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The survival of foreign affiliates in developed countries: a location-based analysis

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Abstract

In the context of a local economy, the attraction of foreign investment is key player, given the positive effects that arise, both directly and indirectly, within the host region. This paper assesses the impact of regional characteristics, such as an R&D-friendly economic environment and institutional quality, on the longevity of companies targeted by foreign investments. We examine the survival probability of a sample comprising over 100,000 foreign-owned manufacturing firms operating within the European Union (EU-28). A multi-level approach enables the evaluation of both firm- and location-specific features at two distinct geographical scales. Our findings indicate that government quality within national boundaries plays a pivotal role, not only in attracting foreign capital but also in promoting a long-term presence. Financial development at the national level exerts a profound influence on the survival of foreign affiliates, reducing the risk of exit by approximately 99%.

Keywords: Regional economy, Survival, Multinational Enterprises, Multilevel analysis, Local Institutions

JEL Codes: F23, C14, C41, L25

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1 Introduction

A substantial body of research has been dedicated to understanding the underlying motives driving multinational corporations' engagement in foreign direct investment (FDI) activities. Four primary drivers have emerged as key determinants of FDI location, namely the pursuit of scarce resources in the home economy, the expansion into new markets, the enhancement of production efficiency, and the acquisition of novel technological capabilities. (Dunning, 1996). In addition to these considerations, the capacity of the host economy to foster a business-friendly environment is of significant consequence for the strategic decision-making processes of multinational corporations. (Lim, 2008; Hebous et al., 2020). Furthermore, it is in the interest of the host economy to provide adequate institutions with the objective of attracting and promoting FDI. The majority of countries, irrespective of their level of economic development, engage in competition for the purpose of attracting FDI, and subsequently allocate resources in a manner that is conducive to this objective. Multinational enterprises (MNEs) have traditionally been the subject of policy attention on the grounds that they contribute to economic growth and employment by creating new jobs, making new investments and developing new technologies. (Markusen, 1984; Markusen and Venables, 1999; Javorcik, 2004; Keller and Yeaple, 2009; Poole, 2013). And the economic literature has showed that inward foreign investment has the potential to enhance the productivity of domestic firms. (Javorcik, 2004; Keller and Yeaple, 2009).

Nevertheless, the importance of attracting FDI extends beyond the immediate economic effects, as the most substantial and enduring benefits originate from the establishment of long-term relationships. In other words, the realisation of positive spillovers is a process that, in a reasonable estimation, will unfold over the long term. (Echandi et al., 2019; Potter, 2002). Consequently, the length of time a foreign investor remain in a market becomes of great importance as conditioning the full realization of FDI beneficial effects. Indeed, the FDI definitions provided by both the OECD[1] and the IMF[2] emphasize its long-term nature. Specifically, these definitions describe FDI as involving a *long-term* relationship and reflecting a *lasting interest*, highlighting the importance of sustained engagement over time. It is been highlighted that encouraging a long-term stay in a market and reinvest is equally important as attracting foreign in-

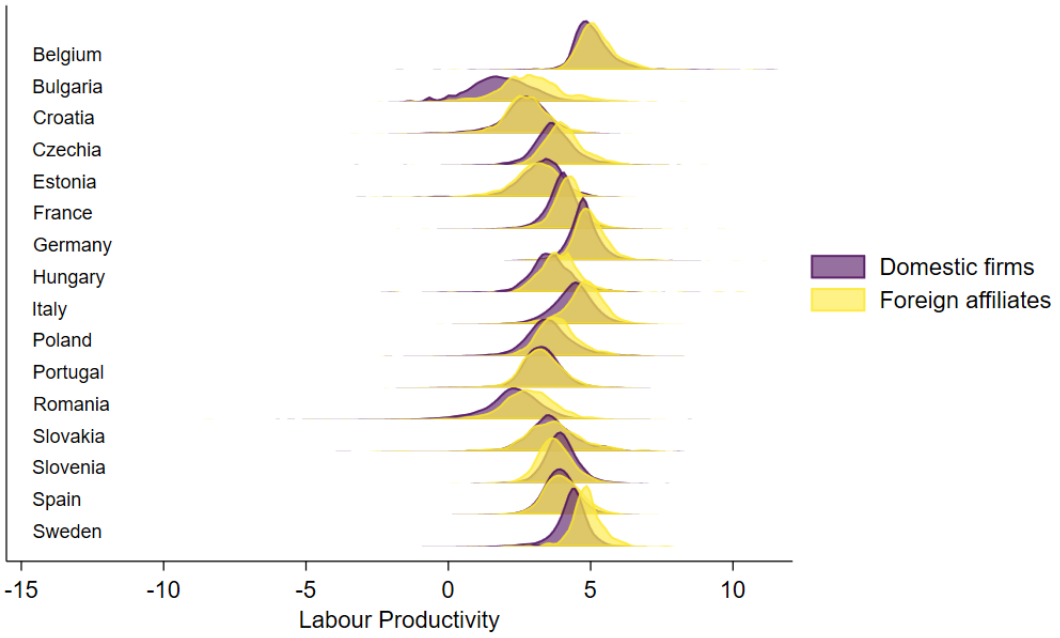
[1]OECD, Detailed Benchmark Definition of Foreign Direct Investment, third edition (OECD, 1996)
[2]International Monetary Fund, Balance of Payments Manual, fifth edition (IMF, 1993)

