The Application of Survival Analysis Methods in the Examination of Foreign Divestment in Poland

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Abstract Investing is a process which takes time and can have an initial and an end phase. The same applies to foreign direct investment (FDI), which may potentially be completed through divestment. From the viewpoint of an investor who carries out foreign divestment by disposing of their shares or by liquidating an enterprise in an FDI beneficiary country, one could seek an analogy with censored cases (foreign investments which have been finalised or in which the owner of the capital has changed). Therefore, the duration of such investments may be tested using the methods applied for survival analysis. The aim of this article is to find patterns of 'survival' among foreign direct investments in Poland based on the relevant tables of FDI duration in Poland, by the criteria of sector and country of origin of the foreign capital. The Cox proportional hazard model will also be used to model the odds of FDI survival.

Keywords Survival analysis · Kaplan–Meier estimator · FDI · Divestment

1 Introduction

The investment process is usually dynamic. Favourable conditions for economic development or prospects for profit incline investors to invest capital in various investment projects, while recession or economic crisis discourage them. In the latter scenario, investors may not only restrict further investment, but may also withdraw their capital. This phenomenon also concerns foreign direct investment (FDI). If an investor closes an enterprise which was the target of direct investment or sells it wholly or in part to a resident or non-resident of another country, the process is called foreign divestment. Investors are more inclined to make such decisions during

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periods of economic or political turbulence, which cause investment uncertainty and the resulting increase in the risk of the entire project. Divestment leads to a restriction of the previous scope and scale of operations within an enterprise which received direct investment, where the scope should be understood as sectors of operations or production volume and scale as the size of financial involvement in a given unit of the enterprise. The literature has presented research on the causes of divestment for long. These causes are most frequently analysed at the level of areas associated with the characteristics of a corporation, characteristics of an affiliate, location and the specific nature of the sector (Moschieri and Mair 2008).

The reasons for divestment may also be explained through various economic theories regarding the causes of foreign direct investments, such as internationalisation theory, the eclectic paradigm (OLI Model), location theory, the organisational life cycle and others. The duration, or 'survival', of investment projects and the chances of foreign direct divestment are analysed in this article with the use of tools usually applied in demographics to examine processes of population mortality. The application of this method for examining divestment is relatively new. Techniques derived from event history analysis are used, thanks to investment projects having a certain life cycle. They begin at different times and can develop and function either for short or for long periods or constantly throughout the entire period of observation. The survival or 'death' of an FDI encourages one to look for an analogy between the duration of investment projects and the duration (survival) of demographic phenomena. This analogy, which is also clearly visible in the occurrence of censored cases, has inspired the author to attempt to model the duration of FDIs using the techniques from survival analysis. The aim of the paper is to find patterns of 'survival' of FDIs in Poland based on the relevant 'FDI duration' tables with the criteria of sector and country of origin of the foreign capital. The Cox proportional hazard model is also used to model the odds of FDI survival.

2 Literature Review

Research on foreign divestment is definitely less extensive in the literature than research on foreign direct investments. However, divestment produces specific effects for the country where the divested foreign affiliate is located. Divestment may lead to changes in production or employment, or may have a considerable impact on the economy. This issue is explored by researchers to a limited extent because foreign divestment is definitely less spectacular than investment decisions, so it is much more difficult to obtain in-depth information on this type of transaction. Access to the relevant data at the macroeconomic level is also limited. Therefore, divestment is still an interesting and unexplored area of scholarly research. Researchers are mostly interested in the causes of divestment. They assess its scale and consequences, and they analyse the key determinants of divestment. The research is most frequently focussed on the host countries of FDIs and the analyses are on micro- and macroeconomic factors (Norbäck et al. 2015; Berry 2010; Sembenelli and Vannoni 2000; Shimizu

