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Study on the survival rate of foreign direct investments in the countries of the Visegrad Group using event history analysis

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Foreign direct investment (FDI) is a process that starts at a point in time and may end over time or continue uninterrupted throughout the observation period. Certain economic conditions may incline investors to divest by liquidating a business entity or selling their shares in the company in which the FDIs were made. Therefore, this is an analogy with the occurrence of censored cases, which allows for the use of survival analysis tools in the examination of the duration of FDIs. The aim of this article was to compare the patterns of 'survival' of foreign direct investments in individual Visegrad Group countries based on the relevant tables showing 'the duration of FDIs' and the survival curves obtained using the Kaplan-Meier estimator according to the criteria of sector and country of origin of the foreign capital. The Cox proportional hazards model was used to model the risk of foreign divestment. Based on the results obtained, the rate of decline in the cumulative probability of FDI survival shows differences between countries; FDI survival medians also vary across countries. In particular, it is demonstrated that the highest probability of foreign direct divestment in Poland applies to projects which are approximately 13.5 to 15 years long. In Czechia, this concerns projects which are approximately 18 to 21 years old, while in Slovakia and Hungary it is projects which are longer than 21. The study also shows that in all Visegrad countries, FDIs with German capital lasted the shortest, while projects with French capital lasted the longest (in the Czech Republic, Poland, and Hungary). In the majority of the Visegrad Group countries, the highest risk of divestment is typical of projects in sectors other than industrial processing and financial, insurance and other services. The data for the computations are from the Orbis and Zephir databases.

Keywords: FDI, survival analysis, the Visegrad Group (V4)

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1. Introduction

The inflow of foreign direct investment is considered to be the most advanced form of expanding an enterprise in foreign markets. Foreign direct investments influence elements of the host country's structure of the economy, such as economic development and growth and the export or labour market. Thanks to FDIs, it is

possible to modernise various sectors of the economy, to implement new production technologies, innovations and new management methods, to improve work efficiency and to transfer know-how. Obviously, the benefits derived from the inflow of FDI depends on the particular economic sector in FDI host countries, the degree to which it has developed, the availability of qualified staff and the industry's capacity to absorb FDIs. With these and other benefits derived from the inflow of FDIs, many countries compete for foreign investors and view FDIs as opportunities to modernise their economies, enhance their export competitiveness, improve their labour market situation, supply capital to certain economic sectors or stimulate economic growth. The countries which are interested in FDIs include emerging economies, countries undergoing transformation and developed countries. The Visegrad Group countries are important and remain attractive to foreign investors. These countries encourage foreign investors to invest their funds by creating an appropriate investment climate in which tax reliefs and legal privileges (e.g. periodic exemption from taxes, preferential tax rates) are important incentives. According to OECD data, inward FDI stocks in Poland, the Czech Republic, Slovakia and Hungary in 2021 were respectively USD 269,225 million (39.94% of GDP), USD 200,587 million (70.97% of GDP), USD 59,369 million (51.68 % of GDP) and USD 101,698 million (56.01% of GDP)[1]. It follows that the largest share of inward FDI stocks is in the Czech economy, and the lowest – in the Polish economy.

However, the process of making FDIs in these countries and all around the world is dependent on market conditions; conditions favourable to economic development and prospects for profit encourage investors, while recession, economic crisis, changing a policy concept of a foreign enterprise or deteriorating investment conditions incline investors towards taking the opposite actions. Divestment is one form of restricting FDIs. Foreign direct divestment is considered to be a voluntary or forced restriction on the scope and scale of operations of an enterprise which is making direct investments by abandoning part of its operations or selling all shares in the enterprise. Therefore, foreign divestment results in a change in operations or ownership of foreign affiliates, but they may also bring changes (perhaps unfavourable ones) to the economies of FDI host countries. These processes also affect the Visegrad Group countries. Due to the geographic vicinity of Poland, Czechia, Hungary and Slovakia, and the similar structure of the economies of these countries, it would seem interesting to conduct a comparative analysis of the process of foreign direct divestment there in relation to the duration of FDI and an assessment of the prospects of continued duration.

The duration of investment projects and FDI opportunities in the Visegrad Group countries are analysed in this article using demographic tools to evaluate population extinction processes. This is made possible by the analogy between the life cycle of an investment project and the survival of demographic units. Both the investment

[1] https://data.oecd.org/fdi/fdi-stocks.htm

project and the life of a demographic entity begin at a specific moment and subsequently either continue or end. In both cases, there are complete observations (if the final event has occurred) or censored cases (if the final event has not yet occurred in the observation window). Both the survival and 'death' of investment projects prompts the search for an analogy between the duration of FDIs and the survival of demographic phenomena. This analogy, also evident in the occurrence of censored cases, inspired the author to carry out modelling of FDI duration using survival analysis techniques (Salamaga, 2022). The purpose of this paper was to identify the 'survival' patterns of FDI in the Visegrad Group countries using the respective 'FDI duration' tables and to compare these results with those obtained using the Kaplan-Meier estimator according to the criteria of sector and country of origin of foreign capital. An important element of the study was the application of the Cox proportional hazard model which made it possible to analyse the odds of FDI survival.