vestors (Echandi et al., 2019). In 2019, the World Bank issues a report focusing on how the decision of MNEs to stay or expand their FDI projects in developing countries had been affected by government conduct, and highlights that the most common reason for FDI withdrawals was the lack of transparency and predictability in dealing with public agencies, along with abrupt adverse regulatory changes.

Although previous studies have established the expectation that foreign direct investments (FDI) have a positive impact on the host economy, there is concern that dependence on foreign multinationals may pose risks, as these firms tend to be less integrated into the local economy and may be more susceptible to withdrawing their operations rapidly Bernard and Sjoholm (2003). On the other hand, amidst the debate about the impact of their presence on the host economy, it has been widely demonstrated that firms that participate in international activities, whether through exports or foreign direct investment (FDI), exhibit several key differences from purely domestic firms, including in terms of productivity, wages, and workers' skill (Mayer and Ottaviano, 2007). Indeed, in most European Union countries, as illustrated in Figure 1, multinational companies show higher productivity levels compared to domestic firms. This productivity advantage is often attributed to selection mechanisms described in the economic literature, which argue that only the most efficient and competitive firms are able to operate profitably in foreign markets. Furthermore, this selection process suggests that international engagement not only filters out less productive firms but also incentives those who participate to enhance their operational efficiencies to remain competitive globally.

We focus on the survival probability of foreign affiliates based within the European Union, analyzing those factors that potentially facilitate a long-term stay. Specifically, we assess both firm-level and "contextual" features, both at the regional and country level, on the survival of foreign affiliates. As we aim to evaluate how the geographic context a foreign affiliate is plunged into affects her survival probabilities, we identify our model of choice in a multilevel survival framework. Hierarchical models are useful to account and explicitly model the correlation between study units within the same cluster, such as foreign affiliates in countries and regions. Given the strong territorial component driving business demography (OECD, 2017), the use of a multilevel modeling approach is particularly suitable for firm survival analysis. Our analysis begins by focusing on local market characteristics at the regional level and then broadens to

Figure 1: Distribution of firm-level productivity by country



Note: For each country of the European Union, the distribution of firm-level labor productivity of foreign affiliates and domestic firms, respectively. Labor productivity is obtained as the ratio between value added and number of employees. Values reported in the graph refer to the 2005-2021 time period.

include national factors. In both cases, our aim is to include the most examined factors in the literature that explain inward FDI at the local level, and then assess their impact on the duration of foreign firms in a local market. We analyse almost two decades of important transformations for the global economy, from 2005 to 2021, and we employ Orbis longitudinal data for around 100,000 thousand firms. In the first place, we find that the quality of institutions has a significantly positive impact on the survival of foreign-owned firms in Europe. From our findings, it emerges that the relevance of government quality is manifested both directly and also through the mediation effect that coordinates other determinants of FDI, such as annual value-added growth in the region. However, within an empirical framework accounting for both between-country and within-country variability, it emerges that the factor leading to a longer duration of foreign investments in the market is the quality of institutions evaluated at the national level, rather than at the regional level. However, investments in R&D and workforce quality at the regional level negatively impact the survival of foreign sub-

sidiaries, indicating that these factors do not support long-term presence. This finding can be interpreted in several ways. In our view, it may be attributed to the fact that an environment that supports research and produces workers in scientific fields makes all firms in the market, including domestic ones, more competitive, thereby reducing the survival probability of foreign-owned companies. In contrast, we find that financial development at the national level has an outstanding impact on the survival of foreign affiliates, reducing the risk of exit by approximately 99%.