and Hitt 2005; Bergh (1997; Hamilton and Chow 1993; Markides 1992; Pashley and Philippatos 1990). The level of internationalisation of transnational enterprises, which are the chief providers of capital, is one of the factors stressed (Norbäck et al. 2015; Berry 2010, 2013; Borga et al. 2019). It is beyond any doubt that economic crises, including the crisis caused by the COVID-19 pandemic, may induce foreign investors to divest, because in times of an economic recession they are more prone to withdraw capital or even liquidate enterprises in which they have made direct investments. However, this phenomenon also occurs during periods of relative economic stability and is caused either by factors typical of a parent company and its affiliates located in FDI host countries (Norbäck et al. 2015; Berry 2010; Sembenelli and Vannoni 2000) or by changing conditions of the economic environment (Norbäck et al. 2015; Chatterjee et al. 2003). Therefore, it is necessary to estimate the risk of foreign divestment and the survival rate of foreign investments throughout the duration of investment projects. Since most projects are subject to a specific life cycle (they begin at a specific moment, develop and then end or exist throughout the entire period of observation), the application of survival analysis methods in the analysis of the duration of FDIs seems justified.

Event history analysis can be applied to various economic concepts. Its use in the analysis of processes of bankruptcy or of finding employment after a period of unemployment is very well known. Some researchers have also used survival analysis with respect to the survival rate of companies with foreign capital (Demirbaga et al. 2011; Meschi et al. 2016; Gaur and Lu 2007; Delios and Beamish 2002; Farah et al. 2021). The influence of the share of foreign capital and other macro- and microeconomic factors on the survival rate of enterprises (mainly in some Asian countries) has been examined using the Cox proportional hazard model and the Kaplan–Meier survival function. However, such research concerns businesses and not FDI, which, in accordance with the OECD definition, involve a non-resident purchasing at least 10% of the shares of a company which is the object of direct investment (providing effective influence on the company's management) or the construction of an enterprise from scratch (greenfield projects).

The literature on the subject does not contain any investigation of FDI survival using event history analysis. This paper is an attempt to fill this research gap. The research covers FDIs in Poland since 1996, and the sample comprises 326 investment projects from various economic sectors. The data for the calculations were taken from the Orbis and Zephyr databases.[1]

[1] The Orbis (https://orbis4.bvdinfo.com/) and Zephyr (https://zephyr.bvdinfo.com/) databases contain information on millions of companies, regarding for example mergers and acquisitions, public offerings, private equity and venture capital transactions and rumours.

3 Research Methodology

Life expectancy tables, the Kaplan–Meier estimator (Kaplan and Meier 1958) and the Cox proportional hazard model (Cox 1972) were used to analyse the process of FDI survival in Poland. Life expectancy tables are used in demographics to present the natural process of population mortality. They are based on a model population of cohorts, or groups, of people born at the same time. Mortality tables are also constructed for sub-populations distinguished from the general population based on specific characteristics, such as sex or place of residence. Typical mortality tables contain the following items: age in years, number of individuals who live up to a certain age, number of deaths, probability of surviving a specific number of years, probability of death, total fund of life expectancy and average remaining life expectancy (Holzer 2003).

This concept of mortality tables was adopted for the construction of the FDI duration tables in this study. Survival time was divided into disjoint ranges, and the absolute and relative sizes of investment projects entering individual ranges 'alive', ending their duration in a range or becoming censored or lost in a range were then determined. Duration tables of investment projects were constructed generally and separately for groups of projects according to the country of origin of the capital and the economic sector in which the FDIs were made. Apart from the classification of investment projects in the duration tables, the function of survival based on continuous survival was estimated. The Kaplan–Meier estimator was used for this purpose (Kaplan and Meier 1958), as it is often used in survival analysis. It is an example of a non-parametric method in which the probability of an event (event risk) is allocated to every time-point at which at least one event (divestment) occurs. The survival function is expressed in this method by the following formula (Bieszk-Stolorz and Markowicz 2012):

$$\hat{s}(t_i) = \prod_{j=1}^{i} \left(1 - \frac{f_i}{n_j}\right), \text{for} i = 1, 2, ..., s, \tag{1}$$

where

t_i—the time-point when at least one event occurred,

f_i—the number of events at time-point t_i ($t_1 < t_2 < \ldots < t_s$),

n_i—the number of cases observed at time-point t_i.

