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‘Creation and destruction’ in transition economies’: SME sector in Slovakia[1]

Abstract

In this article we develop hypotheses from analysis of the transition process in Slovakia to guide our examination of the survival probability of privately owned small and medium sized enterprises (SMEs) in the post-communist period- up to and including the recent recessionary period. We build models within a failure prediction context. Along with the financial and non-financial variables common in failure prediction studies we develop “transition” variables that relate to the origin and ownership of the company. We employ a sample consisting of over 126,649 sets of accounts of 44,597 SMEs in Slovakia and identify 793 exits by failure during the period 1997-2012. We find that the supplementary information relating to the transition process, in combination with the financial and non financial variables, make a significant contribution to the default prediction power of risk models built specifically for Slovakian SMEs. Of particular interest are variables relating to the ownership and origin of Slovakian enterprises. We find strong support for our hypothesis that some foreign ownership reduces failure probability along with support for our ‘privatisation trap’ and ‘post transformation recession’ hypotheses.

Key words: Risk Modelling; Bankruptcy; Small Business failure, Transition Reform, Transition Recession.
JEL: G33, G32, M13

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1. Introduction

Studies of enterprise performance in the transition and convergence economies both in the post communist period (transition) and after EC enlargement (convergence) focus on the impact of transition processes on productive efficiency, profitability and revenue growth (Estrin et al., 2009). Few have specifically analysed small and medium sized enterprise (SME) survival and failure. We explore aspects of the context (Zahra et al., 2014) within which such firms were created and developed in post communist Slovakia in order to model the determinants of exit via bankruptcy.

The transition process, especially privatisation, internalisation and restructuring in transition economies created a corporate sector with a wide range of ownership structures and origins encompassing the sale and break up of state owned enterprises or cooperatives through to new start-up ventures with both domestic and foreign participation (situational context). The changing political, institutional and economic environments created opportunities for new ventures within business services (e.g. consultancy, accounting, legal services) in order to respond to the new demand for advice in a rapidly changing landscape. In addition, there were opportunities to exploit new markets through cross-border sales. Thus, new ventures can exploit existing resources, technologies (Bruton and Rubanik, 2002), social ties, distribution channels and organisational networks (created within central planning) or exploit gaps, create new resources, networks and service new demand and new markets. The analysis of post privatisation enterprise performance needs to take account of the speed of the development of legal and financial systems post-privatisation (temporal and institutional context). Moreover as ownership (concentrated, dispersed, family-owned, worker-owned, foreign-owned, mixed ownership) and governance structures have evolved in the new private sectors, the scope for analysing novel dimensions in the privatisation-performance relationship have become pertinent and possible.

In this article, we focus on survival/failure as outcomes (see Coad, 2013) and are interested in relating firm characteristics and performance to the probability of failure. We follow previous failure prediction studies by incorporating a range of financial and non-financial variables as potential predictions of bankruptcy risk. The novelty and contribution of the paper is to focus on some specific founding characteristics of SMEs in Slovakia. We incorporate data on the origin, timing of entry and ownership structure of the enterprises, including information on foreign participation in the ownership structure, into our empirical

models. We also control for changing macro-economic and policy conditions that relate to both rapid domestic reform and the global crisis. Based on our analysis of transition processes we define three 'transition hypothesis'.

We hypothesise that foreign ownership can add value through bringing innovations and 'know-how' (both technical and managerial), exploiting synergies, creating new networks and by opening entirely new markets for the emergent company. We suggest that the foreign participation in the ownership structure should improve longevity and decrease the probability of failure. Axiomatically, foreign investors will be selective in their choice of investments in privatised assets or enterprises; as such, the likelihood that foreign investors target 'winners' is considered in our estimation method by controlling for performance and endogeneity.

The firms founded during the period of privatization (1990-1998) are likely to be more susceptible to default related to the *'privatization trap' hypothesis* (Ochotnický and Sivák, 2001). In the early stages of privatisation the acquisition of assets by Slovakian citizens and investors was funded predominantly by debt finance and it is likely, in the absence of informed markets, that assets were frequently over-valued in the initial auctions. Moreover the emerging banking sector had little notion/experience of estimating default risk in the transforming economy and set interest rates at conservative levels. Thus, the unusually high level of the nominal interest rates during periods of transition is also a cause of the privatization trap. We include interest rate data in the failure prediction models. Higher interest rate means increased costs of debt and thus increases the probability of insolvency for debt-financed enterprises.

The date of the founding of the company (or age) has a specific relevance for Slovakian enterprises. The early stages of transition and reform in Slovakia are marked by radical measures and painful reforms as are later policies aimed at preparing Slovakia for early entry into the EU. The cumulative impact of the reforms together with an economic slowdown from 1998 culminated in a post transformation recession of 2000. In 2000, the incumbent government had a strategic goal to integrate Slovakia into the European Union. We expect an increased probability of bankruptcy in this period, possibly with a lag as well as in the more recent global recession that manifested after 2009.

The database available covers the population of Slovakia firms that have filed accounts during the period 1997 to 2012. We compiled a dataset based on the financial statements and credit report of 44,597 SMEs in Slovakia, during the period, 1997-2012. This results in a company-year sample of over 126,649 observations or sets of accounts. We identify 793 exits by failure/bankruptcy. We find that the supplement information relating to the transition

process, in combination with the financial and non financial variables, make a significant contribution to the default prediction power of risk models built specifically for Slovakia SMEs and provides insights into the factors impacting on firm level longevity.

The structure of the papers is as follows. In Section 2 we provide a brief overview of the transition process in Slovakia, the creation of an SME sector and describe the chronological and situational context. In section 3 we provide details of the specification of a failure prediction model (PDM) and the novelties in relation to our estimates for Slovakian enterprises. Section 4 discusses the empirical results before we provide some conclusion.

2. The main phases of the creation and destruction processes in Slovakia

As in most developed countries SMEs in the post communist countries are now considered to be the backbone of the economy. In comparison to the developed EU countries where the SMEs private sector grew over many years, the history-length of the private SMEs sector in transition economies, post communism, can be measured in decades.

2.1 Situation of the Slovakian SME sector in the socialistic Czechoslovakia

Before transition the influence of the SME in the Slovakian economy was marginal (Malach, 2005). The predominance of large corporations owned by the state and cooperative enterprises was a consequence of political decisions implemented by the Council for Mutual Economic Assistance (CMEA) across the Eastern bloc. Moreover, the geographical allocation of production in Eastern bloc countries had been coordinated within the common CMEA infrastructure allocation, particularly in respect of the oil and gas pipelines and the electricity networks. The share of employment by firms with over 500 employees was 98.6% in the socialist period and provides further evidence of an orientation towards large-scale state owned firms and assets (Malach, 2005). The small number of units, mostly in services, that could be considered as SMEs under current definitions were largely state-owned (Mikloš, 1997).The share of public sector in national income was 99.3% in 1988 in Czechoslovakia (Kornai, 1992). This level of nationalization was extremely high even in relation to comparable countries such as Poland (81.2%), Hungary (92.9%), or East Germany (96.4) (Kornai, 1992)[2]. The only private businesses were small farms or private vegetables, fruit or flowers producers (Mikloš, 1997).

[2] The figures do not take into account informal economy (Kornai, 1992).

Towards the end of socialist era there were attempts to change the situation with the onset of "perestroika" in the former Soviet Union during the late 1980s at which point, economic reform was undertaken (Myant, 1989). These reforms, among others, enabled registration of sole traders in services, agricultural cooperatives were allowed to engage in so called "associated production" and generally, the decentralisation of economic decision making was supported. But in relationship to the SME sector, unlike neighbouring Poland and Hungary, where corresponding reforms were introduced in the beginning of the 1980s, in Czechoslovakia they had a marginal effect (Kornai, 1992). However, the opportunity for substantial change came with the velvet revolution in November 1989.