In light of previous considerations, our paper makes two contributions to the empirical literature on the impact of location characteristics on foreign multinational activity. On the one hand, the survival of overseas subsidiaries can be an important performance indicator of local economic policies. On the other hand, gaining new insights on this topic might help to foster a friendly environment for sustained foreign direct investments and pursue local economic prosperity. The remainder of the paper is organized as follows. In Section 2, we present an overview of the pertaining literature. In Section 3, we introduce data and motivating evidence. Section 4 illustrates the econometric model, and section 6 concludes.

2 Literature review

Location advantages are a fundamental pillar that influences an enterprise's propensity to engage in international production (Dunning, 1980). Four main motives have been identified for locating production abroad: seeking unavailable resources in their home economy, accessing new markets, improving production efficiency, and acquiring new technological capabilities (Dunning, 1996). To comprehend the impact of contextual factors on the foreign operations of multinational enterprises, it is crucial to examine the motivations driving a company to engage in foreign direct investment (FDI). In theoretical models for FDI, two motives are generally considered: a firm might choose horizontal FDI to save on transport costs by locating production in the destination market, providing an alternative to exports. Alternatively, vertical FDI occurs when a firm leverages comparative advantages across countries by locating different stages of production abroad, leading to intra-firm trade between the parent company and its affiliates (Brainard, 1993; Helpman et al., 2004; Bergstrand and Egger, 2007; Kleinert and Toubal, 2010).

Several studies in different fields have identified the potential factors that influence the attractiveness of a destination for FDI. Factors empirical studies have examined to assess the appeal of a country include technology levels, workforce quality, financial development (Desbordes and Wei, 2017), and institutional quality (Wei, 2000; Bénassy-Quéré et al., 2007; Daude and Stein, 2007; Dellis et al., 2017). Wei (2000) and Mutti and Grubert (2004) also explore the impact of taxation. Crescenzi et al. (2021) analyze the role of Investment Promotion Agencies (IPAs) in Europe, concluding that they are most effective at attracting FDI in underdeveloped areas prone to institutional failures and in sectors that are knowledge-intensive. Locations with poor-quality institutions are generally considered less attractive for FDI, as companies can face additional costs due to negative aspects of the institutional framework, such as corruption (Wei, 2000), and increased investment risks from uncertainties related to inefficient governance or weak enforcement of property rights. According to Costinot (2009), strong institutions and a more educated workforce are complementary sources of comparative advantage in complex industries, as high-quality institutions increase the likelihood of contract enforcement. Zhao (2006) observes that multinational R&D efforts are increasingly focused on countries with weak intellectual property rights and suggests that firms may use internal organizational structures to compensate for the shortcomings of weak external institutions.

Within our research, we are also interested in understanding the factors that influence the duration of foreign investors' presence in a region. This concept, known as **FDI retention**, refers to the ability of a host region to maintain foreign capital once it has been invested. In the economic literature, as far as we know, there is still much work to be done on the examination of FDI retention. Existing contributions in this field can be categorized into two main areas: those that investigate factors that affect the survival of foreign investors and those that analyze decisions related to divestment and expansion. Tang and Beer (2022) specifically address locational advantages to retain FDI. In particular, they investigate whether the regional innovation environment has an impact on FDI retention in China, where the latter is measured through a survival analysis conducted on foreign ventures by MNEs. They find both the regional supply of technicians and the flexibility of intellectual property to positively affect the permanence of MNEs in the local market, although the second aspect is much more relevant than the first for MNEs with high expenditure in R&D. In the international business

field, Dhanaraj and Beamish (2009) examine how the institutional environment, measured as political openness, impacts the survival of foreign subsidiaries and find that it reduces their mortality rate. Their focus on institutions stems from the investment risks associated with regulatory policies in a country. Desai et al. (2006) and Bilir et al. (2019) find that the expansion of the activities of U.S. foreign affiliates is fostered in countries where external finance is readily available and relatively cheaper. Desai et al. (2008) finds that, unlike local firms, affiliates of multinationals expand their activities after depreciation.