In order to compare the significance of differences in the duration of FDIs in subgroups distinguished by specific categories of the analysed characteristics, the following statistical tests were used: Gehan's Wilcoxon test (Gehan 1965; Cox's test 1964), the Cox–Mantel test (1972), Peto and Peto's version of the Wilcoxon test (1972) and the log-rank test (Mantel 1966). The mentioned tests differ mainly in the way of assigning weights to earlier and later failures. For example, the log-rank test gives equal weight to early and late failures, Gehan's Wilcoxon places very heavy weight on hazards at the beginning of the study, and Peto-Peto tests give slightly

more weight on hazards at the beginning of the study (Karadeniz and Ercan 2017). Lee et al. (1975) have shown that the Cox-Mantel test and the log-rank test are more powerful than others when samples are drawn from an exponential or Weibull population. When the hazard ratio is non-constant, the Gehan-Wilcoxon test can be more powerful than the log-rank test (Pepe and Fleming 1989). The Peto-Peto test is also efficient when the proportional hazards (PH) assumption is violated (Karadeniz and Ercan 2017). The verified null hypothesis for the above tests is the one according to which the survival functions in the two groups do not differ significantly.

The calculation of the relative hazard of foreign divestment is an important element of this analysis. This was achieved with the use of the Cox proportional hazard model, which may be presented using the following equation:

$$h(t, x_1, x_2, \ldots, x_n) = h_0(t) exp\left(\sum_{i=1}^{n} \beta_i x_i\right), \tag{2}$$

where

$h_0(t)$—the baseline hazard function,
$x_1, x_2, \ldots, x_n$—independent variables,
β_i -model parameter ($i = 1, 2, \ldots, n$),
t—observation time.

This model is a product of baseline hazard (the non-parametric component) and the log-linear function, thanks to which expressing the equation in the model (2) as a logarithm on both sides allows it to be linearised and estimated in a relatively 'uncomplicated' way. Another advantage of the Cox model lies in the fact that it does not require any assumptions regarding the shape of a hidden distribution of object duration and that it deals with censored cases well. The parameter β_i may be interpreted in the model (1) as logarithms of the failure rate, so the value of $\exp(\beta_i)$ expresses the relative risk of events for entities where each belongs to one of the subgroups. The concept of hazard may be defined as a ratio of a probability density function for time t of the distribution of the number of analysed events to the survival function expressing the probability of the event occurring at a time later than t. The function defined in this way enables the intensity of events in subsequent moments (time-points) to be determined.

Thus, the results of this analysis may be helpful in investors' decision-making with regard to the planning of future FDIs, and the proposed approach to modelling the duration of FDIs may provide support for investment project management processes. The data for the calculations were taken from the Orbis and Zephyr databases.

4 Results of Empirical Research

The research is based on data derived from the Orbis and Zephyr databases, using 326 randomly chosen FDI projects implemented in Poland with an observation timeframe

of 1996–2021 and for which complete data were available. For the purposes of this research, divestment is defined as the disposal of shares by non-residents to a resident (then they reduce the inflow of net capital) or to a non-resident (possible change of the investor's country) to a level below 10% of the shares in the transferred investment project.

The survival pattern of foreign direct investments based on the tables of duration in the aggregate juxtaposition of total foreign direct investments is presented in this section. The same will then be presented by project groups according to the economic sector in which the FDIs were made and the country of origin of the foreign capital.

Table 1 presents the FDI survival tables in Poland. The first column of this table shows the lower limit of the age group (in months) of investment projects in the Polish economy. The subsequent columns contain the following items: the number of investment projects, the number of censored projects, the probability of a project's 'death' (divestment), the probability of survival, the cumulative percentage of survivals and the median survival time (it was not possible to calculate the median in all cases).

The total proportion of censored observations in this study has amounted to 24%. Table 1 reveals that the highest probability of divestment (at the level of 0.462) was observed in the case of investment projects approximately 13–15.5 years old (the projects in this age group also had the lowest probability of survival). On average, around 46 out of 100 FDI projects of the same age underwent divestment. Half of these projects will statistically reach the age of approx. 7 years. It is quite surprising that projects aged 15.5–18 years had the greatest odds of a long life in the Polish economy: half of these FDIs are expected to 'survive' until the age of 7.7 years.