2.2 Big-bang transition after the velvet revolution

The development of the SME sector in Slovakia is fundamentally connected with the start of the transition process to a modern market economy. Besides achieving macroeconomic stability, it was necessary to create well functioning competitive markets, to establish adequate private market structures and free market institutions (Smallbone and Welter, 2001). The basic transition agreed at the then federal level (in the period of 1990 - 1992 Slovakia was the part of common federal state of Czechoslovakia) followed the principles defined by the Washington consensus (Williamson, 1990). The actual reforms in Czechoslovakia were inspired by Anglo-Saxon academic and policy models, namely neo-classic and monetary economic schools (Mikloš, 1997). The reform package in Czechoslovakia[3] was usually labelled as a "big-bang" or "radical approach" as opposed to gradualist approach of small changes over an extended period of time (Wolf, 1999; Balcerowicz, 1994) .

The "big-bang" reform approach had the ambition to simultaneously accede to price and trade liberalization, fiscal, monetary and wage restriction, the introduction of currency convertibility, liberalization and consequent stabilization of the exchange rate and the privatization of state owned enterprises. In the words of Stiglitz (2008: p. 41) the Washington Consensus "represents a set of policies predicated upon a strong faith—stronger than warranted either by economic theory or historical experience—in unfettered markets and aimed at reducing, or even minimizing, the role of government".

But besides ideological reasons for adopting shock therapy, there were practical ones. First, at the beginning of the 1990s, there was sufficient political capital in that citizens sought change such that the government was able to execute market reform (Balcerowicz, 1994) .

[3] Wolf (1999)

Second, there were concerns that if a gradualist approach were to be adopted,, the process of transition would have to be coordinated by government officials who lacked appropriate experience (Lipton, 1990)

The substantive transformation commenced in January 1991 with price liberalization and convertibility of the Czechoslovak koruna REF. The immediate macro-economic consequences were a sharp a decrease of GDP, high inflation and an increase of unemployment, especially in Slovakia REF. In the corporate sector, amongst other changes, there was increased competition with foreign companies and elimination of soft budget constraints (Mikloš, 1997).

2.3 Privatisation and creation of private SME sector in 1990-1993

The process of privatization of state owned companies in Czechoslovakia can be categorised within three types: small-scale privatization, large-scale privatization and restitutions. Small-scale privatization focused on the smaller units, mostly in services and retail sector, large-scale privatization included bigger companies, primarily in manufacturing industry and restitutions involved returning property, that had been nationalized in February 1948, to the original owners or their descendants. The initial development of the SME sector was mostly associated with small-scale privatization. The process of privatizing the service and retail sectors began in February 1991 and finished in March 1994. This privatization focussed on small service units such as retail stores, restaurants, small hotels and some small production units.. The sale method used in small-scale privatization was the public auction. Slovak citizens or domestic entities had priority in the auction. Slovaks only participated in the first round. If the assets were not sold in the first round foreign buyers were able to participate in the second round.

This initial privatisation can be viewed as an important starting point for further expansion of the Slovakian SME sector. Records show that 9,667 privatized units, originally owned by the state, were sold during this period (Lipton et al 1990). However, it was not just small privatization that led to the creation of the new SME sector. A wave of new start-up enterprises can be observed in the early years of transition, partly as a result of involuntary unemployment. The creation of micro enterprises (self-employment) grew rapidly until 1993.

The breaking up of the monopolised production structures, which had been created during the communist system, created opportunities for the creation of SME's within a new competitive market structure (Lipton et al 1990). Large-scale privatization, the restructuring

of large enterprises, coupled with the start of a wave of outsourcing contributed to an explosive growth of new enterprises. These included a spectrum of SME types including sole traders within sectors such as car servicing, cosmetics, retail trade, construction, baking industry, tax & accounting consultancy, etc. The return of assets to citizens through restitutions of land and properties, the liberalization of trade relationships and the creation of SMEs by foreign citizens and investors were important factors in the further development of an SME sector up to 1993.

2.4 The development of SME sector in independent Slovakia 1993-2013 with the focus on the researched hypotheses

The division of Czechoslovakia in January 1993 creating separate states, the Czech Republic and Slovakia, marks a further period of reform in now independent Slovakia. The Slovakian government set their objectives as: the achievement of macroeconomic stability, the creation of well functioning competitive markets and the establishment of free market institutions. However the economy was faltering and mistakes made in the initial privatisation processes (discussed later) manifested as a severe downturn in economic activity in 2000. This downturn led to the stagnation and demise of many new ventures. Post 2000 marked a shift in policy stance and an increase in the provision of SMEs' support schemes that were, for the most part, implemented within a framework of international initiatives and programmes.

The next phase in the development of the SME sector is connected to the entry of Slovakia into the EU in 2004 and into the EMU in 2009. The requirement for harmonisation of legal processes and development of free market institutional structures within the EU led to further reform. As Williams and Vorley (2014) point out the development of an appropriate institutional framework is important for development of economically and socially productive entrepreneurship. Joining the EU framework gave increased access to SME´s support schemes and expertise. Finally Slovakia's integration into the monetary union acted to improve the market conditions and a more central role for SME´s as innovators and job creators. The SME sector grew in its share of value added. Of course, successes and failures, entry and exits become features of this new dynamic market economy. In the next section we highlight hypotheses in relation to the factors determining enterprise survival.

2.4.1 Hypothesis 1 – impact of foreign ownership

The East European countries were from the very beginning of transition seen as potential production sites for Western firms selling mainly in European markets. The highly skilled and relatively cheap labour force was appealing to investors[4]. The gradual opening of the Slovak economy through restructuring processes coupled with the development of financial markets created opportunities for SME's to grow into international markets. However Slovakian firms lacked the innovation, technological and marketing know-how to be effective in international markets and that hindered expansion and growth. Joint ventures with foreign partners, based on different types of common interest and synergies, speeded up the process of internationalizing for Slovakian enterprises and was an attractive entry strategy into Slovakia for foreign investors wary of the risks in this new environment. A further motivation for foreign entrants was clearly the cost and prices differences in the home and foreign markets. Joint ventures could exploit other comparative advantages, synergies and know-how in domestic-foreign partnerships.

Recent research (see Estrin et al., 2009 for a review) has emphasised the relative effects of foreign versus indigenous ownership on enterprise performance within the transition process. As Estrin et al. (2009), note, the "type of private ownership, corporate governance, access to know-how and markets, and the legal and institutional system matter for firm restructuring and performance" (Estrin et al., 2009: page 722). We assume that whether completely, or partially, foreign ownership of the company contributes to the better governance, stronger networks and the ready adoption of new practices and technologies. We expect foreign owned companies to have on average smaller probability of default, controlling for prior performance, compared to the domestic ones.

2.4.2 Hypothesis 2 – privatization trap

As Abiad et al. (2010) argued, financial liberalization in Slovakia came too late after the basic package of transition reforms and privatization. The creation of a privatised and competitive business sector without the support of a well functioning financial market and banking sector was clearly a major flaw in the early transition process. Privatisation proceeded apace without the necessary pricing mechanisms to value effectively property and corporate assets. The tendency was to over value assets in auctions and to fund the purchase with readily available debt finance.

