*). On the other hand, the voluntary dissolution path is used by firms with more short-term liquidity (*Liquidity*) and a lower degree of indebtedness

(*Leverage*). We can also notice that firms have existed for an average of 17 years (*Age*), and more than half of firms have assets worth at least 0.7 million euros (*Size*). Partnership firms (*Legal Form*) represent 15.2% of the liquidated firms and 22.7% of the voluntarily dissolved firms. In addition, most of the liquidated firms operate in the construction (28.9%) and trade (23.1%) sectors. Regarding the voluntarily dissolved firms, one-third of the firms are trade firms (31.2%).

Table 2 also presents the  $p$ -values of the  $t$ -test for equal means. We can notice that the two subsamples are significantly different in terms of employment (*Managers* and *Employees*), financial features (*EBIT/TA*, *Leverage*, *Liquidity*, and *Export*), legal form (*Legal Form*), activity sectors (*Services*, *Trade*, *Construction*, *Industry*, and *Other*) and the economic development of the firm's region (*Growth Rate*). Nevertheless, the univariate analysis of table 2 does not make any distinction between the values 1 year and 2 years prior to a firm's exit. This analysis is useful in order to identify the financial factors that degrade the most as a firm approaches its exit.

{Table 2 near here}

The distinction between the two years is shown in table 3. First, we can notice that the number of managers significantly diminished between the two periods for both subsamples. This reduction in managerial staff might be explained either by a firm's financial strategy or a manager's decision to resign. However, a firm's number of employees was similar 1 year prior to their exit compared to 2 years before leaving the market. Employees seem to remain attached to their firm despite the firm's outcome. Nevertheless, payment of their due compensation benefits from a high degree of legal protection as French bankruptcy law grants them priority over the claims of other creditors (Ellul & Pagano, 2019). Second, a firm's financial conditions significantly worsened in the last two years prior to their exit, mainly when a liquidation procedure was triggered. Those firms had more debt and less liquidity as

they approached their exit year. Surprisingly, the voluntarily dissolved firms show less variance in financial ratios. Overall, table 3 seems to indicate that the arbitration between the exit strategies may depend on the financial features. Furthermore, we shall empirically assess our hypotheses.

{Table 3 near here}

#### **4. Econometric analysis**

Forecasting a firm's exit should be based on econometric approaches that integrate more previous data. Shumway (2001) argues that such hazard models or simple multiperiod logit models have three main advantages. First, hazard models automatically adjust to a firm's risk period. Second, a hazard model is based on time-varying explanatory variables. Consequently, those estimations take into account the progressive deterioration of a firm's financial health. Third, hazard models provide more accurate predictions by using more data on firms. Bauer and Agarwal (2014) compared the predictive ability of hazard models with other bankruptcy prediction models. Their analysis confirms that the hazard model outperforms the *z*-score model and contingent claims-based model in terms of accuracy (i.e., the model's ability to correctly predict a higher percentage of cases). In our sample, a firm has 1 or 2 year(s) of complete data prior to their exit. Hence, we may use a hazard model to predict arbitration between exit strategies (subsections 4.1 and 4.2).

##### *4.1. Liquidation versus voluntary dissolution*

In this subsection, we examine the arbitration between liquidation and voluntary dissolution. In this sense, our dependent variable (*Liquidation*) will be equal to 1 if the firm

followed the liquidation path and 0 if the firm exited through voluntary dissolution. We use the following multiperiod logistic regression with robust standard errors:

$$Liquidation_{i,t} = \alpha + \varphi Managers/Employees_{i,t-1} + \beta Control\ variables_{i,t-1} + \eta_t + \xi_{i,t} \quad (2)$$

where  $i$  identifies the firm;  $t$  is the year,  $\alpha$  is the intercept;  $\eta_t$  captures the time effect; *Control variables* <sub>$i,t-1$</sub>  is a vector composed of 9 control variables lagged by 1 year including *EBIT/TA*, *Leverage*, the logarithm of *Size*, *Liquidity*, *Export*, the logarithm of *Age*, *Legal Form*, *Industry* and *Growth Rate*;  $\beta$  is the vector of control variables' coefficients and  $\xi_{i,t}$  is the error term.

In equation (2), we lagged our control variables by 1 year given that the firm's exit decision requires a certain period of time. Owners and/or managers will consider a firm's previous financial health when assessing the likelihood of recovering from financial distress. However, reverse causality may be present in our specification as the already foreseeable exit path may determine the number of managers that are still present two years prior to the exit.<sup>3</sup> Bellemare et al. (2017) argue that lag identification based on lagged explanatory variables is not always a solution to endogeneity problems due to reverse causality. Such an econometric strategy introduces a strong assumption of no dynamics among unobservable variables that can lead to faulty interferences under the null hypothesis significance test paradigm. Fortunately, Bellemare et al. (2017) specified the conditions under which lag identification is an appropriate response to endogeneity concerns. Hence, lag identification can mitigate the reverse causality bias in one of the following two scenarios, namely,

1. the already foreseeable exit path only affects the managerial staff size in the same year (1.1), and *Managers/Employees* affects the choice of exit path with a one-year lag (1.2), or

---

<sup>3</sup> We thank an anonymous referee for pointing out the issue of reverse causality.