2. Literature review

Research on the causes of divestment has been carried out for years, most frequently in the context of various theories, movements and concepts, such as the reversal of Dunning's theory of foreign direct investments (Boddewyn, 1983), a change in a foreign investor's strategy or business model (Penrose, 2009), a serious deterioration of the conditions of operations, surroundings and investment climate of an affiliate of a given enterprise (Tsetsekos and Gombola, 1992), reduced investment risk (Miller, 1992), an investor's withdrawal for the purposes of correcting an investment error, an investor's revising of their preferences or withdrawal from an unprofitable market (Casson, 1987), an enterprise being driven out of a market by its stronger competitor (Porter, 1980), and others. Foreign divestments have only been studied by researchers to a limited extent because they are far less spectacular than investment decisions, so it is much more difficult to obtain in-depth information and detailed data on them. As a result, divestments remain an interesting and little-studied area of academic research.

Some researchers are primarily interested in the causes of divestment and examine their impact on the economy in terms of micro and macroeconomic factors economy and analysing micro and macroeconomic factors (Pashley and Philippatos, 1990; Sembenelli and Vannoni, 2003; Shimizu and Hitt, 2005; Berry, 2010, 2013; Norbäck et al, 2015). Economic crises, including the crisis caused by the COVID-19 pandemic, increase the frequency of disinvestment, so it is necessary to assess the risk of foreign disinvestment as well as the likelihood of continued FDI. A large number of investment projects start at a specific point in time and then have an end (complete observations), but there are some investments that exist for the entire observation period (censored observations), so survival analysis methods can be used to model their duration. Event history analysis finds applications in the study of various

economic issues and concepts. The application of these methods in the analysis of FDI project duration can be considered a new phenomenon, yet there has been research in which survival analysis was used to assess the survival of foreign-invested companies (Gaur and Lu, 2007; Demirbaga et al., 2011; Meschi et al., 2016; Farah et al., 2021).

Such studies were based on the use of the survival function and the Cox proportional hazard model, for example, and they examined the impact of the various macro and micro-economic factors, including the share of foreign capital, on the survival (duration) of enterprises. It should be noted that such studies focus on the companies themselves and not on investment projects. In the literature, it is difficult to find research results on the survival of FDI using event history analysis (Salamaga, 2022). This article should be seen as an attempt to fill this research gap. The subject of this study is FDI in the Visegrad Group countries by different economic sectors. The data for the computations were taken from the Zephir and Orbis databases.[2]

3. Research methodology

The principle research methods used in this article are life expectancy tables, the Kaplan-Meier survival function (Kaplan and Meier, 1958) and the Cox proportional hazard model (Cox, 1972). The original use of life expectancy tables was in demography, where they were used to analyse the natural mortality process of a population. The construction of the tables is based on populations of cohorts or groups of people who were born in the same year. Life expectancy distributions are divided by a specified number of intervals. For each interval, the number and percentage of live cases, 'extinct' cases and cut (lost) cases are specified. Mortality tables usually include: the age of people in years, the number of people who will live up to a certain age, the probability of surviving a certain number of years, the average remaining life expectancy, the number of deaths and others (Holzer, 2003). This concept of mortality tables was adopted by the author for the construction of the FDI duration tables.

The Kaplan-Meier estimator (Kaplan and Meier, 1958) is another method that has been used for event history analysis with respect to FDIs. This is a non-parametric method in which the risk of an event, measured by an appropriate probability, is linked to the time-point at which at least one disinvestment (event) occurs. The survival function in this method can be described by the following formula (Bieszk-Stolorz and Markowicz; 2012, Salamaga, 2022):

[2] The Zephir (https://zephyr.bvdinfo.com/) and Orbis (https://orbis4.bvdinfo.com/) databases provide a wealth of information on companies around the world, including information on mergers and acquisitions, private equity and venture capital transactions.

$$\hat{s}(t_i) = \prod_{t_j \le t} \left(1 - \frac{f_j}{n_j}\right), \tag{1}$$

where: t_i – the time-point with at least one disinvestment, f_j – the number of disinvestments at time-point t_j, n_j – the number of cases observed at time-point t_j.

The variance of this estimator is shown in the following formula (Greenwood, 1926):

$$\hat{\sigma}^2 = \left[\hat{s}(t_i)\right]^2 \sum_{t_j \le t} \frac{f_j}{n_j\left(n_j - f_j\right)}. \tag{2}$$

Therefore, in this case, the survival function is estimated using continuous times and the estimator is the product limit estimator, because the evaluation of the probability of survival we are looking for is the product of conditional survival in subsequent periods.

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

$$h(t, x_1, x_2, ..., x_n) = h_0(t)\exp(\sum\nolimits_{i=1}^{n} \beta_i x_i), \tag{3}$$

where: $h_0(t)$ – the baseline hazard function, x_1, x_2, …, x_n – independent variables, β_i – model parameters, t – the time variable.

The model is formed by the product of a non-parametric hazard term and a log-linear function. The Cox model does not require additional assumptions about the form of the distribution of the duration of observations and copes well with censored cases. The β_i parameter should be interpreted as the logarithm of the hazard rate, so value $\exp(\beta_i)$ describes the relative risk of events for entities, each of which belongs to one of the studied groups.