The absence of informed relative prices, reflecting the fundamental value of the privatised firms, combined with politically motivated pressure on the banks to speed up the privatisation

[4] See Lipton et al. (1990)

process, led to many poorly structured credit decisions and credit assessments. The principal and the interest repayments for privatisation credits (debt finance) led, in the majority of privatised SMEs, to liquidity problems. The high auction prices of privatised firm (fictive collateral), often exceeding the real firm value, was a major factor driving the failure rate of the newly privatised firms. We refer to this as the "privatisation trap" hypothesis. The high rate of default on debt endangered the financial health of the creditor banks. Thus this "self destruction" process of SMEs in the transition period may be seen as a consequence of the credit based small-scale privatisation. Moreover the problem of initial undercapitalisation is frequently cited as a cause of failure of SME's in developed countries. In Slovakia the difficulties of raising adequate funding in weak capital markets coupled with an absence of equity finance exacerbates this problem. The share of the toxic privatisation credits in the portfolio of the creditors' banks started to increase substantially and in some cases threatened the solvency of the banks.

In the period from 1990 to 1998 individuals without sufficient market, legal and financial knowledge started a large number of new businesses. These businesses became vulnerable as the economy weakened. The rapid decrease of demand and the rising number of domestic and foreign competitors worsened the situation for the new SME's and led, in many cases, to solvency and liquidity problems. We argue that companies founded in this period will have on average higher failure rate than those founded later.

2.4.3 Hypothesis 3 – post-transformation recession

The accumulation of problems in the Slovak financial sector in the nineties (transitions recession impact, privatisation mistakes, worsening credit portfolios of the banks, bad financial discipline, hidden debts, and expansionary fiscal policy in the second half of 90s) started to manifest towards the end of the decade. The restrictive fiscal policy connected with recession in the year 1999, the restructuring of the Slovak banks and their privatisation, influenced the next phase of the destruction process of the SMEs. The mass default of these businesses, in the legal sense, was postponed only by the weak or slowly improving justice sector. The legal processes in place to identify debts and deal with defaults were inadequate and very slow which meant that many SME's continued to exist long after technical insolvency. However, we assume that the average rate of failures will be higher in the span of 2000 to 2002.

3. Probability default models (PDM) for SMEs

3.1 Construction of PDM

Our study follows the literature in the development of a model to predict default or bankruptcy. Default-prediction models[5] have been extensively studied by the literature since Altman (1968). However, in recent years, the introduction of non-financial information as predictor variables (e.g. Grunert et al., 2005; Altman et al., 2010), the development of models specifically designed for firm types such as size or sector (e.g. Altman and Sabato, 2007), ownership and financing have opened three new research lines in relation to default prediction. Altman et al. (2010) aimed to produce bankruptcy models specifically for small and medium-sized enterprises (hereafter, SMEs) in which are introduced both financial and non-financial variables. However, consideration of ownership and governance variables (see Fich and Slezak, 2008; Wilson et al., 2013a, 2013b) adds an extra dimension to failure prediction studies. Numella et al (2014) in their study of failure in Finland identify 'critical incidents' that inform the failure process. The incorporation of macro-economic data adds further interest. We follow Altman et al (2010) by estimating logit and Cox's proportional hazard models that predict the probability of bankruptcy using a combination of variables reflecting both financial and non-financial characteristics but consider the origin and ownership of the company and macro-economic conditions.

3.2 PDM model for Slovakia

We firstly develop within a logit model framework a model for testing the factors influencing survival/bankruptcy of Slovakian SME's. We evaluate the propensity to fail amongst Slovakian SME's whilst controlling for economic conditions and company specific factors associated with insolvency risk. The use of multi-period financial statements allow us to both include time-varying covariates for each company and the data facilitates the estimation of a base hazard function by capturing changes in the macro-economic.

[5] Default-prediction models (or bankruptcy models) assign firms to one of two groups: a 'good firm' group that is not likely to experience financial distress, and thus survive in the long-term discharging its obligations to creditors; or a 'bad firm' group that has a high likelihood of bankruptcy and/or default caused by financial distress.

We use accounting and credit report data for each enterprise up to the year of bankruptcy. The explanatory variables were lagged in relation to the outcome and thus may be considered as exogenous[6]. The model is specified as:

$$P(d_{i,t} = 1|\Omega_{t-1}) = 1/\{1 + \exp[-(\beta_0 + \beta_1 F_{i,t-1} + \beta_2 N_{i,t-1} + \beta_3 TC_{i,t-1} + u_{i,t})]\} \quad (1)$$

where F denotes financial explanatory variables, N non-financial variables, TC are variables of the special interest, i individual company, t year, β coefficients vector to be estimated and u error term.

The set of explanatory variables used in our model was generally divided into three groups. The first group (F) consists of the selected financial ratios. The financial ratios measuring profitability, liquidity and solvency are considered in the literature to be the most significant indicators of the upcoming problems (Altman, 2000). Since there was no bankruptcy study performed for the Slovakian companies[7], in our model we build mainly on the set of financial ratios analysed in Altman et al. (2010). We considered also the influence of group (N) of non-financial explanatory variables that have been used by PDM in other countries. The (TC) represents specific factors group labelled as the transition/convergence default factors.

3.2.1 Individual explanatory PDM variables

Financial variables group (F) includes as the first Capital employed/ Total liabilities (CETL-)[8]. It is equal to shareholders' funds plus long-term liabilities divided by long-term liabilities and indicates the leverage of the company. Companies in financial difficulties are expected to have larger liabilities relative to shareholders' funds and thus the indicator will be smaller. Next variables represent various liquidity indicators: Quick assets/ Current assets (QACA-), Cash/ Total assets (CTA-), Net cash/ Net worth (NCNW-) and Current assets/ Current liabilities (CACL-). The financially distressed companies are expected to have lower values for these ratios.

Additionally the Total liabilities/ Quick assets (TLQA+), Inventory/ Working capital (IWC-) and Trade creditors/ Total liabilities (TCTL+) – reflect working capital cycle. The Retained

[6] The foreign ownership effect is considered in greater depth later in the paper.
[7] The only study with similar focus we are conscious of is Fidrmuc and Hainz (2010). They investigated the performance of bank loans portfolio to about 700 SMEs in Slovakia in the period of 2000 to 2005. According to their results earnings before taxation and cash and bank accounts are significant determinants of loan default.
[8] The sign in parentheses denotes the expected impact of the variable on the probability of bankruptcy.

profit/ Total assets (RPTA-) and Net worth/ Liabilities (NWL-) – measure the cumulative profitability of the company.

Even though the corporate bankruptcy is closely related to the financial difficulties and these are reflected in the financial ratios, the non-financial variables often carry important additional information. Hence the second group of potential explanatory variables consists of the following non-financial variables (N).

We included among the explanatory variables also the dummy variable reflecting the statement of the auditor (STA). Negative statement or the comments of the auditor are expected to increase the probability of bankruptcy[9]. Regarding the legal form of the company we have mostly three kinds of companies from the viewpoint of legal form in our sample – cooperatives, joint stock companies and limited liability companies – we included the dummy variable for joint stock company (JS). The companies operating in the fields of construction, retail, wholesale and manufacture are considered to be more sensitive to business cycle and main business activity. Thus we included dummy variables for construction (CON), manufacture (MAN), retail (RET) and wholesale sector (WHO). The financial crisis 2008 with deep decrease of Slovak economy performance in 2009 (FC) represented the newest most intensive external shock. We expected the financial crisis to adversely impact the probability of bankruptcy, albeit with some lag.

The novelty and at the same time the added value of this paper in the field of empirical research of the SMEs in Slovakia represents the third group of the potential explanatory variables. Ownership structure (OS) was used as the main assumption that the foreign participation in the ownership structure should contribute to the operation of the company. On one hand it may be know-how brought by foreign owner, on the other hand the foreign owner may open entirely new markets for the company. We assume that the foreign participation in the ownership structure should decrease the probability of default (H1). The date of the founding of the company (or age) as the standard PDM factor for developed countries was substituted by a reverse assumption: the companies founded during the period of small and other waves of privatization (1990-1998) should be more susceptible to default. The reason for this assumption is the influence of the privatization trap hypothesis (PTH, H2) mentioned

[9] Audit obligation of the financial statements (according to Slovak Accounting Act, § 19, section 1) have the limited liability companies, joint stock companies and cooperatives if they meet at least two of the following conditions:

1. Total assets exceed 1 000 000 EUR
2. Net sales of more than 2 000 000 EUR
3. Average number of employees is greater than 30.

above. Interest rate represents the access to financing (AF+) for the SMEs. Higher interest rate means increased costs of debt and thus increases the probability of insolvency. The unusually high level of the nominal interest rate may be considered also as a consequence of the privatization trap.