It should be noted that the probabilities of foreign divestment do not exhibit a constant growth trend or a decreasing trend for all age groups. The cumulative probabilities of survival can be plotted as a survival curve for FDI projects. Such a

Table 1 Tables of foreign direct investment duration in Poland

Lower limit of age group (months)	Total number of cases	Number of censored cases	Probability of FDI death	Probability of FDI survival	Cumulative percentage of survivals	Median survival time
0.00	326	62	0.129	0.871	100.00	125.438
31.11	226	94	0.324	0.676	87.12	104.440
62.22	74	9	0.058	0.942	58.89	96.340
93.33	61	8	0.088	0.912	55.50	68.935
124.44	48	4	0.391	0.609	50.63	43.148
155.56	26	0	0.462	0.538	30.82	83.556
186.67	14	2	0.038	0.962	16.60	93.333
217.78	12	4	0.050	0.950	15.96	62.222
248.89	8	7	0.111	0.889	15.16	31.111
280.00	1	1	1.000	0.000	13.47	–

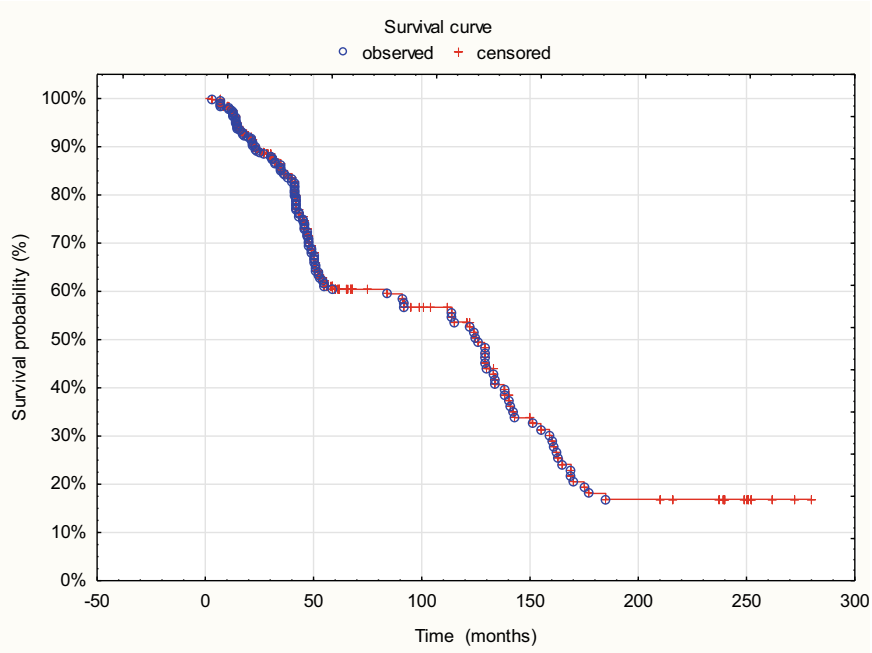

Fig. 1 The survival curve of FDIs in Poland, obtained with the use of the Kaplan–Meier estimator

curve is shown in Fig. 1, which was constructed using the Kaplan–Meier estimator (the survival function is estimated here based on continuous functions of time).

The course of the resulting survival curve confirms that along with an increase in the age of investment projects, the cumulative probability of their survival systematically decreases, though the rate of the decrease varies over time. The value of the survival function also shows that half of the investment projects will survive for a maximum of approx. 10.5 years, 25% for approx. 3.75 years and the remaining 75% for about 13.6 years. Tables of FDI survival were drawn up separately for FDIs by country of origin of the capital, but the research covered the countries which are lead investors in Poland, both in terms of the inflow of FDI in recent years and total FDI resources: Germany, the Netherlands, Luxembourg and France, plus a category for 'other' (covering countries not mentioned here). The results of the research are presented in Table 2.