The concept of hazard should be understood as the ratio of the probability density function for time t of the distribution of the number of analysed events to the survival function representing the probability of an event occurring later than at time t.

This function allows to calculate the intensity of events according to consecutive time-points. In this research study, the Kaplan-Meier estimator was used to analyse the duration of investment projects in total and separately for project groups distinguished by the economic sector and the country of origin of the capital. Cox's F test was used to compare the significance of differences in the duration of FDI between these groups, as it is more powerful than Gehan's generalised Wilcoxon test when sample sizes are small, the samples are from an exponential or Weibull, and there are no censored observations (Gehan 1965; Gehan and Thomas, 1969).

The verified null hypothesis for the above tests is that the survival functions in two groups do not differ significantly. The statistical analyses were performed by the Statistica computer program.

4. Results of empirical research

The study used data derived from the Zephir and Orbis databases, using 326 randomly chosen FDI projects in Poland, 309 investment projects in Hungary, 317 projects in Czechia and 319 projects in Slovakia with an observation timeframe from 1996 to 2021 and for which complete data were available. It is worth noting that despite the differences in the size of the Visegrad Group (V4) economies, their industry structure is similar (Szabo, 2019). Therefore, FDI projects were selected randomly so that they represent the most important sectors of the economy where FDI is located. In particular, the services sector (broken down into financial services, insurance and other services), trade, manufacturing and others were covered. The detailed sector structure of the collected sample is shown in Figure 1.

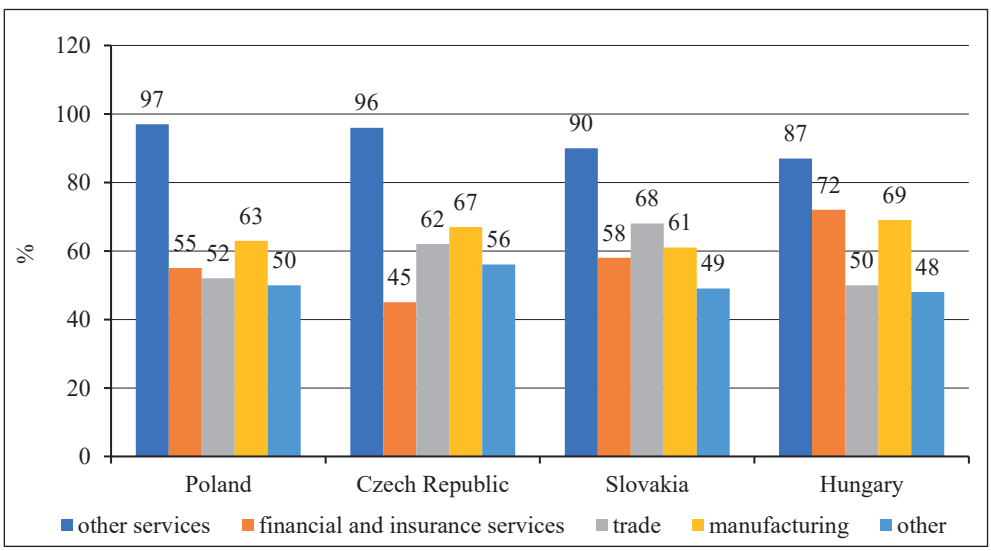

Fig. 1. Sector structure of the randomly selected FDI projects

Source: own study.

In each of the V4 countries, the service sector had the highest representation in the sample, which is in line with the current industry structure of FDI in the economies of the analysed countries. Differences in the industry structure of the random sample between countries resulted from, among others, having to omit observations with missing data.

For the purposes of this research, the end-point of each FDI project is understood as a foreign investor disposing of shares until they hold less than 10% of the shares in the investment project. Disinvestment consists in selling shares to a resident (then they decrease the net capital inflow) or to a non-resident (in the event of a possible change of the investor's country). The 10% limit was chosen because the OECD defines a foreign direct investment as involving a non-resident who acquires shares (at least 10%)in the direct investment company guaranteeing effective influence on the management of the company. Detailed descriptive statistics for the duration of investment projects in the V4 countries are presented in Table 1.

Table 1

Descriptive statistics for the duration of FDI projects (in months) in the Visegrad Group countries

Descriptive statistics	Poland	Czech Republic	Slovakia	Hungary
Number of all observations	326	326	326	326
Number of censored observations	191	122	155	160
Mean	61.00	81.37	92.92	77.26
Standard error of the mean	3.10	3.27	3.21	3.18
Median	45.00	58.50	80.50	61.00
Standard deviation	55.96	58.98	57.98	57.41
Variation coefficient	0.92	0.72	0.62	0.74
Kurtosis	3.49	0.73	1.66	2.93
Skewness	1.93	1.13	1.29	1.67

Source: own calculation based on data from the central banks of the Visegrad Group countries, and Orbis, Zephir databases.