Post-transformation recession 2000 (PTR+,H3) was included as the outstanding explanatory variable. The year 2000 was the third year of the government whose main strategic goal was to integrate Slovakia into the European Union. To achieve the objective many painful reforms were necessary. The cumulative impact of the reforms together with the economic slowdown since 1998 culminated in transformation recession of 2000. We expect increased probability of bankruptcy, possibly with a lag. We provide descriptive statistics for all variables in table 2.

Table 2 here

3.3 Survival analysis model for Slovakia

To confirm the results obtained by logit model, especially regarding the proposed hypotheses, we performed the survival analysis (SA) of our data, as well. This technique was used for the first time, in the field of finance, by Lane et al. (1986) and in business failure prediction by Luoma and Laitinen (1991). The primary concern in SA is not the classification of the observations into two groups based on the fact whether the company went bankrupt or not. It is rather the time to failure that is of interest. Even though the survival time for some subjects is not observed (if the company did not bankrupt), the technique makes use of the fact that the company survived. The distribution of survival times is usually described by two functions – hazard function h(t) can be interpreted as the number of bankruptcies per firm per small unit of time provided that the firm survived until that time and survivor function S(t) represents the probability that the firm survives until time t or longer[10]. The various SA models assume specific relationship between the set of possible explanatory variables and one of the descriptor functions. The general expression of hazard function is $h(t) = f(t, X_1, \dots, X_k)$ where t is time and X_i, $i=1,\dots,k$ are explanatory variables. Most widely used SA model – Cox's proportional hazard model (Cox, 1972) – assumes that hazard function is the product of two parts – baseline hazard function which is function of time and exponential function of linear combination of predictors[11]:

[10] Unlike logit model where the time horizon we wish to model is fixed, in our paper it was one year, in survival analysis framework the probability of survival/failure can be predicted for various time horizons t.

[11] In other words Cox proportional hazard model separates the effect of time and the effect of the predictors.

$$h(t) = h_0(t)\exp(\beta_1 X_1 + \cdots + \beta_k X_k) \quad (2)$$

$h_0(t)$ – baseline hazard function (left unspecified by the model), corresponds to the hazard function if all covariates are set to zero.

There are two approaches to SA models in the academic literature dedicated to business failure prediction. Shumway (2001), Nam et al. (2008) and Wilson et al. (2013b) are the representatives of the first one. This approach builds on the results derived in Beck et al. (1998). Beck et al. (1998) showed that model employing panel data with binary dependent variable and cloglog link[12] function corresponds to the grouped duration model[13]. At the same time they showed that if the probability of the event is small, as is the case of company failure, the cloglog and logit are almost identical. Generally the only difference comparing to the logit specified in equation (1) is that it must contain some function of company age in order to represent the SA model and thus make use of its additional flexibility (Shumway, 2001). Nam et al. (2008) and Wilson et al. (2013b) include another explanatory variables to capture the baseline hazard rate. Typically, these models can be used for one year ahead prediction of the business failure. The logit model described in the previous sub-section we built for the Slovakian SMEs can be considered as SA model in which a hazard rate does not depend on company's age (time) and the baseline hazard rate depends on the interest rate and time dummies.

The second approach to SA modelling is in a way closer to its spirit in that given the financial accounts and other characteristics of the firm in year t_0 it enables to answer the question what is the probability of different survival times from year t_0 on. Comparing to the previous approach the age of the company (or any function of it) can be used as explanatory variables but it is not considered to be the survival time of interest. The survival time in this approach is the time from submitting the financial statements to either failure or end of the dataset (if the company did not bankrupt the observation is censored). Gepp and Kumar (2008) represent this approach and since it differs from the previous one we consider it to be a good method to provide additional check of the results obtained by logit model. The parameters ß in equation (2) are estimated using the maximum partial likelihood that is the efficient estimation method similar to maximum likelihood.

[12] The cloglog link refers to the complementary log-log function. The term link function is taken from generalized linear model terminology. It specifies the functional relationship between dependent variable and linear combination of explanatory variables.

[13] Grouped duration model refers to the continuous survival model where we the failure can occur any time during the year but we are able to observe it only in specific time intervals.

3.4 Definition of default and the construction of the dependent variable

It is crucially important to define the business failure outcome when building the probability default and survival models. For the purpose of this study firms facing financial difficulties leading to the commencement of formal bankruptcy proceedings are categorised as failed. The data is compiled from a credit reference agency, concerned to provide their customers with information about the creditworthiness of their potential business partners. If the company was not trustworthy it was marked as defaulted. By careful checking of the legal documents relating to all companies marked as defaulted in the database we ensured that we included only the companies that filed for bankruptcy. In order to capture the earliest possible sign of the difficulties we use the year when the company was filed for bankruptcy as the proxy for the year of default.

The identification of non-problematic companies poses a challenge for the Slovakian SME sector. The executive of the company is obliged by law to monitor the financial situation of the company and to file for bankruptcy within a 30-day period after discovering its insolvency or over-indebtedness [14]. Even though it is a legal requirement for the executives to disclose its financial difficulties (under certain conditions the creditor can file the company for bankruptcy, as well), there is no guarantee that this process is always followed. However the credit reference database is the only comprehensive source of company level data and bankruptcy in Slovakia and we believe identifies the trading enterprises that have exited via financial distress and bankruptcy.

For the purpose of building the logit model we divided the records with financial statements for a given company and year into two groups – "defaulted" and "non-defaulted". We marked the company-year observation as "defaulted" if it directly preceded the year of default of the company as defined above. Since the companies in difficulties are sometimes less likely to submit their financial statements in a timely manner, we use the last financial statements submitted prior to the legal announcement of default. Moreover because bankruptcy is a legal process it can take some years for the legal documents to be filed after the bankruptcy company has ceased trading, we limited this time period to five years in the data set. Thus the dependant variable in case of logit was binary and it was equal to one when the statements were marked as "defaulted" and zero otherwise. In case of survival analysis the distinguishing

[14] The company is considered insolvent if it is in arrears at least with two creditors for more than 30 days. It is considered over-indebted if it has more than one creditor and its liabilities exceed the assets.

of the records was not necessary; it was the time of survival or difference between the year of default and year of financial statements submission that was of interest.

4. Empirical results for Slovakia PDM (SPDM)

4.1 Dataset

We employ a sample consisting of 126,649 sets of financial statements submitted by 44,597 small and medium-sized companies in Slovakia and identify 793 exits by failure during the period 1997-2012. The source of the original data was the largest commercial credit reference database of its kind for Slovakian companies. The data were firstly carefully checked to make sure there are no duplicities. In case of multiple versions of the financial statements for a given company and year only the last updated version was used. Accounting ratios are often subject to outlying and extreme values, particularly for private companies so we used 95% winsorization for the constructed financial variables[15]. We used this procedure in order to eliminate outliers that could possibly bias the coefficients' estimates[16].

4.2 Results of logit model

We estimated different model specifications based on the different groups of the explanatory variables. The models were estimated using logistic regression with $d_{i,t}=1$ if the firm i failed in year t, $d_{i,t}=0$ otherwise.

Table 3 here

Only the statistically significant variables are retained in the table. The predictive performance of the models was assessed using the area under ROC curve indicator.

