



Article Labor Contracts, Wages and SME Failure

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Abstract: Although employment protection and employee remuneration has been shown to affect many aspects of a firm's performance, evidence of their ability to explain firm failure is very limited. This paper examines the effect of different types of labor contracts and wages on the probability of corporate failure between 2012 and 2019 using a sample of 29,596 Belgian SMEs. Using discrete time hazard regression models, we find that the use of contract types with lower employment protection and paying lower wages are significant predictors of failure.

Keywords: bankruptcy prediction; employment protection; human capital; hazard models

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1. Introduction

The labor market imperfections caused by employment protection (EP) legislation and the effect of wages on firm performance have been popular topics in labor research for many years. EP, for instance, has been shown to affect the employment levels [1–3] and productivity levels of firms [4,5], while paying high wages is seen as a way to build human capital [6] or as a way for managers to buy off conflicts within the firm, which could be value-destroying [7]. More recently, the hiring and firing costs introduced by employment protection are also seen as a market imperfection that can affect a firm's decision-making process in general. As a consequence, EP and wages have been examined in connection to, for instance, firm investment [8–10], the location decisions of multinationals [11,12], venture capital investments [13,14], debt policy [15,16], innovation [17,18], valuation and performance [19,20] and merger and acquisition activity [21–23].

As all of the issues listed above may be related to a firm's success and, ultimately, to its survival chances, this paper focuses on the link between employment protection and wages and the likelihood that a firm enters into bankruptcy. The ex-ante expected effects of EP and wages on firm failure are not clear. On the one hand, firms with less EP obligations are more capable of adjusting to new circumstances [24] and are able to allocate human capital more efficiently [25]. In addition, low EP companies are less hindered by fixed hiring and firing costs and have a lower operating leverage level [15,26]. Based on these arguments, a firm is expected to be less likely to fail if it is more flexible in terms of employee contracts. On the other hand, companies that are subject to many EP obligations and are therefore less flexible may also have a lower probability of entering into bankruptcy, as EP and the paying of higher wages promotes the adoption of skills by employees and may increase the stakes of the employees in the company [17,27]. The resulting higher human capital costs of bankruptcy may increase both the incentives of employees to guard their interests and their efforts to keep the firm viable and retain their jobs.

This paper adds to the existing literature in three ways. First, to the best of our knowledge, we are the first to examine the effects of wages and employment protection in a failure prediction setting. Although many papers advocate the use of non-financial variables in failure models [28–30], employment protection has not yet been studied in

connection with firm failure. Second, we are able to create firm-specific variables that show to what degree a firm is subject to EP while, because of data limitations, the existing literature mainly has to resort to country-level EP indexes [15,21,24]. The use of countryspecific EP variables implicitly assumes that the level of labor protection is the same for all types and categories of employees in a given country and that a company does not have the ability to choose to what extent it is subjected to protection rules. This assumption is violated if several labor contract categories with different labor protection rules exist. In that sense, studies that use country-level variables are confronted with an omitted variable problem. The Belgian setting of this study has the advantage that it allows for creating company-specific EP variables, since Belgian firms are obliged to report not only financial- but also workforce-related data. As a result, we are able to construct two variables that show how flexible a firm is in terms of labor contracts. A few papers created a firm-specific variable based on the distinction between temporary and permanent workers [26,31]. This paper not only makes use of this difference between temporary and permanent workers, but it also exploits the legal difference between two core types of employment contracts: the better protected white-collar employees and the less protected blue-collar workers. Third, while the majority of the existing literature focuses on large quoted companies (again, often because of data availability issues), this paper focuses on small- and medium-sized enterprises. Examining labor contract flexibility and wages in large firms may introduce noise, as quoted and large companies often have employees in many countries and consequently have to comply with the labor protection rules and wage levels of these different countries. Furthermore, SMEs have less access to the capital markets, are financially more constrained than large firms, are on average less diversified and may experience more volatility in earnings, all of which makes them more likely to be affected by the rigidity caused by stringent EP rules.

The sample consisted of 29,596 Belgian small- and medium-sized firms, of which 1585 firms entered into a bankruptcy or formal reorganization procedure between 2011 and 2019. As in the work of Shumway [32] and Campbell, Hilscher and Szilagvi [33], the probability that a firm failed was estimated using a discrete time hazard model. The results indicate that, ceteris paribus, firms that used relatively more protected contract types and paid higher wages were less likely to fail, which is consistent with the view that building human capital is beneficial for firm survival. The results were robust for several different choices in model specifications and variable definitions.

The remainder of this paper is organized as follows. Section 2 reviews the relevant literature on the topic and derives the hypotheses. Section 3 explains the methodology, defines the variables and discusses the sample and the descriptive statistics. In Section 4, the empirical results are presented, while Section 5 concludes the paper.

2. Literature and Hypotheses

Employment protection legislation can be described as any set of rules that restricts the employer's ability to fire an employee without delay or cost. Some examples of these rules are trial periods, notices of termination, severance payments, administrative procedures, difficulty of dismissal and additional measures for collective dismissals [27]. Therefore, firms that are subject to less EP obligations, by definition, incur less hiring and firing costs when they want to make adjustments to their workforce composition [34,35].