Table 2 shows that the survival functions of FDIs with capital from the selected countries differ. Generally, the largest decrease in the cumulative probability of survival, especially for FDIs older than 8 years, was observed for FDI projects with capital from Luxembourg, and the probability decreased at a relatively slower pace, for example, in the case of capital from countries other than Germany, the Netherlands, France or Luxembourg.

It should be also noted that the FDIs with French capital had the highest median value in the majority of age groups; the lowest median value was noted for the projects

Table 2 Fragment of FDI duration tables, by selected countries of origin of capital

Lower limit of the age (months)	Germany		The Netherlands		France	
	Cumulative percent survival	Median survival time	Cumulative percent survival	Median survival time	Cumulative percent survival	Median survival time
0.00	100.0	64.11	100.0	54.03	100.0	111.54
31.11	94.97	43.30	82.98	61.67	79.66	111.86
62.22	67.37	93.68	44.45	171.93	55.52	162.24
93.33	44.14	87.32	42.11	153.02	52.26	145.58
124.44	42.84	64.94	36.85	144.81	48.99	125.48
155.56	37.31	45.65	34.22	116.44	35.93	120.89
186.67	33.92	25.06	29.33	87.33	32.33	90.67
217.78	17.96	15.56	24.44	58.22	29.10	60.44
248.89	4.49	11.67	22.00	29.11	25.46	30.22
280.00	2.24	–	18.33	–	19.10	–

Lower limit of the age (months)	Luxembourg		Other	
	Cumulative percent survival	Median survival time	Cumulative percent survival	Median survival time
0.00	100.0	130.48	100.0	131.26
31.11	91.92	103.91	83.56	111.37
62.22	85.58	76.36	81.52	84.83
93.33	72.41	52.65	79.89	58.07
124.44	55.38	31.11	72.10	34.72
155.56	27.69	62.22	42.41	23.52
186.67	18.46	62.22	17.46	20.75
217.78	13.84	46.67	5.82	27.67
248.89	9.23	15.56	2.91	13.83
280.00	4.61	–	1.46	–

funded with German capital. FDI survival curves by countries of origin of the capital are presented in Fig. 2.

The course of survival curves visible in Fig. 2 exhibit certain differences. For the purpose of verifying which countries of capital origin demonstrated considerably different survival functions, Gehan's version of Wilcoxon's statistical tests, F Cox, Cox–Mantel, Wilcoxon by Peto and Peto and log-rank tests were performed. The results of these tests are presented in Table 3.

Based on the results provided in Table 3, it can be inferred that the most statistically significant differences with a significance level of 0.05 occurred in the survival functions of the FDIs with capital from Germany and Luxembourg, as well as from the Netherlands and Luxembourg (which is confirmed by the results of all tests). Only part of the results of the tests is clearly decisive for differences in the survival