The first model includes only the explanatory variables from the first group of the potential explanatory variables. The letter w after the variables' names denotes winsorization.

$$P(d_{i,t}=1|\Omega_{t-1}) = 1/\{1+\exp[-(\beta_0+\beta_{11}CTAw_{i,t-1}+\beta_{12}TLQAw_{i,t-1}+ \beta_{13}TCTLw_{i,t-1}++\beta_{14}RPTAw_{i,t-1}+\beta_{15}NWLw_{i,t-1}+u_{i,t})]\} \quad (3)$$

[15] 95% winsorization means that if the value of a given variable is smaller than its 5th percentile, the value is set to its 5th percentile and if on the other hand it was greater than the 95th percentile, it was set to the 95th percentile.

[16] Sensitivity to outliers is one of the disadvantages of logistic regression.

After experiments with different specifications we chose the group of financial explanatory variables that was the most robust in terms of the coefficients' stability. All coefficients have the expected signs and are highly statistically significant (table 3 model 1).

The second model includes also the explanatory variables from the second group of the potential explanatory variables (table 3 model 2). The whole set corresponded as much as possible to previous studies. The following equation was the final specification:

$$P(d_{i,t} = 1|\Omega_{t-1}) = 1/\{1 + \exp[-(\beta_0 + \beta_{11}CTAw_{i,t-1} + \beta_{12}TLQAw_{i,t-1} + \beta_{13}TCTLw_{i,t-1} + +\beta_{14}RPTAw_{i,t-1} + \beta_{15}NWLw_{i,t-1} + \beta_{21}STA_{i,t-1} + \beta_{22}JS_{i,t-1} + \beta_{23}CON_{i,t-1} + \beta_{24}MAN_{i,t-1} + \beta_{25}RET_{i,t-1} + \beta_{26}FC2010_{i,t-1} + u_{i,t})]\} \quad (4)$$

We find, as expected, that negative statement of auditor or the statement with the comments increases the probability of failing of the company. The coefficient for the joint stock company dummy suggests that ceteris paribus comparing to other types of legal forms it has on average a higher probability of bankruptcy. The sectors of manufacture and construction are more prone to default than the retail sector. This is perhaps due to the lower barriers to entry and initial financing costs of retail businesses. The lagged impact of the recent financial crisis did not prove to be significant in some specifications. We retained this variable, however, since it was significant in majority of the tested specifications. This model specification improves the overall predictive performance of the model measured by the area under ROC curve from 0.719 for the first model to 0.765.

The third model includes the variables from the third group of variables (table 5 model 3 and 4). We estimated two specifications – with and without the interest rate. The equation with the broader set of the variables is as follows:

$$P(d_{i,t} = 1|\Omega_{t-1}) = 1/\{1 + \exp[-(\beta_0 + \beta_{11}CTAw_{i,t-1} + \beta_{12}TLQAw_{i,t-1} + \beta_{13}TCTLw_{i,t-1} + +\beta_{14}RPTAw_{i,t-1} + \beta_{15}NWLw_{i,t-1} + \beta_{21}STA_{i,t-1} + \beta_{22}JS_{i,t-1} + \beta_{23}CON_{i,t-1} + \beta_{24}MAN_{i,t-1} + \beta_{25}RET_{i,t-1} + \beta_{26}FC2010_{i,t-1} + \beta_{31}OS_{i,t-1} + \beta_{32}PTH_{i,t-1} + \beta_{33}PTR2001_{i,t-1} + \beta_{34}AF_{i,t-1} + u_{i,t})]\} \quad (5)$$

The foreign ownership proved to be important in diminishing the bankruptcy rate for the SMEs in accordance with our hypothesis (H1). The know-how, financing and access to external markets brought by foreign ownership appear to be important in distinguishing those firms that survive from those that fail. The post-transformation recession was significant with positive sign indicating the increased probability of bankruptcies. The bankruptcy rate was

significantly higher for the companies founded in 1990-1998, this effect stopped to be significant after including the interest rate variable as a proxy for access to financing. The overall predictive performance of the model increased as well, when compared to the second model, the variable contributing the most to the improvement of the prediction performance was the interest rate.

4.3 *Results of Cox's proportional hazard model*

Similar to logit the same group of potential explanatory variables was used. For the defaulted companies the survival time was constructed as a difference between the year when the default occurred and the year when the statements were submitted. For the non-defaulted companies it was the difference between end of the sample (2012) and the statement year. The variables that proved statistically significant were retained.

Table 4 here

The first model includes only the explanatory variables from the first group of the potential explanatory variables. When we compare with the logit model – instead of total liabilities to quick assets ratio the variable quick assets to current assets prove to be statistically significant in survival analysis model. All coefficients have the expected signs and are highly statistically significant (table 4 model 1).

The second model includes also the explanatory variables from the second group of the potential explanatory variables (table 4 model 2). The coefficients of dummy variables reflecting the statement of auditor, legal form of the company and the sector are similar to the logit model. However, the time dummies included with the intention to capture the effect of recent financial and economic crisis are all statistically significant but all of them with negative sign. The negative coefficients of these dummies may be due to the fact that it is on the end of the sample and thus not so many defaults occurred for the companies that submitted the statements in these years. Also as we note shortly, the coefficients decreased substantially after the inclusion of the interest rate variable and thus the negative coefficients for these dummies reflect for the large part more favourable interest rates after joining eurozone[17].

The remaining model is the most important from the perspective of the hypotheses put forward in this paper and includes the variables from the third group of variables (table 4 model 3 and 4). We estimated again two specifications – with and without the interest rate. We find support for the first hypothesis regarding the foreign ownership. The companies with

[17] Slovakia joined European monetary union in 2009.

foreign ownership (about 11.5% of the sample) have, all other things equal, the lower probability of default when compared to those with different ownership structure. The statistical significance of the foreign ownership dummy is somewhat smaller, it is significant only at the level of 10% in both specifications – with and without interest rate. Secondly, the companies founded during the various waves of privatization (about 43% of the sample) have, on the other hand, higher risk of default – it supports the second hypothesis. And thirdly, all time dummies capturing the post-transformation recession are significant with positive coefficients. Even though their size and statistical significance dropped substantially after the inclusion of interest rate among the explanatory variables, the 2001 dummy, similar to logit models kept both – the statistical significance and to the large part its size, as well.

4.4 Addressing the possible FDI endogeneity

A substantial number of papers challenged the view of the foreign ownership as exogenous variable in the corporate performance models (e.g. Smith et al., 1997; Anderson et al., 2001; Bishop et al., 2002; Poghosyan and Borovička, 2007; or Galeotti and Ryšavá, 2008). They argued that the foreign investors did not choose firms at random but picked rather those that performed best or had the greatest potential. The choice of the firms to invest in was in this regard referred to as "cream skimming" or "cherry picking". Thus the simple inclusion of the foreign ownership dummy among the set of explanatory variables aimed at explaining the performance of the companies may lead to the endogeneity bias due to simultaneity. Namely, the company owned by foreign entity (in total or partially) might perform well not because of the superior governance of the foreign owner but rather because it was a well-performing company before.

Even though the focus of the models presented in this paper is the default and not the performance and at the same time we used lagged explanatory variables to prevent endogeneity, in order to rule out possible doubts we performed the additional check to prevent simultaneity bias. In line with other studies we employed the two-stage procedure using instrumental variables. In the first step we estimated logit model with foreign ownership dummy as explanatory variable. In the second step (either logit or survival analysis model) we used the predicted probabilities from the first stage model instead of the foreign ownership dummy. The variables used in the literature as the determinants of foreign ownership and thus possible instruments were from the categories performance, size, capital structure, location, industry, etc. Since our data covered the years 1997-2012 and the substantial part of the companies was founded before, we could not effectively control for the pre-existing

conditions using the time-changing firms' characteristics. That is why we opted for time-invariant features or those that are either stable or do not change so quickly over time. The number of employees (company's size), Bratislava region dummy (location) and the dummies for the retail, wholesale, construction and manufacture sector (industry) were chosen. The results of the first stage model suggest that the foreign investors preferred companies with higher number of employees, in the proximity of capital city Bratislava and from the sector of wholesale, manufacture and retail.