First, models of survival of foreign direct investments are presented based on the FDI duration tables. Probabilities of FDI survival and "FDI death" in individual Visegrad Group countries are shown in Table 2. The first column in this table contains the values of the lower limit of the age range of investment projects (in months). The subsequent columns contain the following items: the probability of project completion, the probability of continued FDI and the median duration (it was not possible to calculate the median in every case).

Table 2 reveals that the highest probability of divestment was observed in Poland for investment projects that were approximately 13 to 15.5 years 'old'; in the case of Czechia it was projects lasting approximately 18 to 21 years, while for Slovakia and Hungary, those longer than 21 years. Statistically, about 46% of FDI projects of the same age were disinvested in Poland. The number of divestment cases was 48 out of 100 in Czechia, 50 in Slovakia and 46 in Hungary. Projects between 15.5 and 18 years long were most likely to 'live a long life' in Poland and the Czech Republic.

Table 2

Tables of FDI survival in the Visegrad Group countries

Lower age limit (in months)	Poland			Czech Republic		
	Probability of FDI death	Probability of FDI survival	Median survival time	Probability of FDI death	Probability of FDI survival	Median duration
0	0.129	0.871	125.438	0.219	0.781	89.265
31	0.324	0.676	104.440	0.274	0.726	72.549
62	0.058	0.942	96.340	0.258	0.742	72.924
93	0.088	0.912	68.935	0.252	0.748	63.349
124	0.391	0.609	43.148	0.333	0.667	106.317
156	0.462	0.538	83.556	0.070	0.930	93.122
187	0.038	0.962	93.333	0.034	0.966	64.639
218	0.050	0.950	62.222	0.476	0.524	36.111
249	0.111	0.889	31.111	0.333	0.667	31.778

Lower age limit (in months)	Slovakia			Hungary		
	Probability of FDI death	Probability of FDI survival	Median survival time	Probability of FDI death	Probability of FDI survival	Median duration
0	0.050	0.950	110.069	0.094	0.906	101.252
31	0.166	0.834	82.163	0.249	0.751	91.276
62	0.280	0.720	64.019	0.254	0.746	86.801
93	0.314	0.686	91.372	0.133	0.867	77.576
124	0.212	0.788	130.970	0.340	0.660	56.622
156	0.091	0.909	112.054	0.327	0.673	61.812
187	0.146	0.854	84.170	0.286	0.714	75.877
218	0.167	0.833	58.400	0.174	0.826	60.399
249	0.500	0.500	16.222	0.462	0.538	32.556

Source: own calculation based on data from the central banks of the Visegrad Group countries, and Orbis, Zephir databases.

In Slovakia and Hungary, it was the 'youngest' FDIs (of approximately 2.5 years) which had the greatest odds of survival[3]. It is worth noting that the probability of foreign disinvestment did not have a consistent upward or downward trend in each age group in all the V4 countries. Poland and Hungary recorded the highest median FDI duration in projects lasting up to approximately 2.5 years (approximately 125

[3] The term *odds of survival* means the probability that the FDI project will be implemented without interruption for a specified period of time (it will not be disinvested within the meaning of the accepted definition of divestment).

and 101 months, respectively). In Czechia and Slovakia, FDI projects of approximately 10 to 13 years duration had the longest median FDI survival. FDI survival functions in individual Visegrad Group countries were estimated based on continuous times, using the Kaplan-Meier estimator (Figure 2). Analysing the trajectory of the survival curves, it can be concluded that as long as the age of investment projects increases, the cumulative probability of survival most often decreases, while the rate of decline varies over time and by country. In all of the countries in the comparison, the definite majority of complete observations were found in the first half of the observation window, where they were decidedly more concentrated than in the second part of the study period. Based on the analysis of the value of survival functions, it can be expected that 50% of all investment projects in Poland will survive a maximum of around 10.5 years. This was the highest median FDI survival among all of the selected countries. The median survival for Czechia, Slovakia and Hungary was 6.9, 9.0 and 8.5 years, respectively.