2. there is reverse causality (2.1), the causal effect of *Managers/Employees* is contemporaneous (2.2), there are no dynamics in the exit path (2.3) and there are dynamics in *Managers/Employees* (2.4).

Bellemare et al. (2017) also proposed two tests for those conditions. Under the first scenario, no contemporary correlation should be present between the two variables (i.e., a zero coefficient of *Managers/Employees*  $_{i,t}$  in equation (2)). Under scenario 2, *Liquidation* should have no dynamics (i.e., a zero coefficient of *Liquidation* lagged by 1 year in equation (2)).

The first scenario implies that the current number of managers is affected by the foreseeable exit path. This assumption (1.1) tends to be valid as rational managers can have strong incentives to find more stable jobs and to avoid repercussions on their reputation by acknowledging the current perspective of financial failure and/or business dissolution. Those arguments also support assumption (2.1). However, the data may reject scenario 1 because the test of the contemporary correlation may fail. Current managerial decisions on business strategy and investment policy and current managerial and cognitive resources can relate to a firm's exit path. Therefore, the causal effect of management size may be contemporaneous, providing support for assumption (2.2). In addition, (2.3) and (2.4) strongly hold true according to our data. As *Liquidation* is not subject to dynamics, the test associated with scenario 2 can be confirmed. Overall, lag identification seems to be suitable to help address reverse causality in light of the second scenario.<sup>4</sup>

Our set of control variables includes covariates that were used by previous studies dealing with a firm's likelihood of exit (Cultrera & Brédart, 2016; James, 2016; Ben Jabeur, 2017; Stef & Ben Jabeur, 2018). In this picture, we expect firms with higher earnings

---

<sup>4</sup> Leszczensky and Wolbring (2019) suggested the use of ML-SEM method (Maximum Likelihood in Structural Equation Modeling) with both contemporaneous and lagged values (of *Managers/Employees*) to overcome the reverse causality with panel data. However, data on the number of managers in the year of a firm's exit are not available given that a legally dissolved or liquidated firm has no employees. One solution would be to identify the number of managers as of January 1<sup>st</sup> of a firm's exit year.

(*EBIT/TA*), more assets (*Logarithm (TA)*) and more liquidity (*Liquidity*) to have strong incentives to prevent liquidation. These firms are able to quickly pay off short-term debt. However, higher debt (*Leverage*) may increase a firm's default risk and *ipso facto* creditors' incentives to recover their claims in court. In addition, firms that export more may be more productive than nonexporting firms (Wagner, 2007). Hence, such firms may have more valuable assets with a higher liquidation value that can encourage creditors to file for a firm's bankruptcy in order to benefit from a higher debt recovery. Thus, we expect higher values of *Export* to favor the liquidation path. We also expect partnership firms (*Legal Form*) to have a higher likelihood of an out-of-court exit. Owners may be reluctant to engage in costly exit paths as bankruptcy costs are borne by their firm. Furthermore, more experienced firms should more easily avoid liquidation (*Logarithm (Age)*) whereas growing economic environments should provide more financial opportunities for debt settlement outside of court (*Growth Rate*).

The regressions are presented in table 4. We sequentially added our financial variables lagged by 1 year (*EBIT/TA*, *Leverage*, logarithm of *Size*, *Liquidity*, and *Export*) in columns (2)-(7).

Regional effects were also included in column (7) as one might speculate that unobserved events in a firm's region could be associated with the likelihood of exit. In terms of their significance, columns (6) and (7) are similar. After controlling for a firm's financial structure, a firm's typology, the economic environment and time (regional) effects, table 4 shows that more managerial staff more frequently use their bargaining power to settle creditors' claims outside of bankruptcy court. As suggested by the negative and significant coefficient of *Managers/Employees*, more managerial staff tends to drive the firm to voluntarily dissolve.

Nevertheless, the null hypothesis significance testing procedure has been highly criticized because of the *modus tollens* error, arguing that the probability of the null

hypothesis conditional upon the data cannot be computed (Trafimow, 2019b). Therefore, we shall focus on the effect sizes given by the odds ratios. By exponentiating the coefficient of *Managers/Employees* from column (7), the odds ratio will be equal to 0.87, implying that we should expect a 13% decrease in the odds of following a liquidation path for every 1% increase in the management-to-staff ratio. That result is in line with H1a. Moreover, a 1% increase in a firm's liquidity leads to a 29% decrease in the odds of exiting through liquidation. High levels of liquidity favor out-of-court debt settlement as firms may benefit from more bargaining power in negotiations with creditors. The odds ratio of *Leverage* that is almost equal to 1 suggests that a 1% increase in debt can equally drive the firm either to liquidation or to voluntary dissolution. Surprisingly, the odds for partnership firms (*Legal Form*) to be liquidated are 41% lower than the odds for nonpartnership firms. Due to costly legal procedures, owners may have strong incentives to follow an out-of-court settlement of a firm's debts. Avoiding liquidation can increase owners' chances of partially recovering their investment at the end of a voluntary dissolution once creditors' claims are fully settled.