The results of the second stage estimations are summarized in the tables 5 and 6. The coefficients for the foreign ownership indicators (we presented both the original equations with those containing the predicted probability for the sake of comparison) retained its sign along with their statistical significance and thus confirmed the results from the original models – the foreign ownership is not merely cream skimming but contributes significantly to the decreasing of the probability of default. Partially, though, it may be attributed to the companies' features we cannot account for in our dataset as better business plans, higher growth potential or greater market share. Another thing to note looking at the table 5 and the table 6 is the stability of all other estimated parameters.

5. Discussions and Conclusion

The results provide new insights into the performance and survival of enterprises created in the privatisation/transition process in Slovakia through to the period of convergence into the European Union and into the recession period following the global financial crisis. We construct a comprehensive database of surviving and defaulted enterprises from credit reference records that is representative of the Slovakian company population over the estimation time period. This is the largest sample of financial statements possible for Slovakia. Nonetheless the data may not cover the entire company population due to issues of missing values and erased records therefore we undertake tests associated with survival and selection bias, particularly in the case of foreign ownership. Our robustness tests detailed in section 4.4 provide confidence that the results are robust to sample selection. We track the origin and history of enterprises created in the privatisation process and include in our modelling 'transition variables' relating to the various waves of privatisation and institutional development in Slovakia, financial market conditions, firm level financing choices and the involvement of foreign ownership and expertise in early stage enterprise development.

The first hypothesis put forward in this study deals with the impact of foreign ownership on the default probability. The foreign ownership was modelled using the dummy variable.

The statistical significance and negative sign suggests that the foreign ownership – other things equal – decrease the default probability of a given company. This result holds in both models and all specifications, even after controlling for possible foreign ownership endogeneity using a two-stage procedure and instrumental variables. Thus we consider this hypothesis to be supported in our sample – the foreign participation in less developed and less experienced market economies helps to stabilize the company through bringing the know-how, exploiting synergies and introducing the better governance and/or opening new markets.

Our second hypothesis concerned so-called privatization trap. We hypothesized that the companies founded from 1990 to 1998 had on average higher default rate. The reasons were the credit based small-scale privatization and less experienced owners. We verified the hypothesis in two steps: in the first step the dummy was used for the companies founded between 1990 to 1998 and in the second step the interest rate was added as an additional control variable. In the first step the both models' results confirmed the hypothesis, however, with the interest rate included, the dummy variable for companies founded between 1990 and 1998 lost its significance in logit model, whereas in survival model it kept its significance, albeit the coefficient dropped roughly by one third. The interest rate was strongly significant in both models, suggesting increased default probability with each additional percentage point. Thus the results suggest that the increased default rate for these companies is connected with their indebtedness.

Lastly we hypothesized the adverse impact of the post transformation recession on default probability. We used three dummy variables – for the years 2000 to 2002. Similarly to privatization trap two steps were used, firstly without and then with interest rate. In the logit model only the 2001 dummy was significant with expected sign and it stayed so also after including interest rate, just the coefficient was somewhat smaller. The survival model's results were a bit different but in the final account supported the former model – in the first step the coefficients for all three dummies were statistically significant and positive (increasing the default probability); after adding the interest rate it was just 2001 dummy that retained its significance but its size decreased. Thus the results of both models suggest that on one hand the post transformation recession of Slovakian economy was connected with the conditions on the financial market to great extent, but at the same time there were other reasons for it, as well.

We make a contribution to failure prediction modelling. We draw upon and develop the bankruptcy prediction literature as applied in developed economies such as the US and UK to guide our specification of a failure prediction model (PDM). Although we find that models

built on financial ratios work well in predicting the failure of Slovakian enterprises, we find that non-financial information such as the auditor statement, legal form of the company, main business activity and the financial crisis are useful additional variables in predicting bankruptcy. Of particular interest are variables that we construct relating to the ownership and origin of Slovakian enterprises. We find strong support for our hypothesis that some foreign ownership reduces failure probability along with support for our 'privatisation trap' hypothesis and transformation recession hypothesis. These variables proved to be statistically significant and at the same time contribute to the prediction power of the model as measured by the area under the ROC curve and associated diagnostics. The use of macro-economic, ownership and governance variables in failure modelling is clearly a promising and informative line of research. The transition process, especially privatisation, internalisation and restructuring in transition economies created a corporate sector with a wide range of start-up characteristics, ownership structures and governance arrangements. Clearly there is much scope for further analysis of the development, lifecycles and outcomes of Slovakian enterprises along ownership, financing and governance dimensions.

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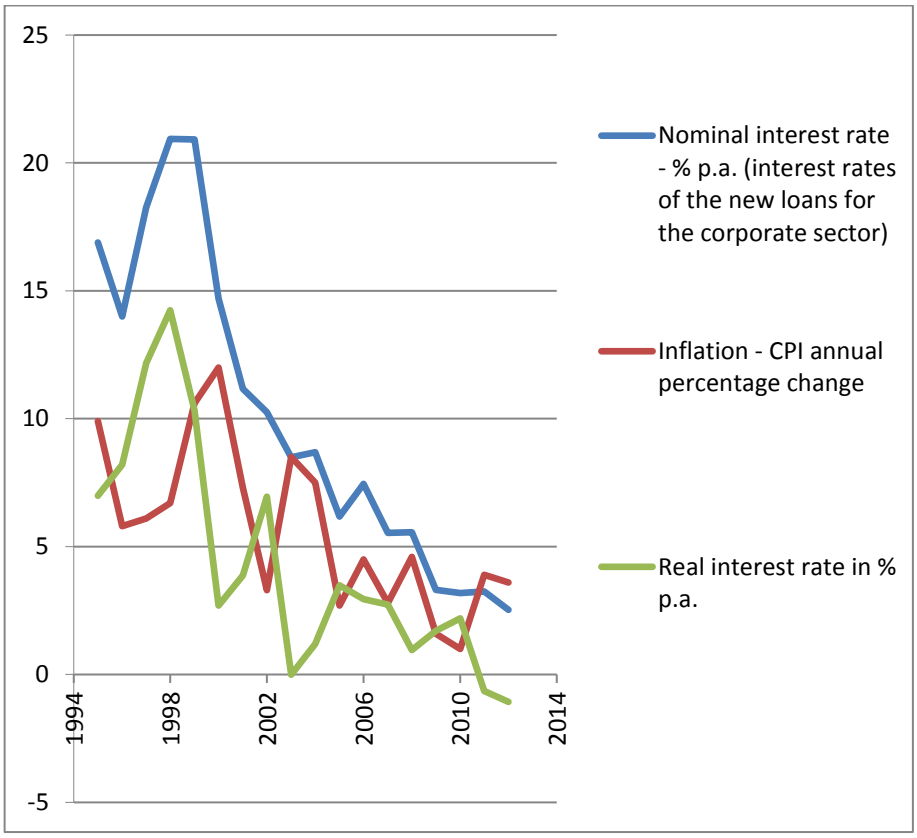
Figure 1.: Average annual nominal interest rate



Source: National Bank of Slovakia – interest rates of the new loans for the corporate sector

Table 1.: Number and structure of enterprises in Slovakia in the period 1993-2011

	Enterprise type					
	Micro	Small	Medium	**SME´s**	Large	Total
	(0-9)*	(10-49)*	(50-249)*	**(0-249)***	(250>)*	(0>)*
Number of subjects 1993	264 090	23 828	2 847	**290 765**	1 695	292 460
Structure in %	90.3%	8.1%	1.0%	**99.4%**	0.6%	100.0%
Number of subjects 2000	269 323	57 247	3 063	**329 633**	610	330 243
Structure in %	81.6%	17.3%	0.9%	**99.8%**	0.2%	100.0%
Number of subjects 2005	344 870	80 159	2 930	**427 959**	621	428 580
Structure in %	80.5%	18.7%	0.7%	**99.9%**	0.1%	100.0%
Number of subjects 2010	538 038	11 881	2 806	**552 725**	584	553 309
Structure in %	97.2%	2.1%	0.5%	**99.9%**	0.1%	100.0%
Number of subjects 2011	534 766	17 968	2 874	**555 608**	598	556 206
Structure in %	96.1%	3.2%	0.5%	**99.9%**	0.1%	100.0%

*Number of employees.