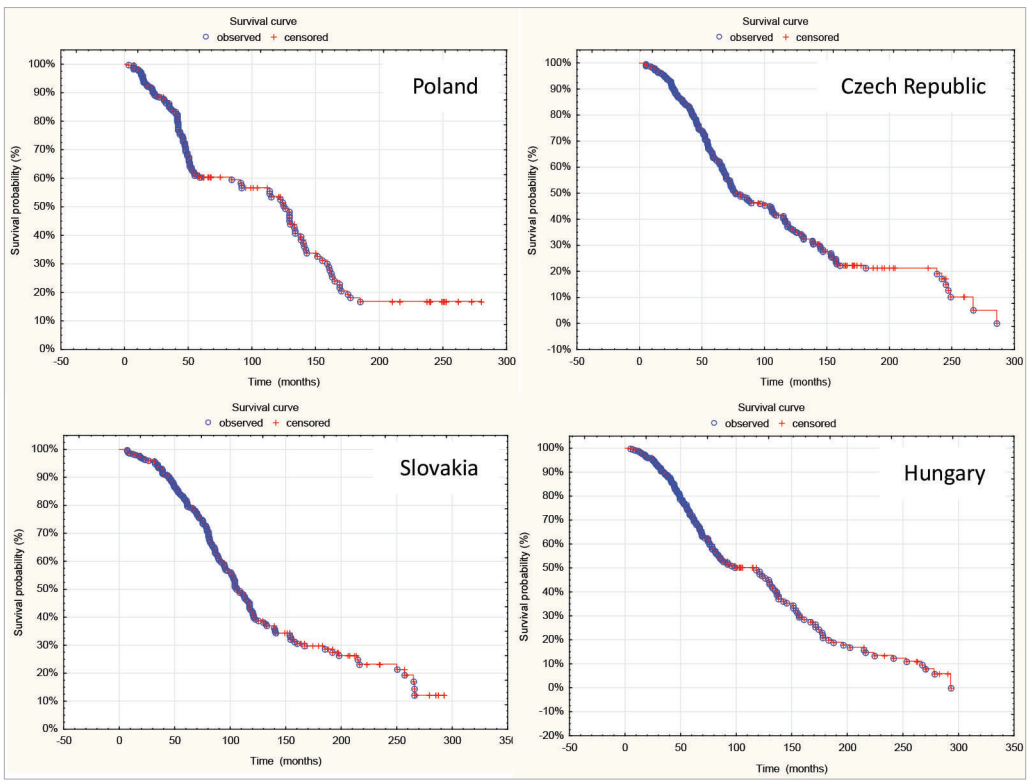

Fig. 2. The FDI survival curves in the Visegrad Group countries, calculated with the Kaplan-Meier estimator

Source: own study.

The Kaplan-Meier estimator was then applied to analyse the survival rate of FDI depending on the country of origin of the capital (Figure 3), and the area of the economy where the FDI was located (Figure 4). Based on data from the central banks of the Visegrad Group countries,[4] it can be concluded that Germany, the Netherlands, France and Luxembourg were the major providers of foreign capital for FDIs in recent years (both in terms of the inflow of FDIs and the total FDI resources).

In Figure 3, one can observe that the FDI survival curves differed in terms of the countries of origin of the capital, as well as between the V4 countries. In Poland, the most dynamic decline in the cumulative probability of survival, especially after eight years, was recorded among FDIs with capital from countries other than the Netherlands, Germany, Luxembourg and France. This likelihood has decreased at a relatively slower rate of Dutch or French FDIs, for example. In Czechia, the fastest decrease in cumulative probability of survival occurred in the case of FDIs with Luxembourg capital. The pace of decrease was relatively slower for French FDIs. The pace of decreased cumulative probability of French-capital FDI survival in Slovakia was the slowest, but the best dynamics of decrease was noted for FDIs from Luxembourg and Germany. The slowest decrease in the cumulative probability of FDI survival visible in Hungary was among FDI projects with German capital. The fastest decrease in probability was noted for Dutch FDIs, however FDIs with French capital had the highest median duration in all the analysed countries; in addition, a high median was observed for German-funded projects in Slovakia, Poland and Hungary.

The courses of the survival curves illustrated in Figure 3 exhibit certain differences. Cox's F-test was used to verify which capital source countries had significantly different survival functions. The results of this test are presented in Table 3.

Analysing the results in Table 3, it can be concluded that Hungary and Poland had the most statistically significant differences between the survival functions of FDIs with German and Luxembourg capital, and between the survival functions of FDIs with Luxembourg and Dutch capital. In Poland, moreover, significant differences can be discerned between the survival functions of FDIs financed with German and Dutch capital and between the survival functions of FDIs with French and German capital. In Hungary, significant differences were also noted in the course of FDI survival functions between those with capital from Germany and those with capital from countries other than the Netherlands, France, Luxembourg as well as for those with Dutch capital and countries other than France, Germany and Luxembourg. In Czechia, significant differences between FDI survival functions were found between capital from France and from the Netherlands and between capital from France and from Luxembourg.

[4] https://www.cnb.cz/en/statistics/bop_stat/bop_publications/pzi_books/; https://www.mnb.hu/en/statistics/statistical-data-and-information/statistical-time-series/viii-balance-of-payments-foreign-direct-investment-international-investment-position/foreign-direct-investments; https://www.nbs.sk/en/statistics/balance-of-payments-statistics/foreign-direct-investment; https://www.nbp.pl/homen.aspx?f=/en/publikacje/ziben/ziben.html