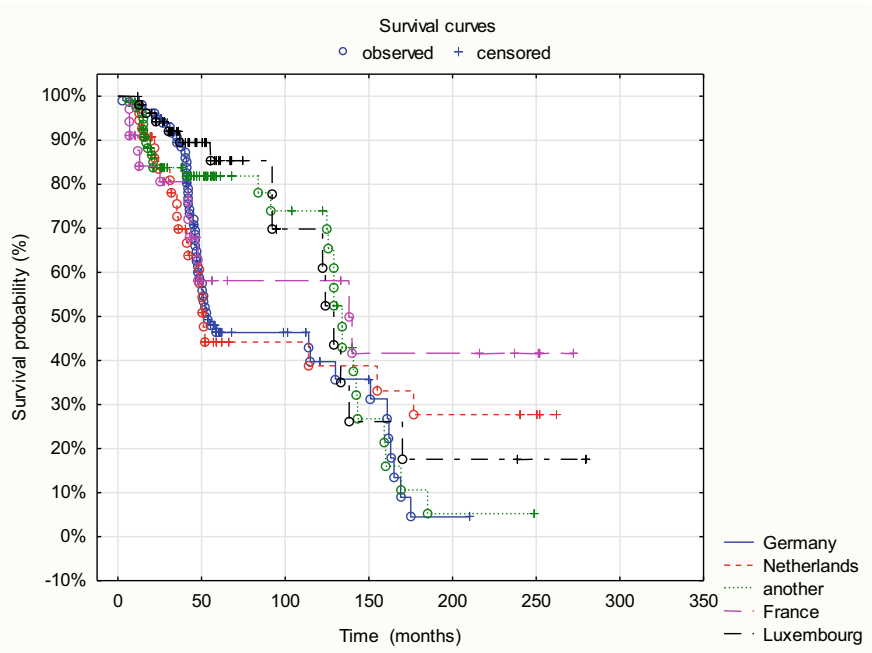

Fig. 2 Survival curves for selected countries of origin of capital obtained with the use of the Kaplan–Meier estimator

Table 3 P-values in statistical tests for differences in FDI survival functions, for pairs of countries of origin of capital

Countries	Significance test for two groups				
	Gehan's Wilcoxon	F Cox	Cox–mantel	Peto & Peto Wilcoxon test	Log-rank
Germany-The Netherlands	0.019	0.022	0.087	0.042	0.088
Germany-others	0.172	0.089	0.089	0.093	0.089
Germany-France	0.724	0.005	0.213	0.820	0.221
Germany-Luxembourg	0.009	0.000	0.009	0.008	0.008
The Netherlands-others	0.139	0.109	0.469	0.138	0.471
The Netherlands-France	0.932	0.314	0.565	0.781	0.562
The Netherlands-Luxembourg	0.004	0.012	0.044	0.008	0.045
Others-France	0.209	0.320	0.717	0.556	0.710
Others-Luxembourg	0.230	0.116	0.454	0.544	0.453
France-Luxembourg	0.032	0.084	0.541	0.208	0.541

functions of the FDIs with capital from Germany and the Netherlands as well as from France and Luxembourg. The tests did not reveal any statistical differences for the remaining pairs of countries in the survival functions. Table 4 shows the FDI duration tables by selected economic sectors in which FDIs are made in Poland. Table 4 shows that a relatively fast decrease in the cumulative probability of survival, especially in the second part of the observation period, was observed in the FDIs in 'other services'. The probability decreased at a relatively slower pace in the case of the FDIs in wholesale and retail trade. On the other hand, the trade sector displayed the highest median value of FDI survival in the majority of age groups, whereas the lowest median value was observed for projects in the 'other services' sector. FDI survival curves by the country of the FDI sector are shown in Fig. 3, while Table 5 presents the results of significance tests of differences in the survival functions of FDIs for pairs of sectors.

Based on the course of the relevant curves and the results of the statistical tests, it can be concluded that the most significant differences, at a significance level of 0.05, were found for the survival functions of the FDIs in trade and the financial and insurance services; in trade and other services (as confirmed by the results of all tests); and in trade and manufacturing, other services, and financial and insurance services (as confirmed by results of some tests). For the remaining pairs of economic sectors, the tests did not reveal any significant differences in the survival functions.

In the next part of the study, the Cox proportional hazard model was used. The application of the Cox proportional hazard model requires the fulfillment of assumptions regarding, among others proportional hazards. The PH assumption was checked using statistical tests based on the scaled Schoenfeld residuals (1982). At the significance level of 0.05, there were no grounds to reject independence between residuals and time (for all variables and in global test $p > 0.20$). So the PH assumptions are fulfilled. The Cox proportional hazard model was used to verify the influence of FDI project duration, the number of projects, the country of origin of the FDI supply capital and the economic sector of FDI on the duration of the FDIs. The first two indicators are quantitative, whereas the others are qualitative. Multi-variant qualitative characteristics were introduced to the Cox regression model using dichotomous variables coded with the numbers 0 and 1. With this method of coding, it is possible to estimate $n - 1$ parameters for n such variables (due to the collinearity of variables). Therefore, one of the variants of the qualitative characteristic is treated as a reference variant (to which the risk of the occurrence of the remaining variants refers). For the characteristic known as 'the country of origin of capital', the Netherlands was the reference variant; for the reference sector, 'wholesale and retail trade' was used. For these reference categories, the estimated Cox model had the most statistically significant parameters. The results of the estimations of the Cox model are given in Table 6.