Overall, the addition of regional effects to equation (2) improved the predictive ability of our model from 73.4% to 75.1% (*Prediction rate*). Column (8) of table 4 also provides the marginal effects of our specification with a firm's regional effects. An increase of 10% in the management-to-staff ratio is associated with a decrease of 0.32% in the likelihood liquidation whereas a 10% increase in *EBIT/TA* is associated with a decrease of 0.18% in the likelihood of liquidation. The model of column (7) seems to explain 18.4% of the variance of our dependent variable. As shown by the *p*-value of our *F*-test, adding *Management/Employees* lagged by 1 year significantly improved the explanatory power of regressions. In addition, the maximum value of the variance inflation factors (*VIFs*) is also reported in table 4. Severe multicollinearity is detected whenever the *VIF* is higher than 10. However, no such

econometric shortcoming is recorded as the maximum *VIF* of our explanatory variables is very close to 1.

{Table 4 near here}

#### 4.2. Alternative specifications

Previous estimations have shown that the management-to-staff ratio can be related to a firm's exit path. However, we test the robustness of the relationship between *Managers/Employees* and *Liquidation* using a different set of accounting variables. Therefore, we replace *EBIT/TA*, *Leverage*, the logarithm of *Size* and *Liquidity* with *ROA*, *WC/TA*, the logarithm of *Equity* and *Sales/TA*. As with *EBIT/TA*, return on assets (*ROA*) captures the changes in a firm's performance. In addition, *WC/TA* is the ratio between a firm's working capital and total asset value, and *Equity* measures the total value of a firm's equity.<sup>5</sup> The amount of sales as a percentage of asset value is assessed through *Sales/TA*. We use the same econometric approach as in table 4.

Estimates of this robustness check are presented in table 5. Again, we sequentially introduced those 4 variables in equation (2), as shown in columns (2)-(5). The odds ratio of *Managers/Employees* is similar to that reported in table 4, providing support for H1a. However, a high level of previous economic performance (*ROA* lagged by 1 year) results in a decrease in the likelihood of a court-driven exit (columns (4) and (5)). Firms seeking to exit may benefit from more net income that can be used to partially pay off certain debts and thus avoid a bankruptcy filing. However, a 1% increase in a firm's performance is only associated with a 6% decrease in the odds of a court-driven exit (column (5)). In table 5, we notice that partnership firms (*Legal Form*) use voluntary dissolution more frequently than liquidation.

---

<sup>5</sup> We have treated the negative values of *Equity* as 0 in the logarithm function. However, we obtain similar results if we exclude the observations for which *Equity* is negative (results available upon request).

This result was also confirmed in table 4. Although the econometric specification with alternative accounting variables has weaker predictive abilities, as suggested by *the prediction rate* and *prediction liquidation*, H1a seems to be consistent. Moreover, the estimated coefficients of table 5 are not subject to multicollinearity as the maximum *VIF* ranges from 1.284 (column (1)) to 1.460 (column (5)).

{Table 5 near here}

## **5. Discussion and conclusion**

In this section, we discuss the contributions and implications of our findings, and we present the main caveats along with the directions of future research.

### *5.1. Contributions and implications*

This research contributes to the literature on firms' exit routes by shedding more light on the explanatory power of nonfinancial aspects associated with management. In this sense, we investigate the relationship between the distribution of the number of managers per employee and the choice of a firm's exit path. Using a sample of 697 French firms, the empirical analysis shows that a 1% increase in the management-to-staff ratio leads to a decrease of 13% in the odds of exiting through liquidation rather than through voluntary dissolution. Nevertheless, how can these results be explained? In the case of voluntary dissolution, a trustee nominated by a firm to conduct asset liquidation can be either an insider (i.e., owner or manager) or an outsider (i.e., bankruptcy practitioner). This discretionary power may encourage the use of voluntary dissolution. In addition, that exit route also has less harmful consequences on managers' reputation as the legal procedure is not performed in court. Thus, managers may have strong incentives to produce enough earnings for debt

settlement that can facilitate the firm's out-of-court exit. Our findings also highlight the consideration of managers as high-value resources, supporting some previous theoretical arguments (Cefis & Marsili, 2012; Le et al., 2017). In order to drive a firm's exit through voluntary dissolution rather than through a court-driven exit, owners must be encouraged to invest in human capital and the development of management skills and knowledge.

Moreover, legal systems that lower barriers to failure may also encourage more capable entrepreneurs to continue building new businesses (Eberhart et al., 2017). Compared to liquidation, voluntary dissolution does not incur any direct bankruptcy costs, such as practitioners' fees or any other administrative costs associated with the legal procedure. Bankruptcy costs limit the reimbursement of creditors and owners as those costs need to be borne by firms. Hence, a less costly exit procedure such as voluntary dissolution may also represent a legal device that can promote new firm formation among the entrepreneurs of failed businesses.