The flexibility resulting from less stringent EP may play an important role in firms in times of financial distress. It is frequently argued that labor-flexible firms may mitigate fluctuations in customer demand and volatility of returns more easily, as they can adjust their workforce and curtail wage expenditures more quickly in comparison with a firm with high EP obligations [24,36–38]. A firm's human capital may be allocated more efficiently if there is more labor contract flexibility, since there are fewer costs imposed on the employer when hiring and firing employees [25,39]. Evidence of the advantages of EP flexibility in a changing environment can be found in the work of Boeri and Jimeno [40] and Kugler and Pica [41]. These authors showed that firms more frequently make adjustments to

their workforce compositions in regimes with less restrictive EP rules. Further, Cuñat and Melitz [42] argued that firms in a volatile sector have a comparative advantage in international trade when they are located in a less restrictive EP country. They find that volatile sectors are larger in countries with more labor flexibility.

Kuzmina [26], Serfling [43] and Simintzi, Vig and Volpin [15] examined another way in which firms in a less restrictive EP setting may be able to react more efficiently to changing circumstances. They stated that EP increases a firm's operating leverage by imposing more fixed hiring and firing costs on the firm, consequently raising the firm's fixed costs of conducting business. Labor costs indeed have been shown to be more fixed in nature in a restrictive EP environment [44,45], leaving less opportunity for the firm to make adjustments when necessary. Since firms that are subject to less employment protection obligations may be able to react more efficiently to a shock or to changing circumstances in the business environment, they may be less likely to fail. The arguments above lead to the first hypothesis:

Hypothesis 1a (H1a). *Firms that employ more employees with flexible labor contracts are, ceteris paribus, less likely to fail.*

By contrast, another line of reasoning argues that firms may also be more likely to fail when they are less exposed to EP regulation. This reasoning builds on two arguments. First, employees that are better protected by EP could be more willing to invest in skills and know-how because they do not face the possibility of being dismissed without any compensation or protection, which would render the workers' investments in companyspecific knowledge of no value [17,27,36,46,47]. Empirical evidence of this effect can be found in studies that look at the effect of EP on innovation, which is an activity that is known to thrive on knowledge. Acharya, Baghai and Subramanian [48] found that the introduction of wrongful discharge laws, which protect employees against dismissal, indeed increase employee effort in innovation and consequently spur innovative activity and foster entrepreneurship. Griffith and Macartney [17] also examined the effect of labor regulations on innovation and found that stricter EP leads to more innovation as well. Since Pennings, Lee and Van Witteloostuijn [49] showed that firms with more skills are less likely to fail, this line of reasoning suggests that firms that are subject to lower EP obligations and, consequently, have fewer incentives to invest in knowledge and skills-which were valuable resources in Barney's [50] resource-based view of the firm—are more likely to go bankrupt.

Secondly, Berk, Stanton, and Zechner [51] stated that employees may face large human costs of bankruptcy, as they have to search for a new job when the firm in which they work fails. Empirical evidence of this effect can be found in the work of Graham, Hyunseob, Li and Qiu [52], who pointed out that the bankruptcy costs borne by employees can be considerable. Additionally, Berk et al. [51] argued that employees who are more entrenched in the firm will bear more of the human costs of bankruptcy. Employees may be more entrenched if they are better protected by the law, as they may lose their superior job security the moment the firm fails. Employees in a stricter EP setting may therefore face larger human costs of bankruptcy than employees that are less protected. This may increase the incentives for well-protected employees to keep the firm healthy and in going concern. This leads to another version of the first hypothesis, namely Hypothesis 1b:

Hypothesis 1b (H1b). *Firms that employ more employees with flexible labor contracts are, ceteris paribus, more likely to fail.*

The literature presents two opposite possibilities for the relationship between wage levels and survival chances as well. The human capital view of remuneration starts with Akerlof's [6] concept of reciprocity, which implies that satisfied employees will pay back their satisfaction through higher effort for their employer. Employee-friendly firms have been shown to be better innovators [53] and have more productive workers,

superior financial performance [54] and valuation [19]; in other words, paying higher wages increases costs, but it can raise the return on investment on labor [55]. Next to raising the human costs of bankruptcy (see above), offering better compensation packages also increases employee loyalty and reduces turnover and absenteeism [56], which should help the long run viability of the firm. Zhou [57] considered several reasons why exporting firms pay higher wages, including that paying higher wages leads to better quality of goods produced due to lower shirking costs. Moreover, higher wages may also be related to higher education levels and a larger skill set of the workers [58,59]. Verwijmeren and Derwall [60] also argued that firms that invest in employee well-being have a lower probability of bankruptcy. All of the above leads to Hypothesis 2a:

Hypothesis 2a (H2a). Firms that pay higher wages are, ceteris paribus, less likely to fail.