The evaluations of the majority of parameters in the Cox model were statistically significant at a significance level of 0.05. Only French capital and the number of FDI projects had an insignificant impact on the risk of foreign divestment. Investments in the financial and insurance services bore the greatest risk of divestment in comparison to the reference values (approx. 218% higher). When it comes to the other sectors,

Table 4 Fragment of FDI duration tables, by selected economic sectors of FDIs

Lower limit of the age group	Financial and insurance services		Other services		Manufacturing	
	Cumulative percentage of survivals	Median survival time	Cumulative percentage of survivals	Median survival time	Cumulative percentage of survivals	Median survival time
0.00	100.00	49.37	100.00	113.39	100.00	93.45
31.11	84.38	24.87	94.59	91.43	88.14	88.82
62.22	34.98	105.89	56.76	95.08	53.80	86.37
93.33	31.10	84.42	54.34	68.60	51.24	68.92
124.44	26.66	69.87	50.84	42.76	47.58	56.00
155.56	22.21	58.22	38.13	22.31	27.19	93.60
186.67	14.81	67.93	14.30	48.81	23.79	78.40
217.78	11.11	58.22	9.53	41.83	17.84	56.00
248.89	8.33	29.11	6.35	13.94	14.87	28.00
280.00	5.55	–	3.18	–	11.15	–

Lower limit of the age group	Trade		Other	
	Cumulative percentage of survivals	Median survival time	Cumulative percentage of survivals	Median survival time
0.00	100.00	174.47	100.00	128.12
31.11	90.91	154.37	79.03	112.49
62.22	76.07	184.18	75.08	92.86
93.33	73.02	161.59	73.89	72.58
124.44	69.98	138.01	72.41	52.37
155.56	57.81	124.44	63.36	33.94
186.67	44.96	93.33	60.19	14.13
217.78	41.51	62.22	16.42	30.83
248.89	37.73	31.11	10.94	10.28
280.00	31.44	–	5.47	–

the greatest odds of further 'survival' were found for FDIs in 'other services', where the risk of foreign divestment was 156.3% higher than for the reference sector. Luxembourg capital displayed the greatest chances of FDI survival in Poland among the countries of origin of capital (in comparison to the reference country). The risk of Luxembourg divestment was 59.7% lower than the risk of Dutch divestment. It should be noted that only in the case of German capital was the risk of divestment higher than for the reference country (by 12.3%). An increase in the age of FDIs by every subsequent year increased the risk of divestment by approx. 1.1% on average, ceteris paribus.

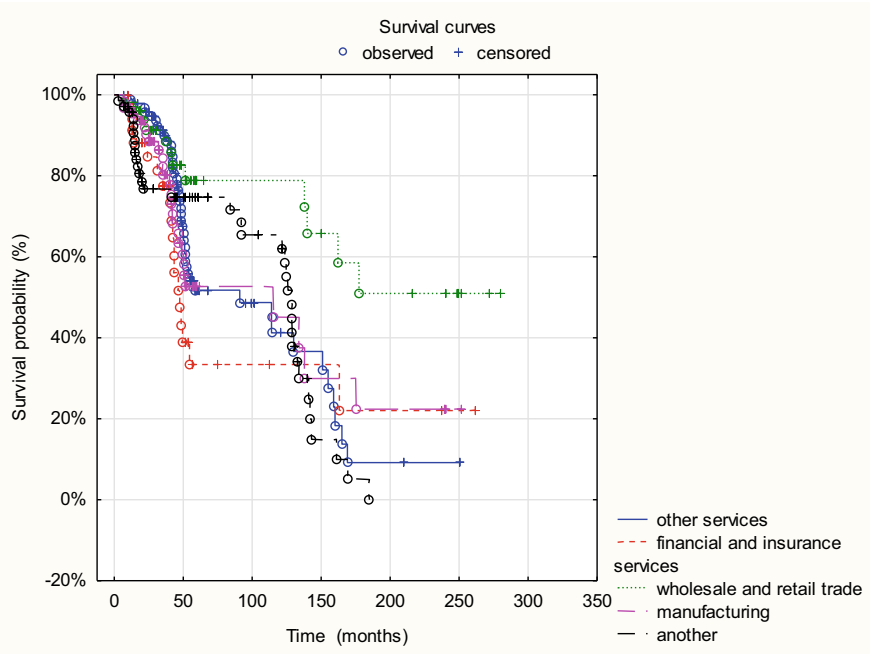

Fig. 3 Survival curves for selected economic sectors for FDIs, using the Kaplan–Meier estimator