However, the perspective of financial failure probably affected employee turnover. Relying on a sample of 1029 managers from 17 Fortune 500 companies, Reilly et al. (1993) revealed that financial restructuring and organizational breakup were positively associated with career loyalty. As suggested by psychological contract theory (Hirsch, 1993), a firm's turbulence can break the psychological contract, leading to free agency behavior. In our empirical approach, the number of managers that are present two years prior to the firm's exit may capture managers with a high degree of organizational loyalty. According to our findings, the likelihood of an out-of-court exit tends to be higher than the likelihood of a court-driven exit when firms can retain their managers. More organizational loyalty may facilitate the path to voluntary dissolution by reducing managers' intentions to leave. Nevertheless, how can entrepreneurs strengthen such loyalty so that the business has a higher likelihood of an out-of-court exit? According to Demirtas and Akdogan (2015), more ethical

leadership behavior improves perceptions of a firm's ethical climate, leading to less turnover intentions and more affective commitment. In other words, honest and trustworthy treatment may create an ethical work climate that can preserve managerial staff. Similar findings that a strong business ethical culture can prevent manager turnover were also reported by Babalola et al. (2016) and Kangas et al. (2018). Therefore, entrepreneurs should support an ethical climate so that firms would have more opportunities for out-of-court exits.

### *5.2. Limitations and future research*

The econometric analysis has some caveats despite the use of hazard models. First, our sample is composed of nonlisted firms. Some studies show that the failure risk of quoted firms is significantly affected by the volatility of the macroeconomic environment (Bhattacharjee et al., 2009) or the monetary policy of national banks (Nam & Jinn, 2000). Moreover, those firms have more rescue alternatives in financial markets such as buyouts or mergers. A potential extension of our study may cover the relationship between the managerial structure of quoted firms and bankruptcy risk. Second, businesses may fail for various reasons. According to Blazy et al. (2013), the causes of business failure may be classified into 7 categories, namely, causes associated with pricing policy (1), market strategy (2), production capacity (3), financial policy (4), management quality (5), accidents (6) and the stability of the external environment (7). However, business closure may differ from business failure. As stated by Headd (2003), owners can follow a planned exit strategy in order to close a business with a low level of debt or to retire from the work force. The sample used in this study does not permit us to examine the circumstances under which owners considered the closure or voluntary dissolution of their firm successful. Our hazard model integrates only financial data of the last two years prior to a firm's exit. Adding more past

information may allow us to investigate the importance of the management staff size in the likelihood of success of business closure. Third, our database does not make any distinction between the different types of managers. Treating the heterogeneity of managerial staff may improve our understanding of its relationship with exit risk and provide a more precise analysis of managerial resources by differentiating managers by their human capital or knowledge or by examining how firms can improve managerial knowledge to overcome business failure (Garcia Martinez et al., 2019). Fourth, the econometric analysis deals only with firms that follow an exit path. A comparison between those firms and financially healthy firms may provide a better understanding of the consequences of changes in managerial staff. Fifth, managers can foresee the firm's future path earlier than other employees given their higher involvement in the firm's decision-making processes. Therefore, rational managers with a high degree of employability may prefer to leave the boat before it sinks. Changes in management staff may occur even 3 years or 4 years before a firm's exit. According to Whitaker (1999), management staff engage in corrective actions in the yearly stages of financial distress. Some managers might be confident in the *ex post* efficiency of those actions while other managers might have strong incentives to find new jobs. Having only 2 years past data, our sample is not able to identify when exactly the management structure started to change. Constructing data sets with more past information may shed light on the turning point of managerial staff reduction from which firms head towards exit.

Our research recommends that creditors such as banks and financial institutions include the management-to-staff ratio in their bankruptcy prediction analysis. Nevertheless, we considered only two exit routes of firms. As noted by Cotei and Farhat (2018), the outcome of M&A (mergers and acquisitions) exit strategies may depend on the legal form of the firm. The analysis should be extended to other types of exit routes, such as M&As. In addition, the outcome of an out-of-court exit may be the result of a planned exit strategy

seeking the protection of managers' reputation or work force retirement. The treatment of such dimensions in the firm's exit analysis can also represent an interesting path for future research.