However, due to agency problems arising from the separation between shareholders and management, paying high wages may not always be positive for a firm's performance. Managers may hire too many employees to engage in empire building and may overpay and delay layoffs to avoid conflicts and maintain employee support [24] or to avoid hostile takeovers and whistleblower behavior [7]. Cronqvist, Heyman, Nilsson, Svaleryd and Vlachos [61] found that more entrenched managers pay higher wages to get private benefits, such as being able to spend less effort in wage bargaining and having better social relations with their employees. If these types of inefficiencies are common, the link between remuneration and failure chances may be negative. Labor costs are also a cost component that is relatively sticky; wages are likely to be related to seniority, which could be a reflection of human capital accumulation [62], but this is also linked to employment protection, as severance payments increase with the time spent in a contract. As a result, firms with high wage obligations may be less flexible in adjusting their cost structures in times of distress, which could be associated with lower survival chances. The arguments listed above lead to Hypothesis 2b:

Hypothesis 2b (H2b). Firms that pay higher wages are, ceteris paribus, more likely to fail.

3. Materials and Methods

3.1. Methodology

Following the work of Shumway [32], we estimated the probability of corporate failure using a discrete time hazard model. Hazard models explore the time series variation in the number of failures using time-varying variables to assess the likelihood of failure at each point in time and have been shown to predict firm failure very well compared with other more traditional bankruptcy prediction models (see, for example, Bauer and Agarwal [63]). In practice, this entailed estimating a logistic regression model on a panel of firm year observations, which Campbell et al. [33] referred to as a dynamic logit model (also see Chava and Jarrow [64] for a detailed proof of why this is technically appropriate), in which the marginal probability of failing during the next period is assumed to be equal to

$$P_{t-1}(F_{i,t} = 1) = \frac{1}{1 + \exp(-\alpha - \beta x_{i,t-1})}$$
(1)

where $F_{i,t}$ equals one if firm *i* goes bankrupt in the next period (*t*) and $x_{i,t-1}$ is a vector of explanatory variables which are known in period t - 1. In order to fulfill the latter condition, we only considered data that had been disclosed before the moment of failure. As in the work of Dewaelheyns and Van Hulle [65], the year t - l was defined as the fiscal year that ended between 7 and 19 months before failure. The typical lag between the fiscal year and the filing of the accounts at the National Bank of Belgium is seven months, which is the maximum allowed publication lag in Belgium. To avoid a look ahead bias (by using data which would not yet have been publicly available at the time of failure to make a prediction, which might bias performance upward), we did not include data closely

preceding the date of failure. For instance, for a failing firm for which we had data from 2 months before failure and 14 months before failure, we used the data from 14 months before failure as t - 1. As is common practice in the bankruptcy prediction literature going back to the seminal works of Beaver [66] and Altman [67], we also estimated the models to investigate whether we could predict which firms would fail after a longer time period (specifically, three years later (t - 3)).

3.2. Variables

The main variables of interest in this research were the labor contract and wage variables. In Belgium, a firm's level of exposure to employment protection depends on the workforce composition, as some types of workers are legally better protected than others. Because of Belgium's extensive disclosure requirements for all incorporated firms with respect to their workforce in the so-called social balance sheet, we were able to create two types of variables that show the EP obligations of a firm. In other words, we were able to create two types of variables that indicated whether a firm was more flexible in terms of labor contracts than others.

The first type of contract variable followed the work of Cappellari, Dell'Aringa and Leonardi [31], Kuzmina [26] and Valverde, Tregaskis and Brewster [38], and it was based on the duration of the employee agreement. As in most European countries, Belgian labor contracts can be classified into three categories: permanent contracts, fixed term contracts and fixed job contracts. Permanent workers are better protected than employees with a fixed term agreement or fixed task agreement. If a company hires or fires a permanent worker, it has to follow many EP rules. The firm, for instance, needs to give a term of notice and pay severance fees. By contrast, an employer who hires an employee for a fixed term or a fixed job may choose to either renew the agreement or to end the collaboration at the end of the contract. Consequently, firms that hire more employees with a fixed term or fixed job contract and less permanent employees are subject to fewer EP rules. *Temp* is the percentage of temporary employees that are hired under a fixed term or fixed job agreement. The higher this percentage is, the more possibilities the firm should have to reduce its number of employees at a low cost. The second type of contract variable was based on the Belgian distinction between two types of employees, more specifically between blue-collar workers (arbeider/ouvrier) and white-collar workers (bediende/employé). The Law on the Employment Contracts states that a blue-collar worker's job mainly involves manual work, while a white-collar worker mainly performs intellectual work. Although this distinction appears to be clear-cut in theory, the difference between both types of work and the relation between the type of labor and the contract type has become blurred in practice, which results in a large amount of case law on the topic. Additionally, firms can offer white-collar contracts to attract and reward skilled manual workers, which disrupts the distinction even more. During a large part of the time period of our sample, blue-collar workers were subjected to much lower employment protection rules than white-collar workers; their trial periods and terms of notice, for instance, were much shorter [68]. For example, up until 1 January 2014, the legal term of notice for a blue-collar worker with 5 years of seniority was 28 days if he or she was fired by the employer, while the term of notice of a whitecollar worker with the same level of seniority was at least 6 months, but it may have been even longer, depending upon the wage. As this was judged to be discriminatory, a legal reform (Wet van 26 december 2013 betreffende de invoering van een eenheidsstatuut tussen arbeiders en bedienden inzake de opzeggingstermijnen en de carenzdag en begeleidende maatregelen) made the legal terms of notice equal for both types of employees but kept in place all rights for existing contracts, which in practice implies that the vast majority of employees are still treated in a substantially different way if they are fired. Even after the reform, blue-collar contracts can be interrupted more easily because of economic reasons, technical disturbances or because of weather conditions, and employers need to pay lower compensations in case of illness for employees with blue-collar contracts. As a robustness check, we estimated all models in a split sample approach (available upon request). Even

based on data from after the reform of 2014, our main results and conclusions remained the same. The variable *Bluecollar* was the percentage of blue-collar employees in a firm. The higher the value of *Bluecollar*, the lower the EP obligations of the firm would be.