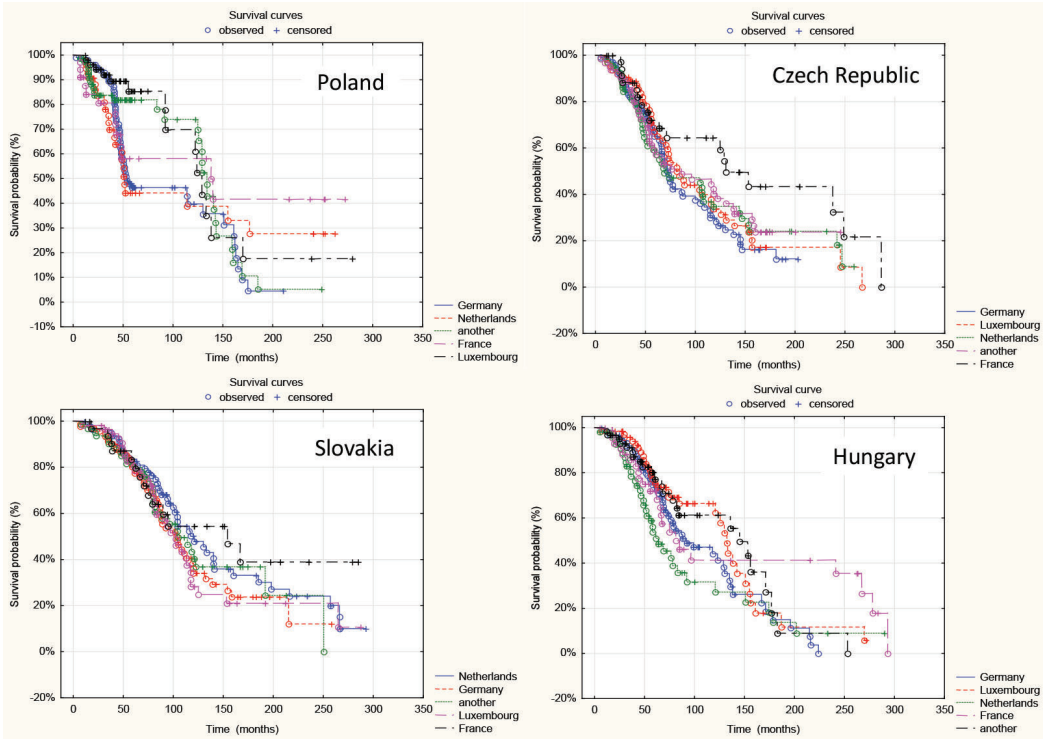

Fig. 3. The FDI survival curves in the Visegrad group countries by major capital source country, determined using the Kaplan-Meier estimator

Source: own study.

Table 3

The results of the Cox's F-test (p-values) for differences in FDI survival functions, by pairs of capital source countries

Countries	Poland	Czech Republic	Slovakia	Hungary
Germany vs the Netherlands	0.022	0.330	0.370	0.273
Germany vs others	0.089	0.439	0.367	0.017
Germany vs France	0.005	0.055	0.157	0.279
Germany vs Luxembourg	0.000	0.274	0.343	0.047
the Netherlands vs others	0.109	0.405	0.473	0.012
the Netherlands vs France	0.314	0.035	0.205	0.172
the Netherlands vs Luxembourg	0.012	0.430	0.231	0.026
others vs France	0.320	0.053	0.258	0.119
others vs Luxembourg	0.116	0.333	0.257	0.288
France vs Luxembourg	0.084	0.018	0.112	0.216

Source: own calculation.

According to the results of Cox's F-test, there were no significant differences in the survival functions of investment projects for the other country pairs. Figure 4 presents the survival curves in the Visegrad Group countries by some economic sectors in which the investment projects were located.

Figure 4 shows that, especially in the second part of the observation period in Poland, there was a fairly rapid decline in the cumulative probability of survival for FDIs placed in 'other services'. The rate of decrease of the probability was relatively low for FDIs directed into the wholesale and retail sector. The financial and insurance services sector recorded the fastest decrease in cumulative probability of survival in Czechia, whereas this probability declined slowest in trade and industrial processing, as well as in sectors other than services. The slowest decrease in cumulative probability of survival was also observed in other sectors in Slovakia and in Hungary. The cumulative probability of FDI survival, in turn, decreased at the fastest pace in both of these countries.