## References

- Altman, E. I. (1968). Financial Ratios, Discriminant analysis and the prediction of corporate bankruptcy. *Journal of Finance*, 23(4), 589-609.
- Babalola, M. T., Stouten, J., & Euwema, M. (2016). Frequent change and turnover intention: The moderating role of ethical leadership. *Journal of Business Ethics*, 134(2), 311-322.
- Balcaen, S., S. Manigart, & H. Ooghe (2011). From Distress to Exit: Determinants of the time to exit. *Journal of Evolutionary Economics*, 21(3), 407-446.
- Balcaen, S., S. Manigart, J. Buyze, & H. Ooghe (2012). Firm exit after distress: Differentiating between bankruptcy, voluntary liquidation and M&A. *Small Business Economics*, 39(4), 949-975.
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99-120.
- Bauer, J., & V. Agarwal (2014). Are hazard models superior to traditional prediction approaches? A comprehensive test. *Journal of Banking & Finance*, 40, 432-442.
- Bellemare, M. F., Masaki, T., & Pepinsky, T. B. (2017). Lagged explanatory variables and the estimation of causal effect. *The Journal of Politics*, 79(3), 949-963.
- Ben Jabeur, S. (2017). Bankruptcy prediction using partial least squares logistic regression. *Journal of Retailing and Consumer Services*, 36, 197-202.
- Bhattacharjee, A., C. Higson, S. Holly, and P. Kattuman (2009). Macroeconomic instability and business exit: Determinants of failures and acquisitions of UK firms. *Economica*, 76(301), 108-131.

Blazy, R., & J. Combier (1997). La Défaillance d'entreprise: Causes économiques, traitement judiciaire et impact financier. *INSEE Méthodes*, 72–73, Economica, Paris.

Blazy, R., Chopard, B., & Nigam, N. (2013). Building legal indexes to explain recovery rates: An analysis of the French and English bankruptcy codes. *Journal of Banking & Finance*, 37(6), 1936-1959.

Blazy, R., & Stef, N. (2020). Bankruptcy procedures in the post-transition economies. *European Journal of Law and Economics*, 50(1), 7-64.

Castanias, R. P., & C. E. Helfat (1991). Managerial resources and rents. *Journal of Management*, 17(1), 155-171.

Cefis, E., & O. Marsili (2011). Born to flip. Exit decisions of entrepreneurial firms in high-tech and low-tech Industries. *Journal of Evolutionary Economics*, 21(3), 473-498.

Cefis, E., & O. Marsili (2012). Going, going, gone. Exit forms and the innovative capabilities of firms. *Research Policy*, 41(5), 795-807.

Chava, S., & Jarrow, R. A. (2004). Bankruptcy prediction with industry effects. *Review of Finance*, 8(4), 537-569.

Cotei, C., & J. Farhat (2018). The M&A exit outcomes of new, young Firms. *Small Business Economics*, 50(3), 545-567.

Cultrera, L., & Brédart, X. (2016). Bankruptcy prediction: the case of Belgian SMEs. *Review of Accounting and Finance*.

D'Aveni, R. A. (1990). Top managerial prestige and organizational bankruptcy. *Organization Science*, 1(2), 121-142.

- Demirtas, O., & Akdogan, A. A. (2015). The effect of ethical leadership behavior on ethical climate, turnover intention, and affective commitment. *Journal of Business Ethics, 130*(1), 59-67.
- Eberhart, R. N., Eesley, C. E., & Eisenhardt, K. M. (2017). Failure is an option: Institutional change, entrepreneurial risk, and new firm growth. *Organization Science, 28*(1), 93-112.
- Ebert, T., Brenner, T., & Brixy, U. (2019). New firm survival: the interdependence between regional externalities and innovativeness. *Small Business Economics, 53*(1), 287-309.
- Ellul, A., & Pagano, M. (2019). Corporate leverage and employees' rights in bankruptcy. *Journal of Financial Economics, 133*(3), 685-707.
- Garcia Martinez, M., F. Zouaghi, T. Garcia Marco, & C. Robinson (2019). What drives business failure? Exploring the role of internal and external knowledge capabilities during the global financial crisis. *Journal of Business Research, 98*, 441-449
- Greenaway, D., J. Gullstrand, & R. Kneller (2009). Live or let die? Alternative routes to industry exit. *Open Economies Review, 20*(3), 317-337.
- Headd, B. (2003). Redefining business success: Distinguishing between closure and failure. *Small Business Economics, 21*(1), 51-61.
- Hirsch, P. M. (1993). Undoing the managerial revolution? Needed research on the decline of middle management and internal labor markets. *Explorations in Economic Sociology*.
- Iwasaki, I. (2014). Global financial crisis, corporate governance, and firm survival: the Russian experience. *Journal of Comparative Economics, 42*(1), 178-211.
- James, S. D. (2016). Strategic bankruptcy: A stakeholder management perspective. *Journal of Business Research, 69*(2), 492-499.