Furthermore, we included the variable *Costemployee*, which was calculated as the ratio of the total cost of employees (which included normal wages as well as holiday pay and bonuses, health insurance payments and employer contributions to pension plans, among other factors) over the number of full-time equivalent (FTE) employees (cf. Bae, Kang and Wang [69]; Graham et al. [52]).

We followed the vast literature on bankruptcy prediction in our choice of control variables (see, for instance, Tian and Yu [70] for a review). The first control variable was ROA, defined as earnings before interests, taxes, depreciation and amortization (EBITDA) over the total assets. As profitable companies are more likely to remain in going concern, the expected effect of ROA on the likelihood of corporate failure was negative. The next variable, Leverage, was defined as the sum of the long-term and short-term financial debt over the total assets. Since firms with higher debt levels are more likely to experience financial distress, firms with higher values for Leverage were expected to have a higher probability of failure. The third financial control variable was a liquidity measure. Liquidity was defined as the quick ratio (i.e., the difference between the current assets minus inventories and work in progress over the current liabilities) and showed whether the firm was able to repay its short-term obligations. It was expected that firms with better liquidity positions were less likely to fail, so this variable was expected to have a negative influence on the probability of failure. As in the work of Johnsen and Melicher [71] and Shumway [32], the variable Risk, which measured the volatility of a firm's performance, was included as well. It was constructed as the standard deviation of ROA over the previous three years. Firms with more volatile earnings are more likely to run into difficulties. Next to the four financial ratios, we also included the size of the firm (defined as the natural logarithm of total assets) and its age (defined as the natural logarithm of the number of years since incorporation), as Hadlock and Pierce [72] showed that these have a large impact on the probability of being financially constrained. A group membership dummy, Group, was introduced to indicate whether or not the firm was part of a business group. Firms that were controlled 50 percent or more by another company were defined as a being linked to a group. Group subsidiaries are less likely to fail, as they may count on the support of the parent company in times of distress [65,73]. Finally, we also included one of the most popular bankruptcy predictors in the literature, viz. Altman's Z-score. Specifically, we used the version of the Z-score which is also applicable to nonmanufacturers [74] (sometimes also referred to as the Z"-score). Altman, Iwanicz-Drozdowska, Laitinen and Suvas [75] showed that this specification works well in predicting bankruptcy in many settings, including a sample of Belgian private firms.

A detailed overview of the definition of all the variables used in the analyses is given in Table 1. It goes without saying that the typical values for many of these variables can differ across industries or across time, so all of our regression models will include industry-fixed effects (based on two digit NACE-codes) and time-fixed effects.

Table 1. Variable definitions

Variable	Definition
Тетр	(number of FTE employees with fixed-term or fixed-job contracts)/(total number of FTE employees)
Bluecollar	(number of FTE employees with blue-collar contracts)/(total number of FTE employees)
Costemployee	ln[(total employee costs)/(total number of FTE employees)]
ROA	(earnings before interests, taxes, depreciation and amortization)/total assets
Leverage	(LT financial debt + ST financial debt)/(total assets)
Liquidity	(current assets—inventories and work in progress)/current liabilities
Risk	$\sigma(\text{ROA}_t, \text{ROA}_{t-1}, \text{ROA}_{t-2})$
Size	ln(total assets)
Age	ln(years since date of incorporation)
Group	0 if standalone, 1 if the firm is owned 50% or more by another company
Zacana	6.56 [(current assets – current liabilities)/total assets] + 3.26 (retained earnings/total assets) + 6.72 (earnings
Z-score	before interest and taxes/total assets) + 1.05 (book value of equity/total liabilities)