More in general, our work is related to the literature on firm survival analysis. Many contributions analyse how firm-level characteristics, such as size, productivity, innovation and technological level, affect firms' survival (Agarwal and Audretsch, 2001). The positive effect of size and productivity has gathered a large consensus in literature, whereas there is definitely divergence on the role of innovation activity, both empirically and theoretically, with predictions differing according to the model (Ugur and Vivarelli, 2021). Indeed, the effect of innovation depends on several other factors, such as the technological intensity of the sector and the type of innovation. Other works empirically investigate the relationship between firm survival rates and ownership structures. Giovannetti et al. (2011) find that Italian firms involved in export activities and foreign investments exhibit a higher risk to exit the market as they face a heightened competition in international markets. Ferragina et al. (2012) observe that Italian firms owned by foreign MNEs are more likely to exit than domestic ones and interpret this finding in terms of *different degree of persistence* between foreign and domestic: the global networks established by multinational enterprises (MNEs) lead to promptly adjust to adverse shocks in a host economy by relocating their production. It is worth to mention a more recent literature focusing exclusively on determinants of foreign affiliates survival and introducing bilateral covariates to account for the distance between affiliate and parent locations (Arte and Larimo, 2023). In the same line, Giovannetti et al. (2017) examine how firm characteristics influence affiliate survival, focusing on size and technological relationships. Findings show that larger affiliates of large investors have a competitive advantage and are more likely to survive. Network ties and technological gaps between affiliates and investors also impact survival probability. Bernard and Sjoholm (2003)'s study finds that, in the Indonesian manufacturing sector, foreign-owned plants are less likely to close down compared to domestically-owned plants. However, this higher survival rate is attributed to the larger size and higher productivity of foreign

plants, rather than the foreign ownership itself. When controlling for size and productivity, foreign ownership is actually linked to an increased probability of closure. The authors attribute this evidence to the fact that multinational enterprises have higher flexibility in adjusting labor on the extensive margin, i.e. through plant shutdowns. In line with this findings, Bandick (2010) observes for the swedish manufacturing sector that foreign MNE plants are more likely to close down than non-MNE plants, also when controlling for other plant-level factors affecting survival. Furthermore, foreign market presence negatively impacts the survival rate of plants owned by domestic firms that do not engage in any international activities.

3 Data

We collect a comprehensive set of firm-level, region-level (NUTS2) and country-level variables. We source firm-level information from Orbis, the commercial database compiled by the Bureau van Dijk that collects balance sheets and income statements from national public registries of worldwide countries. We focus on EU27 manufacturing firms and cover a time period of sixteen years, from 2005 to 2021.
We define foreign-owned companies according to the nationality of the Global Ultimate Owner (GUO) as reported by Orbis[3]. All EU based companies linked to a GUO incorporated in a foreign country, whether intra or extra-EU, are included in the sample, amounting to a total of almost 80,000 enterprises active at least one year over the observed time period[4].

We source the time series for sales, cost of materials, number of employees and tangible fixed assets[5], for which we report some general statistics in Table 1. We obtain labour productivity as the ratio between valued added and number of employees, and capital intensity as the ratio between tangible fixed assets and number of employees[6].

[3]Note that we are not able to tell wheather firms in the sample represent greenfield or brownfield investments, and, most importantly, we do not observe the acquisition year.

[4]Unfortunately, we do not have entry-exit data for any foreign affiliate in Ireland, which is consequently excluded from the analysis.

[5]Due to missing data among firm-level variables, some countries (Malta, Cyprus, Lithuania, Greece, and Denmark) are entirely excluded from the sample.

[6]In order to compute labour productivity and capital intensity, both value added and tangible fixed assets have been deflated using the Eurostat producer price indexes

Table 1: Financial variables statistics for foreign-owned companies, 2005-2021

Variable:	**Mean**	**SD**	**p1**	**p99**
Sales	32,050.22	426,871.20	0.00	456,990.10
Tangible Fixed Assets	6,592.20	71,827.56	0.00	105,272.00
Material Costs	21,406.75	401,641.10	0.22	287,837.00
Value Added	11,315.87	101,057.60	1.54	167,609.40
Number of Employees	101	575	0	1342