- Kangas, M., Kaptein, M., Huhtala, M., Lämsä, A. M., Pihlajasaari, P., & Feldt, T. (2018). Why do managers leave their organization? Investigating the role of ethical organizational culture in managerial turnover. *Journal of Business Ethics*, 153(3), 707-723.
- Le, S., M. Kroll, & B. Walters (2017). TMT departures and post-IPO outside director additions: implications for young IPO firms' survival and performance. *Journal of Small Business Management*, 55(1), 149-169.
- Leroy, H., S. Manigart, M. Meuleman, & V. Collewaert (2015). Understanding the continuation of firm activities when entrepreneurs exit their firms: Using theory of planned behavior. *Journal of Small Business Management*, 53(2), 400-415.
- Leszczensky, L., & Wolbring, T. (2019). How to deal with reverse causality using panel data? Recommendations for researchers based on a simulation study. *Sociological Methods & Research*, 0049124119882473.
- Nam, J. H., & T. Jinn (2000). Bankruptcy prediction: evidence from Korean listed companies during the IMF Crisis. *Journal of International Financial Management & Accounting*, 11(3), 178-197.
- Ohlson, J. A. (1980). Financial ratios and the probabilistic prediction of bankruptcy. *Journal of Accounting Research*, 18(1), 109-131.
- Ooghe, H., & De Prijcker, S. (2008). Failure processes and causes of company bankruptcy: a typology. *Management Decision*, 46(2), 223-242.
- Reilly, A. H., Brett, J. M., & Stroh, L. K. (1993). The impact of corporate turbulence on: Managers' attitudes. *Strategic Management Journal*, 14(S1), 167-179.
- Shumway, T. (2001). Forecasting bankruptcy more accurately: A simple hazard model. *The Journal of Business*, 74(1), 101-124.

- Stef, N. (2018). Bankruptcy and the difficulty of firing. *International Review of Law and Economics*, 54, 85-94.
- Stef, N. (2015). Cost sharing and bankruptcy law orientation. *Research in Law and Economics*, 27, 181-207.
- Stef, N., & S. Ben Jabeur (2018). The bankruptcy prediction power of new entrants. *International Journal of the Economics of Business*, 25(3), 1-20.
- Sutton, R. I., & A. L. Callahan (1987). The stigma of bankruptcy: Spoiled organizational image and its Management. *Academy of Management Journal*, 30(3), 405-436.
- Teece, D. J., G. Pisano, & A. Shuen (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7), 509-533.
- Thornhill, S., & R. Amit (2003). Learning about failure: bankruptcy, firm age, and the resource-based view. *Organization Science*, 14(5), 497-509.
- Trafimow, D. (2019a). Five Nonobvious Changes in Editorial Practice for Editors and Reviewers to Consider When Evaluating Submissions in a Post  $p < 0.05$  Universe. *The American Statistician*, 73(sup1), 340-345.
- Trafimow, D. (2019b). A Frequentist Alternative to Significance Testing, p-Values, and Confidence Intervals. *Econometrics*, 7(2), 26.
- Trafimow, D. (2017). Using the coefficient of confidence to make the philosophical switch from a posteriori to a priori inferential statistics. *Educational and Psychological Measurement*, 77(5), 831-854.
- Trafimow, D., Wang, C., & Wang, T. (2020). Making the a priori procedure work for differences between means. *Educational and Psychological Measurement*, 80(1), 186-198.

Van Praag, C. M. (2003). Business survival and success of young small business owners. *Small Business Economics*, 21(1), 1-17.

Wagner, J. (2007). Exports & productivity: A survey of the evidence from firm-level data. *World Economy*, 30(1), 60-82.

Whitaker, R. B. (1999). The early stages of financial distress. *Journal of Economics and Finance*, 23(2), 123-132.

Wernerfelt, B. (1984). A Resource-based view of the firm. *Strategic Management Journal*, 5(2), 171-180.

**Table 1**

## Description of variables

Liquidation	Dummy variable equal to 1 if a liquidation procedure was triggered and 0 if the firm was voluntarily dissolved.
Managers/Employees	The ratio between a firm's total number of managers and a firm's total number of employees.
Managers	Firm's total number of managers.
Employees	Firm's total number of employees.
EBIT/TA	Ratio between earnings before interest and taxes and the value of total assets.
Leverage	Ratio between total debt and total equity.
Size	Value of a firm's total assets.
Liquidity	Ratio between current assets and current liabilities.
ROA	Return on assets measured as the ratio between net income and total asset value.
WC/TA	Ratio between working capital and total asset value.
Equity	Value of a firm's total equity.
Sales/TA	Ratio between a firm's turnover and total asset value.
Export	Percentage of export sales revenue with respect to total sales.
Age	Firm's age measured in years.
Legal Form	Dummy variable equal to 1 if the firm is a partnership firm and 0 otherwise.
Services	Dummy variable equal to 1 if the firm's activity sector is services and 0 otherwise.
Trade	Dummy variable equal to 1 if the firm operates in the trade sector and 0 otherwise.
Construction	Dummy variable equal to 1 if the firm's activity sector is construction and 0 otherwise.
Industry	Dummy variable equal to 1 if the firm is an industrial firm and 0 otherwise.
Other	Dummy variable equal to 1 if the firm operates in a sector other than services, trade, construction, and industry and 0 otherwise.
Growth Rate	Growth rate of the gross domestic product per capita of a firm's region.

Notes: All variables were gathered from the *Diane* database of *Bureau Van Dijk* with the exception of the *Growth Rate* that was retrieved from the *INSEE* (French Institute of Statistics and Economic Studies).