3.3. Sample and Descriptive Statistics

The empirical analysis was based on a comprehensive sample that consisted of Belgian small- and medium-sized firms with limited liability that filed unconsolidated financial statements, for which the BelFirst database (Bureau Van Dijk EP) was consulted. We followed the European Commission's definition of small and medium-sized enterprises (Art 2.1 recommendation 2003/361/EC) in terms of employment numbers (fewer than 250 FTE) and balance sheet size (less than EUR 43 million). We did not consider micro firms (which employ fewer than 10 FTE) because their organization tends to be less wellstructured [76] and because labor-related ratios for these very small companies may suffer from small denominator problems. Using Belgian data had several advantages in the context of this research. First, all Belgian firms, including SMEs, are obliged to not only disclose standard financial information, but also detailed information on the composition of their workforce in a separate section of the annual account, which is called the social balance sheet. This gave us the opportunity to create the contract type variables defined in the previous section for a very large number of firms, while in many countries, that would only be feasible for large, quoted companies. The failing firms in our sample were those that filed for liquidation bankruptcy (cf. US Chapter 7 bankruptcy) or a reorganization procedure under the so-called Law on the Continuity of Enterprises (LCE) (cf. US Chapter 11 bankruptcy) from the beginning of 2012 to the end of 2019. This implies that the data used in the prediction models included fiscal years 2011-2018. For all non-failing firms, data for those same fiscal years were added to the sample. Following common practice, financial firms, insurance companies, real-estate firms and public services companies were excluded. Furthermore, start-ups that were less than two years old were removed from the sample. To reduce the effect of acquisitions, reorganizations and other major corporate events, only firm years for which the absolute value of the asset growth did not exceed 100% were considered (cf. Almeida and Campello [77]).

In total, the sample consisted of 153,826 firm year observations for 29,596 firms. This set should be highly representative as, for instance, at the end of 2016, the entire population of small- and medium-sized firms in Belgium (across all industries and excluding micro firms) was 35,827. Panel A in Table 2 shows the distribution of the sample across six broad sector groups and the number of failing companies in each sector. As is typical for an open, developed economy such as Belgium's, most SMEs were active in services and retail and wholesale. The failure rates over the eight-year sample period were lowest in the (very small) agriculture and mining sector (3.70%) and highest in the construction sector (8.14%). In total, our sample contained data on 1585 failing firms. Table 2 Panel B reports the summary statistics on all of our main variables (as defined in the previous section). All continuous control variables were winsorized at a 1% level to reduce the impact of outliers. Robustness checks showed that winsorizing at higher cutoffs (for instance, at the 2.5% level) would lead to a slightly higher model fit but would not influence the conclusions or findings, so we opted for a conservative approach in which only a limited number of observations were replaced. The correlation matrix is reported in Appendix A Table A1 and shows that multicollinearity issues were not likely to play a major role in the multivariate tests.

Panel A. Sample Firms per Sector									
	Number of Failed Sample Firms	Total Number of Sample Firms	Percentage of Total Sample	Failure Rate duri	ng Sample Period				
Agriculture and mining	13	351	1.19%	3.70%					
Manufacturing	302	5294	17.89%	5.7	0%				
Construction	428	5259	17.77%	8.1	4%				
Retail and wholesale	358	8875	29.99%	4.0	3%				
Transportation	127	2420	8.18%	5.2	5%				
Services	357	7397	24.99%	4.8	3%				
Total	1585	29,596		5.3	5%				
	Panel B. Summary Statistics								
Variable	Mean	Median	Stdev	Min	Max				
Temp	0.0641	0	0.1282	0	0.6875				
Bluecollar	0.5470	0.6667	0.3675	0	1				
Costemployee	10.732	10.745	0.3544	9.6358	11.718				
RÓA	0.1245	0.1129	0.1279	-0.3478	0.5309				
Leverage	0.1799	0.1282	0.1862	0	0.7612				
Liquidity	1.4763	1.0803	1.4587	0.1080	9.5901				
Risk	0.0534	0.0355	0.0551	0.0015	0.3059				
Size	14.792	14.775	1.1868	11.883	17.364				
Age	2.9644	3.0910	0.7482	0.6931	4.7707				
Group	0.5802	1	0.4935	0	1				
Z-score	3.1640	2.6838	4.1245	-9.0901	17.022				

Table 2. Sample composition and summary statistics.

Note: Variables are as defined in Table 1.

4. Results

4.1. Univariate Tests

Table 3 contains the mean (Panel A) and median (Panel B) values of all variables in the subsamples of non-failing firms and failing firms in the year before failure (t - 1) and three years before failure (t - 3), as well as the test statistics of equality of the means or medians between failing and non-failing firms. With respect to the contract variables, Panel A shows that the workforce of a non-failing firm, on average, consisted of 6.4% temporary workers and 54.6% blue-collar workers, while in failing firms, the work force contained 7.5% temporary workers and 63.9% blue-collar workers one year before failure. Although results from univariate tests should always be interpreted with caution, the significant test statistics provided a first indication of support for Hypothesis 1b, stating that using relatively more flexible, less protected labor contracts is linked to a higher probability of failure. The univariate tests for *Costemployee* pointed toward the human capital view (H2a) as well; failing firms spend significantly less money per employee than non-failing firms (in euro terms, the difference is about 14% in the year before failure). The findings for the medians of the contract variables in Panel B are similar to those for the means.

Table 3. Univariate tests.