Table 5 P-values in statistical tests for differences in FDI survival functions, for pairs of economic sectors

Sectors	Significance test for two groups				
	Gehan's Wilcoxon test	F Cox test	Cox–mantel test	Gehan's Wilcoxon test, Peto & Peto version	Log-rank
Other services-financial and insurance services	0.019	0.159	0.186	0.048	0.211
Other services-trade	0.158	0.003	0.004	0.025	0.004
Other services-manufacturing	0.214	0.419	0.853	0.402	0.855
Other services-other	0.581	0.369	0.900	0.946	0.901
Financial and insurance services-trade	0.008	0.003	0.003	0.004	0.004
Financial and insurance services-manufacturing	0.292	0.162	0.299	0.290	0.301
Financial and insurance services-other	0.291	0.294	0.568	0.238	0.579
Trade-manufacturing	0.054	0.015	0.013	0.018	0.014
Trade-other	0.939	0.254	0.726	0.918	0.731

Table 6 Parameters of the Cox proportional hazard model

Variable	Effect level	Parameter	Standarderror	Chi-square	*p*	Relative hazard (HR)
Number of FDI projects		−0.045	0.076	0.351	0.554	0.956
Age of FDI project		0.011	0.005	4.484	0.034	1.011
Country of origin of capital	Germany	0.116	0.041	7.988	0.005	1.123
	other	−0.809	0.339	5.710	0.017	0.445
	France	−0.335	0.360	0.869	0.351	0.715
	Luxembourg	−0.909	0.368	6.081	0.014	0.403
Sector	other services	0.941	0.345	7.451	0.006	2.563
	financial and insurance services	1.157	0.381	9.217	0.002	3.180
	manufacturing	0.960	0.364	6.931	0.008	2.611
	other	1.355	0.380	12.714	0.000	3.876

5 Conclusions

FDIs are subject to market processes and as with many other products, they have their own life cycle. In accordance with the literature, the analysis of the duration of FDI using survival analysis tools was actually not performed yet, but the occurrence of censored cases among FDIs with an appropriate amount of data makes it possible to use such research tools. The article presents the survival analysis of FDI projects using the duration tables of FDIs. The test results indicate that certain characteristics of an FDI may have a significant impact on their likely duration. Based on the results, various interesting conclusions can be drawn. In particular, it has been demonstrated that projects ranging in age from 13.5 to 15 years have the greatest odds of being divested. Older projects (aged 15–20 years) and investments with a medium duration (approx. 5–8 years) are characterised by the lowest odds of foreign divestment. The study has also shown that FDIs with capital from France survived the longest, while FDIs with capital from Germany survive the shortest. Furthermore, the FDIs financed with German capital and involving the financial and insurance services sector had the lowest odds of survival (the greatest risk of foreign divestment). This conclusion is also confirmed by the results of the Cox hazard model, where the Netherlands was the reference country and trade was the reference sector. Familiarity with the FDI duration tables should facilitate the recognition of the dynamics of the investment process with foreign capital in Poland, and it may be useful to both market analysts and potential foreign investors in making their investment plans. In particular, the optimum choice of the economic sector combined with the familiarity with the odds of survival of FDIs may be significant to investors in the sphere of investment risk diversification and may serve as a tool to support the FDI process. The research carried out for the purposes of this article may obviously be developed in the future

and enriched with survival analysis for other characteristics of investment projects or by expanding the database of the proposed variants of characteristics with subsequent categories. Therefore, it seems that the results presented herein prove the expediency of further research on the modelling of FDI survival patterns.

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