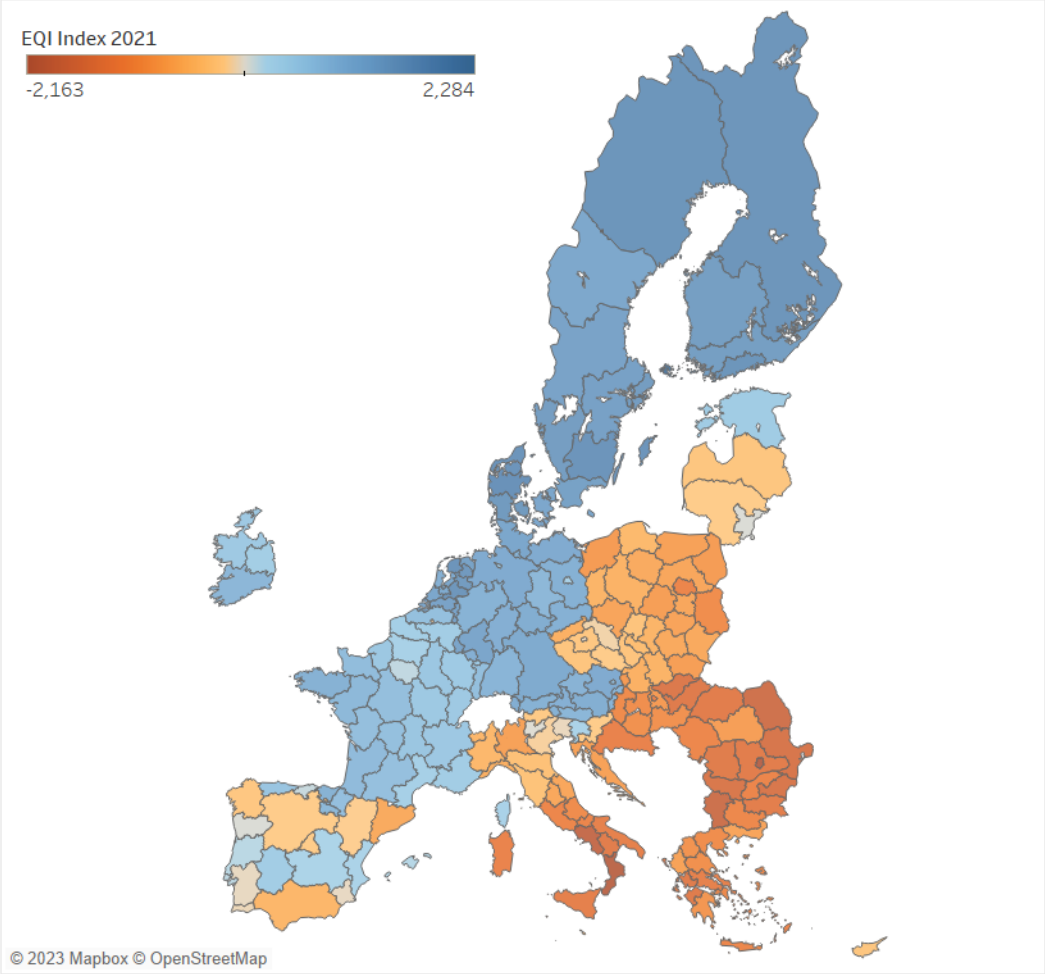
The table presents, in column order, the mean, standard deviation, as well as the 1st and 99th percentiles of the distribution of financial variables used in our analysis. All values are reported in thousands of Euros.

Orbis usefully provides information on incorporation date, firm's status and status date, which allows to identify market entry and exit and define companies' life-span in years. Our sample comprises all foreign-owned enterprises that were active for at least one year during the 2005–2021 period. This includes both newly established firms, which entered the market in 2005 or at any time during the observation period, as well as incumbent firms that entered the market prior to 2005, both of which are considered in the survival analysis. Unfortunately, our duration data suffer from severe right censoring since only 1160 firms out of the total exit the market during the observed period. To address this concern, we reproduce and confirm in the Appendix 7.1 some well-established stylized facts to ascertain the consistency of our sample.

At the NUTS2 level, we use the European Quality of Government Index (EQI) Charron et al. (2022). This index focuses on both perceptions and experiences with public sector corruption, along with the extent to which citizens believe various public sector services are impartially allocated and of good quality in the EU [7].Fig. 2 shows the most recent estimates of the EQI index. EU average is normalized to zero, whereas negative and positive values are, respectively, below and above the EU average. Red (blue) NUTS2 region report a negative (positive) value for the 2021 EQI index.

[7]The EQI index was first published in 2010, and it is issued every three years. To ensure consistency between the three-year index and the panel analysis, which features annual variability (as do all other variables in our study), EQI values are held constant for the three years preceding the measurement. For instance, the values for 2021 are also applied to the years 2019 and 2020.

Figure 2: The European Quality of Institution Index for 2021



Note: The figure shows the most recent estimates of the EQI index. EU average is normalized to zero, whereas negative and positive values are, respectively, below and above the EU average. Red (blue) NUTS2 region report a negative (positive) value for the 2021 EQI index.