Panel A. Means								
Variable	Non-Failing	Failing ($t-1$)	Test Statistic	Failing ($t - 3$)	Test Statistic			
Temp	0.0640	0.0747	3.262 ***	0.0794	4.461 ***			
Bluecollar	0.5460	0.6386	9.969 ***	0.6304	8.524 ***			
Costemployee	10.733	10.602	14.670 ***	10.576	16.595 ***			
RÓA	0.1262	-0.0450	53.501 ***	0.0518	22.253 ***			
Leverage	0.1791	0.2577	16.624 ***	0.2348	11.177 ***			
Liquidity	1.4837	0.7659	19.321 ***	0.9424	13.730 ***			
Risk	0.0528	0.1118	42.694 ***	0.0828	20.847 ***			
Size	14.800	14.057	24.833 ***	14.238	17.731 ***			
Age	2.9676	2.6589	16.355 ***	2.7061	13.090 ***			
Group	0.5842	0.1987	31.031 ***	0.2629	24.335 ***			
Z-score	3.2179	-2.0261	50.761 ***	0.3680	26.170 ***			

Panel B. Medians							
Variable	Non-Failing	Failing ($t-1$)	Test Statistic	Failing ($t - 3$)	Test Statistic		
Temp	0	0	-	0	-		
Bluecollar	0.6667	0.7778	10.828 ***	0.7619	8.903 ***		
Costemployee	10.746	10.631	13.744 ***	10.611	16.329 ***		
RÓA	0.1138	-0.0065	40.179 ***	0.0617	20.575 ***		
Leverage	0.1273	0.2183	14.059 ***	0.2014	10.752 ***		
Liquidity	1.0857	0.6266	32.316 ***	0.7399	20.970 ***		
Risk	0.0353	0.0876	29.186 ***	0.0589	16.345 ***		
Size	14.781	14.053	23.326 ***	14.228	16.837 ***		
Age	3.0910	2.7726	14.766 ***	2.8904	12.067 ***		
Group	1	0	-	0	-		
Z-score	2.7173	-1.3495	45.200 ***	0.7097	26.604 ***		

Table 3. Cont.

Panel A. Note: Means are for the subsamples of the non-failing firms and failing firms in the year before failure (t - 1) and three years before failure (t - 3). Variables are as defined in Table 1. T-test statistics. *** Significance at the 1% level. Panel B. Note: Medians are for the subsamples of the non-failing firms and failing firms in the year before failure (t - 1) and three years before failure (t - 3). Variables are as defined in Table 1. Wilcoxon–Mann–Whitney test statistics. *** Significance at the 1% level.

The results for the control variables were in line with findings from the bankruptcy prediction literature for both the means and medians. The mean values, for instance, show that non-failing companies were quite profitable (*ROA* of 12.6%), while failing companies had an average loss of 4.5% one year before failure. Furthermore, *Liquidity* and *Z*-score were significantly lower and *Leverage* and *Risk* were significantly higher for failing firms. Failing firms were also smaller than non-failing companies as well as younger (on average, a failing firm was 14.3 years old in the year before it failed, compared with an average age of 19.4 years for non-failing firms). Finally, as in the work of Dewaelheyns and Van Hulle [65], there was a large difference in group membership; while a majority of the non-failing firms (58.4%) were controlled by another firm, this was only the case for 19.9% of the failing firms at t - 1. Not surprisingly, the absolute differences across most variables between non-failing firms and failing firms three years before bankruptcy were smaller (as could be expected, difficulties are less severe when failure is relatively further away), but all equality tests for both the means and medians remained highly significant.

4.2. Multivariate Tests

The results of the discrete time hazard model regressions are reported in Table 4. As a starting point, only the main variables of interest (Temp, Bluecollar and Costemployee) were included, together with industry and year-fixed effects. In these base models, only Costemployee was significant, with a negative influence. This started to change, however, as more controls for financial health were added. In models 3 and 4, we added the Z-score. Firms with lower values for the Z-score were assumed to have higher degrees of financial distress, so the negative coefficients in regression models 3 (prediction one year before failure (t - 3) and 4 (prediction three years before failure (t - 3)) were as expected. In models 5 and 6, we replaced the Z-score with the complete set of control variables discussed in Section 3.2. In all models, *Costemployee* was significantly negative which, again, is in line with Hypothesis 2a that higher payment per employee is linked to a lower probability of failure, even when controlling for financial health, industry and time effects, both one year and three years before failure. *Bluecollar* was a highly significant predictor of failure at t-1 in models 3 and 5 (and also at t-3 in the full model including all control variables), with a positive influence, supportive of Hypothesis 1b, stating that firms that offer a larger percentage of low protection contracts, ceteris paribus, have a higher likelihood of failing. The univariate findings for *Temp* could not be confirmed in the regression models; its coefficient was positive in all models, but it was never significant. A potential explanation of why *Bluecollar* was a better predictor than *Temp* could be that the fraction of temporary contracts, by definition, is easier to adjust than the fraction of blue-collar vs. white-collar contracts, as moving from a strong to a more weakly protected contract is very difficult

to accomplish for existing employees. In that sense, *Bluecollar* may have better reflected the overall contract strategy of the firm than *Temp*. The control variables in models 5 and 6 confirmed the univariate findings and were in line with the bankruptcy literature (see, for instance, Campbell et al. [33] or Chava and Jarrow [64]) both one year and three years before failure; failing firms were significantly smaller, younger, less profitable, less liquid, more highly leveraged, more risky and less likely to be part of a business group than their non-failing counterparts. Once again, we observed that making predictions three years before failure was more difficult, as shown by the fit (McFadden R²s) and the prediction accuracy statistics (Area under the ROC curve (AUC)) of the models including financial controls.