**Table 2**  
Descriptive statistics

Variable	Sample: Liquidation Number of firms: 402		Sample: Voluntary Dissolution Number of firms: 295		<i>t</i> -test
	Average	Median	Average	Median	
Managers/Employees	0.282	0.004	0.408	0.040	0.059
Managers	1.551	1	2.007	1	0.005***
Employees	21.851	10	17.666	10	0.014*
EBIT/TA	-2.775	-0.293	2.896	2.405	0.000***
Leverage	89.474	52.09	58.964	25.780	0.000***
Size (K€)	2513.809	703.088	2690.378	705.213	0.793
Liquidity	1.465	1.236	2.325	1.543	0.000***
Export	4.504	0	2.752	0	0.004***
Age	17.289	13	17.408	14	0.450
Legal Form	0.152	-	0.217	-	0.000***
Services	0.169	-	0.241	-	0.000***
Trade	0.231	-	0.312	-	0.000***
Construction	0.289	-	0.064	-	0.000***
Industry	0.184	-	0.142	-	0.019*
Other	0.127	-	0.241	-	0.000***
Growth Rate	0.019	0.018	0.016	0.014	0.000***

Notes: The table reports the average values for the 2010-2017 period. The *p*-values of the *t*-tests are reported. \* implies a significant difference at the 5% level, and \*\*\* implies a significant difference at the 1% level.

**Table 3**  
Difference in values 1 year and 2 years prior to a firm's exit

Variable	Sample: Liquidation Number of firms: 402			Sample: Voluntary Dissolution Number of firms: 295		
	1 year	2 years	<i>t</i> -test	1 year	2 years	<i>t</i> -test
Managers/Employees	0.004	0.562	0.000***	0.041	0.778	0.000***
Managers	0.047	3.055	0.000***	0.203	3.810	0.000***
Employees	21.493	22.211	0.408	17.413	17.920	0.411
EBIT/TA	-4.344	-1.214	0.000***	2.555	3.238	0.170
Leverage	101.262	77.687	0.000***	56.968	60.961	0.282
Size (K€)	2539.951	2487.668	0.940	2340.757	3039.998	0.543
Liquidity	1.369	1.561	0.008***	2.545	2.105	0.077
Export	4.282	4.726	0.321	2.607	2.896	0.377
Age	17.595	16.983	0.258	18.098	16.719	0.107
Legal Form	-	-		-	-	
Services	-	-		-	-	
Trade	-	-		-	-	
Construction	-	-		-	-	
Industry	-	-		-	-	
Other	-	-		-	-	
Growth Rate	0.020	0.017	0.002***	0.014	0.018	0.000***

Notes: The table reports the average values of the variables 1 year and 2 years prior to a firm's exit. No average value is reported for the time-invariant dummy variables such as *Legal Form*, *Services*, *Trade*, *Construction*, *Industry* and *Other*. The *p*-values of the *t*-tests between the two periods are provided. \*\*\* implies a significant difference at the 1% level.

**Table 4**

## Arbitration between liquidation and voluntary dissolution

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Managers/Employees <sub>t-1</sub>	-0.142*	-0.150*	-0.146*	-0.147*	-0.148*	-0.127*	-0.135*	-0.032*
	(0.037)	(0.031)	(0.018)	(0.018)	(0.015)	(0.047)	(0.041)	(0.041)
EBIT/TA <sub>t-1</sub>						-0.076***	-0.076***	-0.018***
						(0.000)	(0.000)	(0.000)
Leverage <sub>t-1</sub>					0.003***	0.003***	0.003***	0.001***
					(0.001)	(0.004)	(0.007)	(0.006)
Logarithm (Size <sub>t-1</sub> )				-0.012	-0.038	0.011	-0.032	-0.008
				(0.931)	(0.788)	(0.943)	(0.829)	(0.829)
Liquidity <sub>t-1</sub>			-0.385***	-0.385***	-0.365***	-0.339***	-0.343***	-0.081***
			(0.000)	(0.000)	(0.001)	(0.002)	(0.002)	(0.002)
Export <sub>t-1</sub>		0.005	0.004	0.004	0.006	0.006	0.004	0.001
		(0.423)	(0.453)	(0.454)	(0.335)	(0.339)	(0.528)	(0.527)
Logarithm (Age <sub>t-1</sub> )	-0.252	-0.222	-0.253	-0.248	-0.261	-0.294	-0.241	-0.057
	(0.198)	(0.260)	(0.197)	(0.223)	(0.207)	(0.186)	(0.265)	(0.265)
Legal Form	-0.447*	-0.428*	-0.423*	-0.422*	-0.416*	-0.484*	-0.534*	-0.130*
	(0.018)	(0.027)	(0.031)	(0.032)	(0.037)	(0.018)	(0.011)	(0.012)
Industry	0.435*	0.419*	0.424*	0.424*	0.382	0.284	0.230	0.053
	(0.029)	(0.038)	(0.036)	(0.036)	(0.059)	(0.186)	(0.319)	(0.309)
Growth Rate <sub>t-1</sub>	6.641	6.091	5.339	5.335	5.486	4.508	-1.668	-0.394
	(0.324)	(0.368)	(0.417)	(0.417)	(0.412)	(0.511)	(0.816)	(0.816)
Intercept	2.385***	2.339***	2.978***	3.007***	2.851***	2.719***	2.865***	
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	
Observations	1004	995	994	994	994	992	992	
R <sup>2</sup> -adjusted	0.087	0.086	0.120	0.118	0.128	0.171	0.184	
F-test	4.321*	4.659*	5.589*	5.574*	5.898*	3.954*	4.164*	
Maximum Variance Inflation Factor	1.280	1.283	1.283	1.283	1.284	1.285	1.467	
Time effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Regional effects	No	No	No	No	No	No	Yes	
Prediction rate (%)	64.2%	63.8%	69.3%	69.3%	69.4%	73.4%	75.1%	
Prediction liquidation (%)	73.9%	73.1%	80.6%	80.6%	78.1%	79.7%	80.9%	