Source: Based on the NASME yearly reports, Ubreziova, Wach, Majorova (2008)

Table 2. Univariate analysis of model variables

	Non-failed			Failed		
Variable name	Mean	SD	N	Mean	SD	N
Capital employed/Total liabilities (w)	0.481	0.410	125 847	0.322	0.445	793
Quick assets/Current assets (w)	0.751	0.261	125 837	0.702	0.259	793
Cash/Total assets (w)	0.071	0.164	125 856	0.034	0.105	793
Net cash/Net worth (w)	-1.562	3.955	125 626	-1.950	5.201	793
Current assets/Current liabilities (w)	2.707	3.813	125 058	1.401	2.286	791
Total liabilities/Quick assets (w)	3.947	4.280	125 856	4.635	4.636	793
Inventory/Working capital (w)	0.329	1.121	125 665	0.209	1.371	793
Trade creditors/Total liabilities (w)	0.240	0.253	125 856	0.374	0.299	793
Retained profit/Total assets (w)	-0.026	0.580	125 856	-0.320	0.616	793
Net worth/Liabilities (w)	1.771	3.784	125 856	0.365	1.684	793
Audited - with comments	0.005	0.071	125 856	0.020	0.141	793
Age	8.115	5.751	125 856	8.507	5.710	793
Joint stock dummy	0.125	0.331	125 856	0.275	0.447	793
Limited liabilities company dummy	0.836	0.370	125 856	0.691	0.462	793
Manufacture sector	0.128	0.334	125 856	0.246	0.431	793
Retail sector	0.121	0.326	125 856	0.066	0.248	793
Wholesale sector	0.161	0.368	125 856	0.136	0.343	793
Construction sector	0.042	0.202	125 856	0.078	0.269	793
Dummy 2009	0.210	0.408	125 856	0.166	0.373	793
Dummy 2010	0.159	0.365	125 856	0.177	0.382	793
Dummy 2011	0.086	0.281	125 856	0.064	0.245	793
Foreign ownership	0.116	0.320	125 856	0.105	0.306	793
Founded 1990-1998	0.434	0.496	125 856	0.497	0.500	793
Interest rate	5.553	3.160	125 856	6.492	4.664	793
Dummy 2000	0.012	0.107	125 856	0.013	0.112	793
Dummy 2001	0.017	0.129	125 856	0.039	0.194	793
Dummy 2002	0.020	0.141	125 856	0.019	0.136	793

Table 3. SME models with different groups of explanatory variables – logit

The table shows the logit models developed for the Slovakian SMEs in the period 1997-2012. The first model includes only the significant explanatory variables from the first group of the potential explanatory variables. The second model is based on the first and second group (the variables correspond to the variables used in Altman et al. (2010). The third and the fourth models are based on the full set of variables from all three groups. The area under ROC curve is calculated in the last row.

	(1)	(2)	(3)	(4)
	default	default	default	default
Cash/Total assets (w)	-2.550***	-1.506***	-1.463***	-1.355***
	(-4.43)	(-3.15)	(-3.05)	(-2.89)
Total liabilities/Quick assets (w)	0.0304***	0.0383***	0.0397***	0.0427***
	(4.15)	(5.08)	(5.27)	(5.69)
Trade creditors/Total liabilities (w)	1.136***	1.279***	1.382***	1.541***
	(8.22)	(8.78)	(9.38)	(10.86)
Retained profit/Total assets (w)	-0.366***	-0.356***	-0.348***	-0.360***
	(-7.10)	(-6.29)	(-6.07)	(-6.32)
Net worth/Liabilities (w)	-0.228***	-0.302***	-0.313***	-0.308***
	(-3.42)	(-3.46)	(-3.45)	(-3.51)
Audited - with comments		0.919***	0.968***	1.072***
		(3.49)	(3.66)	(4.05)
Joint stock dummy		1.137***	1.071***	0.931***
		(13.26)	(12.40)	(10.36)
Manufacture sector		0.724***	0.727***	0.713***
		(8.43)	(8.42)	(8.30)
Retail sector		-0.577***	-0.566***	-0.576***
		(-3.89)	(-3.81)	(-3.88)
Construction sector		0.643***	0.604***	0.599***
		(4.77)	(4.46)	(4.45)
Dummy 2010		0.136	0.174*	0.378***
		(1.45)	(1.83)	(3.66)
Foreign ownership			-0.316***	-0.341***
			(-2.66)	(-2.87)
Founded 1990-1998			0.169**	0.0530
			(2.22)	(0.67)
Dummy 2001			0.851***	0.621***
			(4.30)	(3.12)
Interest rate				0.0767***
				(6.44)
Constant	-5.301***	-5.751***	-5.843***	-6.321***
	(-54.33)	(-51.42)	(-50.91)	(-45.46)
Observations	126649	126649	126649	126649
McFadden pseudo-R^2	0.0456	0.0766	0.0798	0.0844
Log-likelihood	-4594.2	-4444.8	-4429.8	-4407.2
Defaulted	793	793	793	793
Non-defaulted	125856	125856	125856	125856
Area under ROC curve	0.719	0.765	0.767	0.774

z statistics in parentheses

* p<0.1, ** p<0.05, *** p<0.01

Table 4. SME models with different groups of explanatory variables – Cox's proportional hazard model

The table shows the Cox's proportional hazard models developed for the Slovakian SMEs in the period 1997-2012. The first model includes only the significant explanatory variables from the first group of the potential explanatory variables. The second model is based on the first and second group (the variables correspond to the variables used in Altman et al. (2010). The third and the fourth models are based on the full set of variables from all three groups.

	(1)	(2)	(3)	(4)
	survival	survival	survival	survival
Cash/Total assets (w)	-2.989***	-1.908***	-1.703***	-1.549***
	(-5.54)	(-4.30)	(-3.96)	(-3.74)
Retained profit/Total assets (w)	-0.250***	-0.227***	-0.203***	-0.174***
	(-6.10)	(-5.32)	(-4.67)	(-3.99)
Quick assets/Current assets (w)	-0.509***	-0.950***	-0.943***	-0.893***
	(-4.78)	(-8.28)	(-8.26)	(-7.74)
Trade creditors/Total liabilies (w)	1.038***	1.077***	1.269***	1.642***
	(8.87)	(8.93)	(10.29)	(13.40)
Net worth/Liabilities (w)	-0.117***	-0.160***	-0.167***	-0.148***
	(-3.51)	(-4.03)	(-4.02)	(-4.01)
Audited - with comments		0.806***	0.849***	1.001***
		(3.14)	(3.27)	(4.03)
Joint stock dummy		1.394***	1.277***	1.110***
		(17.47)	(15.92)	(13.36)
Manufacture sector		0.892***	0.867***	0.849***
		(11.21)	(10.89)	(10.67)
Retail sector		-0.584***	-0.550***	-0.569***
		(-4.32)	(-4.07)	(-4.24)
Construction sector		0.838***	0.796***	0.801***
		(6.83)	(6.50)	(6.61)
Dummy 2009		-1.018***	-0.910***	-0.232*
		(-9.67)	(-8.49)	(-1.93)
Dummy 2010		-1.116***	-1.000***	-0.270**
		(-10.66)	(-9.41)	(-2.24)
Dummy 2011		-1.359***	-1.222***	-0.469**
		(-7.69)	(-6.88)	(-2.49)
Foreign ownership			-0.188*	-0.176*
			(-1.77)	(-1.65)
Founded 1990-1998			0.376***	0.225***
			(5.51)	(3.12)
Dummy 2000			1.406***	0.369
			(4.78)	(1.29)
Dummy 2001			1.396***	0.930***
			(8.59)	(6.06)
Dummy 2002			0.693***	0.342*
			(3.28)	(1.66)
Interest rate				0.180***
				(17.82)
Observations	124421	124421	124421	124421
R_squared	0.0223	0.0597	0.0649	0.0764
Log_likelihood	-9271.6	-8917.7	-8868.0	-8758.8
Defaulted	789	789	789	789
Non_defaulted	123632	123632	123632	123632