	(1)	(2)	(3)	(4)	(5)	(6)
-	t – 1 Failure	t – 3 Failure	t – 1 Failure	t – 3 Failure	t-1 Failure	t – 3 Failure
Тетр	0.1466	0.2543	0.0761	0.1898	0.2340	0.2736
,	(0.218)	(0.220)	(0.231)	(0.227)	(0.231)	(0.230)
Bluecollar	0.1825	0.0333	0.4498 ***	0.1553	0.6219 ***	0.3092 **
	(0.124)	(0.130)	(0.128)	(0.132)	(0.134)	(0.134)
Costemployee	-0.6800 ***	-0.7362 ***	-0.4474 ***	-0.6232 ***	-0.3548 ***	-0.5001 ***
, ,	(0.110)	(0.105)	(0.106)	(0.106)	(0.116)	(0.114)
Z-score	-		-0.3281 ***	-0.1875 ***	-	
			(0.007)	(0.008)		
ROA	-	-	_	_	-5.2270 ***	-3.0656 ***
					(0.236)	(0.218)
Leverage	-	-	-	-	0.9493 ***	0.8083 ***
0					(0.142)	(0.143)
Liquidity	-	-	-	-	-0.7046 ***	-0.3641 ***
, ,					(0.110)	(0.068)
Risk	-	-	-	-	2.6078 ***	2.9484 ***
					(0.465)	(0.453)
Size	-	-	-	-	-0.2878 ***	-0.2351 ***
					(0.033)	(0.032)
Age	-	-	-	-	-0.0958 ***	-0.1077 ***
C C					(0.037)	(0.037)
Group	-	-	-	-	-1.6810 ***	-1.3363 ***
					(0.070)	(0.067)
Constant	5.089 ***	6.9037 ***	1.8585 ***	5.5886 ***	5.8434 ***	8.0635 ***
	(1.190)	(1.159)	(1.154)	(1.165)	(1.189)	(1.175)
Sector and Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	151,921	108,538	151,918	108,536	151,867	108,506
McFadden R ²	0.0776	0.1237	0.2169	0.1626	0.2729	0.2043
Chi-square Test	1986.20 ***	2718.14 ***	3653.41 ***	3222.61 ***	4252.48 ***	3447.37 ***
ÂUC	0.7151	0.7507	0.8709	0.8142	0.9016	0.8452

Table 4. Failure pre	ediction models.
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Note: Discrete time hazard models. Dependent variable: value = 1 if the firm fails in the next year (models 1 and 3) or if the firm fails three years later (models 2 and 4); 0 otherwise. Independent variables are as defined in Table 1. Clustered robust standard errors are given between parentheses. *** and ** denote significance at the 1% and 5% levels, respectively.

4.3. Robustness Checks

The discrete time hazard models in Table 4 assumed that there were only two possible states: a company either survived or it failed. The previous literature, however, expresses the concern that only opposing failed firms with non-failing firms neglects the possibility that firms can also exit via mergers and acquisitions (M&A) [78–80]. To take both exit paths into account, the sample was expanded with 1062 firms that ceased to exist as independent entities because they were absorbed into another firm through a merger or acquired during the sample period. As in the work of Bergström et al. [78], a multinomial logistic regression model was used, with a dependent variable which equaled one in the case of failure, two in the case of a merger or acquisition and zero if the firm survived. Once again, the prediction models (reported in Table 5) were run both one year and three years before failure or the M&A event. Not surprisingly, an exit through M&A turned out to be more difficult to predict than failure, as both weaker companies (in so-called distressed M&As) and very healthy companies (for instance, because of their growth prospects) can become M&A

targets. The fact that several of the financial variables in the M&A equations of the models had the opposite signs of those in the failure equations of the models indicates that in our sample, the M&A results were mostly driven by successful companies. For instance, one year before the event, M&A targets had lower *Leverage* and higher *Liquidity* than the surviving firms. Consistent with the literature (e.g., Brar, Giamouridis and Liodakis [81]), smaller companies were more likely to become targets, and firms that already had a controlling shareholder were less likely to exit via an M&A deal. Important from the perspective of this paper, all the results for *Temp*, *Bluecollar* and *Costemployee* in models 1 and 3 of Table 5 were completely analogous to the findings from Table 4. *Costemployee* also turned out to be a highly significant predictor of M&A, albeit only at t - 1, with a positive influence. If most M&A targets were indeed relatively healthy firms, this could again point to the view that paying higher wages is a sign of strength.