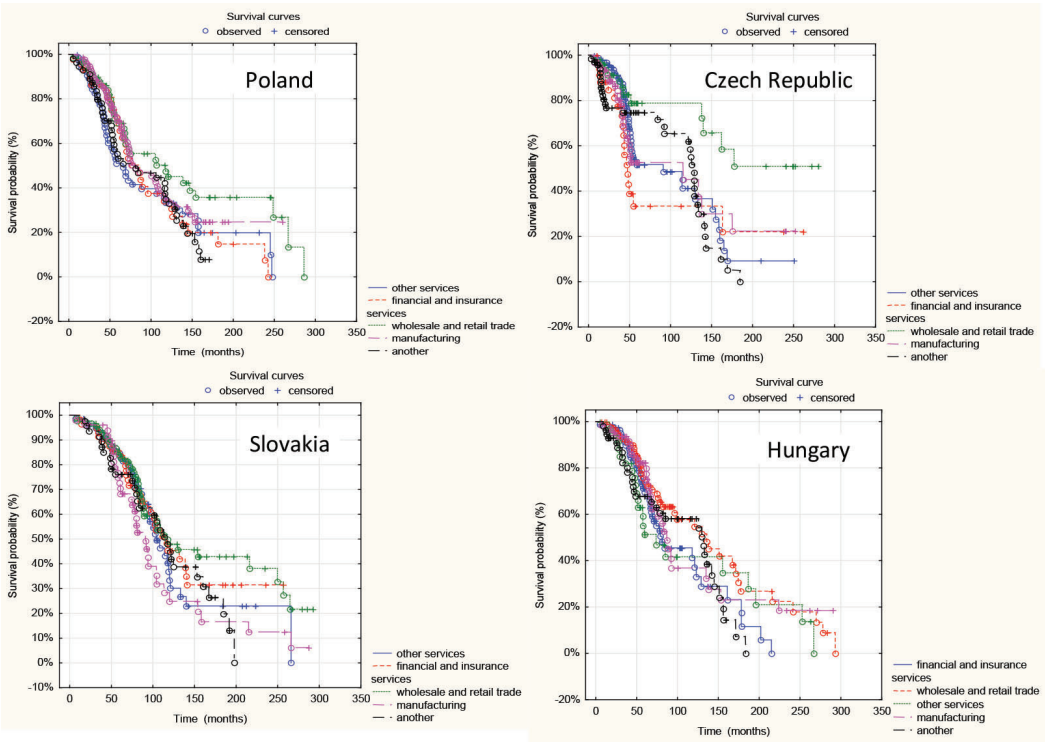

Fig. 4. FDI survival curves for some economic sectors in the Visegrad Group countries, obtained applying the Kaplan-Meier estimator

Source: own study.

In all the Visegrad Group countries, in the majority of age groups the trade sector had the highest value of median FDI survival. The countries used in the comparison had the lowest median survival in the following sectors: Poland in other services, Czechia in sectors other than services, trade and industrial processing and Slovakia in industrial processing and finance and insurance services. Table 4 shows for each pair of economic sectors the results of Cox's F-test for differences in FDI survival functions. Analysis of these curves and the results of Cox's F-test leads to the conclusion that the largest differences, at the 0.05 significance level, are found in the survival functions of FDIs located in trade and other services in the Czech Republic, Poland and Hungary. In Czechia and Slovakia, significant differences in the courses of the relevant curves were noted in trade and in sectors other than services, trade and industrial processing; in Slovakia and Hungary differences were also found in other services and industrial processing. Furthermore, in Poland, statistical differences were observed in the courses of curves that represent trade, financial and insurance services; in Slovakia it was in services and sectors other than services, trade and industrial processing. For the rest of the pairs of economic sectors, the test results did not indicate the presence of significant differences in survival functions.

Table 4

The results of the Cox's F-test (p-values) for differences in FDI survival functions, by economic sector pairs

Sectors	Poland	Czech Republic	Slovakia	Hungary
other services vs. financial and insurance services	0.159	0.254	0.262	0.126
other services vs. trade	0.003	0.014	0.466	0.028
other services vs. manufacturing	0.419	0.058	0.018	0.040
other services vs. other	0.369	0.366	0.048	0.298
financial and insurance services vs. trade	0.003	0.059	0.224	0.156
financial and insurance services vs. manufacturing	0.162	0.241	0.086	0.199
financial and insurance services vs. other	0.294	0.173	0.168	0.326
trade vs. manufacturing	0.015	0.193	0.013	0.457
trade vs. other	0.254	0.007	0.031	0.077

Source: own calculation.

The next part of the study presents the estimates for individual V4 countries in Cox's proportional hazard model. In this model, apart from the variables representing capital source country, the economic sector, GDP per capita, unemployment rate, number and age of FDI projects, were also taken into account. The use of the Cox model requires the fulfilment of assumptions such as proportional hazard (PH). The PH assumption was verified using the Schoenfeld test which uses scaled residuals

(Schoenfeld, 1982). The PH assumptions were not fulfilled as the hypothesis of independence between residuals and time could not be rejected at the 0.05 significance level. The Cox proportional hazard model made it possible to estimate the impact of the number of projects, duration of FDI, capital source country and economic sector on the continued survival of FDIs. Qualitative characteristics such as economic sector and capital source country were entered into the Cox proportional hazard model through dichotomous variables. For the characteristic 'country of origin of capital', the reference category was the Netherlands, while for the characteristic 'economic sector' such a category was 'wholesale and retail trade'. Thus, the risk of events in the other variants was calculated with reference to these categories. Most parameters in the Cox model were statistically significant at the 0.05 significance level, so it was decided to adopt such variants as the reference category for all the V4 countries. The estimates for all of the compared countries in Cox's model are listed in Table 5.

Table 5

The results of the Cox proportional hazard model for Poland, the Czech Republic, Slovakia and Hungary (reference country of origin of capital: *the Netherlands*; reference economic sector: *wholesale and retail trade*)

Variable	Effect level	Poland		Czech Republic		Slovakia		Hungary	
		Parameter	Relative hazard (HR)	Parameter	Relative hazard (HR)	Parameter	Relative hazard (HR)	Parameter	Relative hazard (HR)
GDP per capita		-0.009*	0.991	0.006	1.006	-0.008*	0.992	0.010	1.010
Unemployment rate		1.018**	2.768	0.981	2.667	1.132*	3.102	1.140	3.127
Number of FDI projects		-0.027	0.973	-0.012	0.988	-0.206	0.814	0.095*	1.100
Age of FDI project		0.032**	1.033	0.021***	1.021	0.108	1.114	0.018**	1.018
Age of FDI project^2		0.614	1.848	-0.010	0.990	0.001	1.001	0.000	1.000
Country of origin of capital	Germany	0.105***	1.111	0.072*	1.075	0.149**	1.161	-0.282**	0.754
	Other	-0.609**	0.544	-0.157	0.855	-0.085**	0.919	-0.642**	0.526
	France	-0.285	0.752	-0.431***	0.650	0.059***	1.061	-0.611*	0.543
	Luxembourg	-0.987**	0.373	-0.074***	0.929	0.217*	1.242	-0.674**	0.510
Sector	Other services	0.741**	2.098	0.231**	1.260	0.143**	1.154	0.335	1.398
	Financial and insurance services	1.101**	3.007	0.289**	1.335	-0.085	0.919	0.262***	1.300
	Manufacturing	1.156**	3.177	0.320	1.377	0.314***	1.369	0.031	1.031
	Other	1.284***	3.611	0.527***	1.694	0.147	1.158	0.518*	1.679