Notes: The coefficients were estimated using a multiperiod logistic regression with robust standard errors. The dependent variable is a dummy variable equal to 1 if the firm was liquidated and 0 if the firm was voluntarily dissolved. Column (8) reports the marginal effects for the regression of column (7). Time effects are included in all regressions. The prediction rate (%) represents the percentage of cases that are correctly predicted whereas the prediction liquidation (%) is the percentage of liquidation cases that are correctly predicted. \* implies a significant coefficient at the 5% level, and \*\*\* implies a significant coefficient at the 1% level. Table 1 presents the detailed definitions of the variables.

**Table 5**  
Arbitration between liquidation and voluntary dissolution. Alternative specifications

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Managers/Employees <sub>t-1</sub>	-0.150*	-0.150*	-0.147*	-0.139*	-0.148*	-0.035*
	(0.026)	(0.026)	(0.028)	(0.038)	(0.032)	(0.032)
ROA <sub>t-1</sub>				-0.061***	-0.060***	-0.014***
				(0.000)	(0.000)	(0.000)
WC/TA <sub>t-1</sub>			-0.161	-0.199	-0.282	0.066
			(0.297)	(0.189)	(0.085)	(0.083)
Logarithm (Equity <sub>t-1</sub> )		-0.021	0.019	0.045	0.075	0.017
		(0.734)	(0.796)	(0.549)	(0.339)	(0.338)
Sales/TA <sub>t-1</sub>	0.069	0.066	0.058	0.050	0.055	0.013
	(0.059)	(0.076)	(0.131)	(0.210)	(0.197)	(0.197)
Export <sub>t-1</sub>	0.005	0.005	0.005	0.003	0.002	0.000
	(0.416)	(0.409)	(0.425)	(0.547)	(0.787)	(0.787)
Logarithm (Age <sub>t-1</sub> )	-0.201	-0.193	-0.194	-0.244	-0.234	-0.055
	(0.308)	(0.333)	(0.329)	(0.226)	(0.270)	(0.270)
Legal Form	-0.425*	-0.426*	-0.421*	-0.447*	-0.469*	-0.113*
	(0.029)	(0.028)	(0.030)	(0.026)	(0.021)	(0.024)
Industry	0.408*	0.408*	0.397*	0.406	0.344	0.078
	(0.042)	(0.042)	(0.048)	(0.055)	(0.127)	(0.112)
Growth Rate <sub>t-1</sub>	6.397	6.327	6.226	5.559	0.993	0.232
	(0.347)	(0.353)	(0.361)	(0.420)	(0.887)	(0.887)
Intercept	2.153***	2.181***	2.133***	2.191***	2.201***	
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	
Observations	955	955	955	955	955	
R <sup>2</sup> -adjusted	0.086	0.085	0.085	0.127	0.139	
F-test	4.989*	4.931*	4.823*	4.316*	4.627*	
Maximum Variance Inflation Factor	1.284	1.285	1.285	1.285	1.460	
Time effects	Yes	Yes	Yes	Yes	Yes	
Regional effects	No	No	No	No	Yes	
Prediction rate (%)	64.6%	64.6%	65.1%	69.3%	71.5%	
Prediction liquidation (%)	72.6%	72.7%	72.6%	75.7%	77.4%	

Notes: The coefficients were estimated using a multiperiod logistic regression with robust standard errors. The dependent variable is a dummy variable equal to 1 if the firm was liquidated and 0 if the firm was voluntarily dissolved. Column (6) reports the marginal effects for the regression of column (5). Time effects are included in all regressions. The prediction rate (%) represents the percentage of cases that are correctly predicted whereas the prediction liquidation (%) is the percentage of liquidation cases that are correctly predicted. \* implies a significant coefficient at the 5% level, and \*\*\* implies a significant coefficient at the 1% level. Table 1 presents the detailed definitions of the variables.