	(1)	(2)	(3)	(4)		
-	t – 1 Failure	t-1 M&A	t – 3 Failure	t – 3 M&A		
Тетр	0.2517	-0.7124	0.2736	-1.3641 *		
	(0.231)	(0.619)	(0.230)	(0.830)		
Bluecollar	0.6173 ***	-0.0423	0.3092 **	-0.4605		
	(0.134)	(0.245)	(0.134)	(0.308)		
Costemployee	-0.3682 ***	0.7200 ***	-0.5001 ***	0.0663		
, ,	(0.116)	(0.187)	(0.114)	(0.280)		
ROA	-5.2304 ***	-0.5287	-3.0805 ***	-0.1918		
	(0.236)	(0.348)	(0.218)	(0.543)		
Leverage	0.9488 ***	-1.1341 ***	0.8138 ***	-1.3913 ***		
C	(0.142)	(0.332)	(0.143)	(0.523)		
Liquidity	-0.7139 ***	0.0862 ***	-0.3728 ***	0.0864 **		
, ,	(0.109)	(0.026)	(0.068)	(0.036)		
Risk	2.6740 ***	1.5403 *	2.9867 ***	-0.1139		
	(0.464)	(0.858)	(0.453)	(1.311)		
Size	-0.2844 ***	-0.1067 **	-0.2359 ***	-0.1098		
	(0.033)	(0.054)	(0.032)	(0.080)		
Age	-0.1014 ***	0.0808	-0.1062 ***	0.0705		
C	(0.037)	(0.073)	(0.037)	(0.104)		
Group	-1.6743 ***	-3.0840 ***	-1.3348 ***	-2.3101 ***		
	(0.070)	(0.258)	(0.067)	(0.313)		
Constant	5.8665 ***	-8.9032 ***	8.1843 ***	-0.3272		
	(1.188)	(1.906)	(1.177)	(2.769)		
Sector and Year FE	Yes	Yes	Yes	Yes		
Number of Observations	152,	980	109,084			
McFadden R ²	0.20	695	0.2305			
Chi-square Test	26,657	.85 ***	43,734.86 ***			

Table 5. Failure and M&A prediction models.

Note: Multinomial logistic regression models. Dependent variable: value = 1 if the firm fails in the next year (model 1) or three years later (model 3), 2 if the firm ceases to exist through an M&A deal in the next year (model 2) or three years later (model 4); 0 otherwise. All independent variables are as defined in Table 1. Clustered robust standard errors are given between parentheses. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

Furthermore, the results were robust for several alternative model specifications or variable definitions. For instance, the results did not change when measuring *Liquidity* as the current ratio instead of the quick ratio or defining *ROA* based on EBIT or net profits instead of EBITDA. Moreover, as mentioned in Section 3.2, the main conclusions and results also remained if we estimated the models in a split sample approach based on data after the reform of the blue-collar or white-collar contracts. All results from the robustness checks are available upon request.

5. Conclusions

Although the literature is increasingly paying attention to the effects of employment protection and employee satisfaction on a firm's performance, especially for large quoted firms, the association between labor contracts and wages and the likelihood of corporate failure has not yet been examined. This paper aimed to fill this gap in the literature by adding contract and wage variables to a failure prediction model for a very large sample of Belgian SMEs. The literature argues that flexibility in labor contracts and the level of employee compensation may be both positively or negatively related to firm performance and survival, depending on the underlying motivations of both the firms and the managers. We consistently found evidence in support of the literature's more positive (building human capital) view of labor protection and employee compensation: ceteris paribus, the higher a firm's relative use of better protected white-collar contracts, and the higher the compensation per employee it pays, the better its chances of survival.

Our findings have clear implications for all economic agents that may benefit from being able to predict corporate failure (such as banks, suppliers, clients and governmental agencies): relying solely on well-known financial ratios as predictors may not paint a complete picture of a firm's likelihood to survive. However, a clear limitation of the study is that its design is not well suited to prove causality between employment practices and failure. As is common in the bankruptcy prediction literature, we focused on showing the existence of links between variables and failure probabilities. To better understand the underlying process and be able to pinpoint causality, additional information would be needed. The literature on human resources management provides potential moderating variables which could be taken into account. For instance, it could be hypothesized that the impacts of the contract type and wages are influenced by the quality and flexibility of the HR practices within the firm. It may also be the case that the importance of the effects we found depended on the firm's characteristics, which we were not able to control in the current study, such as the export intensity of the firm or its reliance on creativity and know-how. Linking our dataset to a survey of HR practices, an export database or a patent database may therefore open interesting avenues for further research.

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Appendix A

	Temp	Bluecollar	Costemp.	ROA	Leverage	Liquidity	Risk	Size	Age	Group	Z-Score
Temp	1										
Bluecollar	0.0755	1									
Costemployee	-0.4007	-0.3343	1								
RÓA	0.0588	0.0545	-0.0585	1							
Leverage	0.0774	0.1138	-0.1363	-0.1138	1						
Liquidity	-0.0799	0.0172	0.1083	0.0764	-0.3245	1					
Risk	0.0726	0.0051	-0.0709	-0.0366	-0.0489	-0.0608	1				
Size	-0.2354	-0.2159	0.4876	-0.1062	0.0094	0.1109	-0.3250	1			
Age	-0.1601	0.0644	0.1783	-0.0855	-0.0814	0.1368	-0.2222	0.3141	1		
Group	0.0823	0.0976	-0.1525	0.0527	0.0689	-0.0225	-0.0365	-0.1442	0.0081	1	
Z-score	-0.1093	-0.0208	0.1377	0.3091	-0.4422	0.7763	-0.1982	0.2034	0.2211	-0.0035	1

 Table A1. Correlation matrix.

Note: Pearson correlation coefficients. Variables as defined in Table 1.

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