Note: The significance of the results at level 0.01; 0.05 and 0.1 is marked ***; **; *.

Source: own calculation.

The results in Table 5 show that the country of origin of capital generally brings less risk to foreign direct divestment in all the Visegrad Group countries than the economic sector in which the FDIs are located. In Poland, Czechia and Hungary, the greatest risk of divestment in comparison to the trade sector with Dutch investments was found for investments in sectors other than industrial processing, financial services, insurance services and other services. The divestment risk was approximately 261.1%, 69.4% and 67.9% higher, respectively, than for the reference sector. In Slovakia,, the highest divestment risk was in the manufacturing sector. The exposure of investments in that sector to divestment was approximately 36.9% higher than for the trade sector. The Cox model for countries of origin of capital, in turn, suggests that in Poland and Czechia the greatest risk of divestment came with German capital, whereas in Slovakia it was capital from Luxembourg. The odds of foreign direct divestment in these countries on these grounds was 11.1%, 7.5% and 24.2% higher, respectively, in comparison to projects financed with Dutch capital. In Hungary, the risk of foreign direct divestment, irrespective of capital source country, was lower than in the case of Dutch capital. The duration of FDI projects in Poland, Czech Republic and Hungary significantly raised the odds of divestment in each subsequent year by approximately 1.5% to 3.5%. Only in Hungary was the number of investment projects a factor that significantly increased the risk of divestment. Capital from Luxembourg provided the best chances for FDI survival in Hungary and Poland; capital from France most increased the chances of FDI survival inCzechia; and capital from other countries – in Slovakia. The risk of divestment in these countries was 37.3%, 51% 65%, and 91.9% lower, respectively, in comparison to FDIs with Dutch capital. Among all the V4 countries, only in Poland and Slovakia did the unemployment rate growth significantly increase the risk of divestment and GDP growth significantly reduces this risk.

Conclusion

Investment projects, just like demographic entities, are brought to life, exist for a certain time and are then either terminated (complete observations) or they ‘survive’ the entire observation period (censored cases). For this reason, the application of survival analysis tools in the analysis of foreign divestment seems most justified. Based on the FDI duration tables and survival functions used in this paper, it may be concluded that there are significant differences in the pace of decreasing cumulative probability of survival, and that FDI survival varies over time and by country. The values of median FDI duration in individual ‘age groups’ also suggest considerable variation between countries. It was found that in Poland the highest probability of foreign direct divestment was observed among investment projects that were approximately 13.5 to 15 years ‘old’; in the case of Czechia it was projects lasting approximately 18 to 21 years, and for Slovakia and Hungary it was projects longer than 21 years. The median FDI survival was highest in Poland (approximately 10.5

years), while the lowest value was in Czechia (9.9 years). The Cox model suggests that some features of FDI may significantly affect the likelihood of continuation of investment projects. The research also shows that in all the Visegrad Group countries, FDIs with German capital had the shortest duration, while the longest was found for the projects with French capital (in Poland, Czechia and Hungary).

Furthermore, in Poland and Czechia, the lowest chances of survival (thus the highest risk of foreign divestment) were associated with FDIs with German capital; the lowest odds of survival in Slovakia were from investments with Luxembourg capital. In the majority of the Visegrad Group countries, the highest risk of divestment in comparison to the trade sector with Dutch investments was found for projects in sectors other than manufacturing, financial and insurance services and other services.

The study shows that knowledge of FDI duration tables should improve the diagnosis of changes in the foreign capital investment process and may be useful for both potential foreign investors when creating investment plans and market analysts. With the FDI expectancy tables and estimated results of FDI survival curves, economic sectors and countries of origin of capital can be compared internationally. Based on this, the degree of risk associated with investments in a given area can be assessed. A good knowledge of both the economic sector and of the survival chances of FDI located in this sector are undoubtedly important for investors in planning the diversification of investment risk and can be a support tool in FDI management. This study should be treated as an introduction to further research and the search for factors that affect the 'survival' of FDIs; it defines the risk of investment termination within a specific time limit.

This article is a starting point for further research. The obtained results can be developed and enriched with the results of the survival analysis for other FDI characteristics, adding new categories to the set of characteristics. The presented results indicate the need for further research on the search for patterns of FDI survival. In addition, they can be useful in making decisions by investors regarding planned FDI. The research approach presented in this article can be used by investors as support in the processes of planning and managing investment projects.

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