z statistics in parentheses

* p<0.1, ** p<0.05, *** p<0.01

Table 5. Logit models with adjustment for endogeneity bias

The table shows the logit models with included foreign ownership dummy (models 3 and 4) and the same models with the foreign ownership dummy replaced with the predicted probabily based on the first stage regression (models 3a and 4a).

	(3)	(3a)	(4)	(4a)
	default	default	default	default
Cash/Total assets (w)	-1.463***	-1.504**	-1.355***	-1.419*
	(-3.05)	(-1.96)	(-2.89)	(-1.89)
Total liabilities/Quick assets (w)	0.0397***	0.0435***	0.0427***	0.0455***
	(5.27)	(4.50)	(5.69)	(4.74)
Trade creditors/Total liabilies (w)	1.382***	1.459***	1.541***	1.558***
	(9.38)	(7.38)	(10.86)	(8.17)
Retained profit/Total assets (w)	-0.348***	-0.497***	-0.360***	-0.504***
	(-6.07)	(-6.92)	(-6.32)	(-7.02)
Net worth/Liabilities (w)	-0.313***	-0.302**	-0.308***	-0.300**
	(-3.45)	(-2.51)	(-3.51)	(-2.55)
Audited - with comments	0.968***	0.859***	1.072***	0.924***
	(3.66)	(2.82)	(4.05)	(3.03)
Joint stock dummy	1.071***	0.927***	0.931***	0.855***
	(12.40)	(8.75)	(10.36)	(8.03)
Manufacture sector	0.727***	0.624***	0.713***	0.625***
	(8.42)	(5.45)	(8.30)	(5.47)
Retail sector	-0.566***	-0.378**	-0.576***	-0.384**
	(-3.81)	(-2.13)	(-3.88)	(-2.17)
Construction sector	0.604***	0.620***	0.599***	0.605***
	(4.46)	(3.83)	(4.45)	(3.74)
Dummy 2010	0.174*	0.249**	0.378***	0.398***
	(1.83)	(2.15)	(3.66)	(3.15)
Foreign ownership	-0.316***		-0.341***	
	(-2.66)		(-2.87)	
Predicted Foreign Ownership (IV)		-1.130**		-1.232**
		(-2.26)		(-2.43)
Founded 1990-1998	0.169**	0.123	0.0530	0.0573
	(2.22)	(1.30)	(0.67)	(0.59)
Dummy 2001	0.851***	0.865***	0.621***	0.678***
	(4.30)	(3.45)	(3.12)	(2.66)
Interest rate			0.0767***	0.0543***
			(6.44)	(3.41)
Constant	-5.843***	-5.762***	-6.321***	-6.095***
	(-50.91)	(-34.07)	(-45.46)	(-31.29)
Observations	126649	81152	126649	81152
McFadden pseudo-R^2	0.0798	0.0744	0.0844	0.0766
Log-likelihood	-4429.8	-2929.0	-4407.2	-2922.3
Defaulted	793	524	793	524
Non-defaulted	125856	80628	125856	80628
Area under ROC curve	0.767	0.767	0.774	0.770

z statistics in parentheses

* p<.1, ** p<.05, *** p<.01

Table 6. Survival models with adjustment for endogeneity bias

The table shows the survival models with included foreign ownership dummy (models 3 and 4) and the same models with the foreign ownership dummy replaced with the predicted probabily based on the first stage regression (models 3a and 4a).

	(3)	(3a)	(4)	(4a)
	survival	survival	survival	survival
Cash/Total assets (w)	-1.703***	-2.201***	-1.549***	-2.025***
	(-3.96)	(-2.76)	(-3.74)	(-2.65)
Retained profit/Total assets (w)	-0.203***	-0.286***	-0.174***	-0.274***
	(-4.67)	(-4.69)	(-3.99)	(-4.57)
Quick assets/Current assets (w)	-0.943***	-0.947***	-0.893***	-0.902***
	(-8.26)	(-6.53)	(-7.74)	(-6.11)
Trade creditors/Total liabilies (w)	1.269***	1.249***	1.642***	1.576***
	(10.29)	(7.32)	(13.40)	(9.37)
Net worth/Liabilities (w)	-0.167***	-0.210***	-0.148***	-0.188***
	(-4.02)	(-2.77)	(-4.01)	(-2.75)
Audited - with comments	0.849***	0.749**	1.001***	0.873***
	(3.27)	(2.39)	(4.03)	(2.96)
Joint stock dummy	1.277***	1.165***	1.110***	1.034***
	(15.92)	(12.05)	(13.36)	(10.49)
Manufacture sector	0.867***	0.795***	0.849***	0.762***
	(10.89)	(7.78)	(10.67)	(7.47)
Retail sector	-0.550***	-0.509***	-0.569***	-0.515***
	(-4.07)	(-3.02)	(-4.24)	(-3.09)
Construction sector	0.796***	0.740***	0.801***	0.727***
	(6.50)	(4.97)	(6.61)	(4.90)
Dummy 2009	-0.910***	-1.041***	-0.232*	-0.380**
	(-8.49)	(-7.27)	(-1.93)	(-2.38)
Dummy 2010	-1.000***	-1.181***	-0.270**	-0.472***
	(-9.41)	(-9.10)	(-2.24)	(-3.18)
Dummy 2011	-1.222***	-1.568***	-0.469**	-0.835***
	(-6.88)	(-7.20)	(-2.49)	(-3.63)
Foreign ownership	-0.188*		-0.176*	
	(-1.77)		(-1.65)	
Predicted Foreign Ownership (IV)		-1.362***		-1.291***
		(-2.71)		(-2.59)
Founded 1990-1998	0.376***	0.344***	0.225***	0.241***
	(5.51)	(4.03)	(3.12)	(2.72)
Dummy 2000	1.406***	1.980***	0.369	0.837***
	(4.78)	(6.94)	(1.29)	(2.91)
Dummy 2001	1.396***	1.519***	0.930***	0.980***
	(8.59)	(7.51)	(6.06)	(5.08)
Dummy 2002	0.693***	1.056***	0.342*	0.648***
	(3.28)	(4.25)	(1.66)	(2.63)
Pr(own1)		-1.362***		-1.291***
		(-2.71)		(-2.59)
Interest rate			0.180***	0.178***
			(17.82)	(13.16)
Observations	124421	79573	124421	79573
McFadden pseudo-R^2	0.0649	0.0673	0.0764	0.0774
Log-likelihood	-8868.0	-5347.9	-8758.8	-5290.2
Defaulted	789	520	789	520
Non-defaulted	123632	79053	123632	79053

t statistics in parentheses

* p<.1, ** p<.05, *** p<.01

Author biographies

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