In order to account for the availability of qualified labour and a favorable environment for technological development, we source from Eurostat NUTS2-level values for human resources employed in science and technology as a percentage of total labour force (HRSTO) and gross domestic expenditure on R&D in all economic sectors expressed as percentage of gross domestic product (GERD)[8]. R&D investments serve as a crucial determinant of a region's propensity to create a favorable environment for scientific

[8]In Appendix7.2 we provide some more statistics displaying the geographical distribution of NUTS2-level variables.

research. Regions with higher R&D allocations are expected to exhibit a more robust infrastructure for scientific inquiry, ultimately influencing the trajectory of technological development within those areas. We also use the annual growth rate of gross value added, which tells us whether a certain region has experienced economic growth compared to the previous year.

At the country level, we use the institutional variables developed by Kaufmann et al. (1999)[9]. They construct six indicators, each capturing a different dimension of governance, based on information collected from cross-country surveys and covering from 1996 to 2022 worldwide countries. The first two indicators, *Voice and Accountability* and *Political Stability and Lack of Violence*, describe the quality of the process of selecting and replacing authorities (for instance, the degree at which individuals can control government actions). *Government efficiency* and *Regulatory Quality* reflect the government's capacity to design and implement policies. *Rule of Law* measures perceptions about contract enforceability, as well as predictability of the judiciary, while *Control of Corruption* captures the extent to which public power is exercised for private gain. *Control of corruption* and *Rule of Law* are both highly correlated with the other indicators. This correlation might induce serious problems of multicollinearity, which we avoid by excluding these last two measures from the analysis. This choice is also driven by our particular interest in isolating the effects of political risk and legal certainty, which are the most investigated aspects when studying what leads multinational corporations to divest from a specific region. The World Bank also provides, within the World Development Indicators database, the time series of employee compensation for countries worldwide, which we usefully adopt as a measure of factor cost. We use the Financial Development Index provided by the International Monetary Fund (IMF), which ranks countries based on the efficiency, depth, and access of both financial markets and institutions. This variable is intended to capture the ease of access to external financing for firms.

[9]The database is available at http://info.worldbank.org/governance/wgi/home

4 Econometric model

In the study of firm survival, the variable of interest is the duration a company stays active in the market, measured in time units from market entry to market exit. The objective is to estimate the probability that a company surviving until period t, exits the market in period t+1, based on a sample of firm life spans. In our case, durations are expressed as the number of years between the incorporation date and the exit event, whether it is due to insolvency, corporate transactions, or any other reason. The exit event does not occur during the observation period for most companies, as the latter survive beyond the observable time window. This causes the duration variable to be right-censored at the last year of the analysis. Moreover, in our dataset, firms may enter at any point in time, either during or before the observation period.

The Cox proportional hazards model accounts for the data censoring issue described above and it is generally formulated as follows:

$$h_i(t) = h_0(t)exp(X_i\beta)$$

where $h_i(t)$ is the probability that firm i exit at time t given that it has survived in $t-1$, with $i = 1, ..., N$ and $t = 1, ..., T$. $h_0(t)$ represents the baseline hazard function, e.g. the hazard rate when all of the covariates are set to zero, X is a set of firm-level explanatory variables and β represents the set of parameters to be estimated. As we are working with panel data and our model features time-varying regressors, we allow the baseline hazard to vary by year.

Moreover, our data are hierarchically structured with firms nested within increasingly aggregated geographic units. We are interested in a survival analysis that, while assessing the impact of contextual features, accounts for the hierarchical structure of data, whereby companies can be grouped by regions at the lower level and by countries at the higher level. We accordingly apply a multilevel survival model, also referred to as random intercept model. The multilevel approach allows one to consider within the model that the data are hierarchically structured by assuming that the error in the regression is structured according to the known hierarchy. In a standard regression framework, this equals passing from this

$$y_{ij} = \alpha + \gamma x_{ij} + e_{ij} \tag{1}$$

where i observations, with $i = 1, ..., N$ are nested into $j = 1, ..., M$ groups, to this

$$y_{ij} = \alpha + \gamma x_{ij} + v_{ij} + u_j \tag{2}$$

where the error has been partitioned into two components corresponding to the levels of the hierarchy. u_j are also defined *cluster effects* and incorporate the unobserved cluster characteristics affecting the outcome of the regression and inducing correlation between the observed outcomes within the same cluster. The residual variance is consequently partitioned into within-cluster (σ_{ij}) and between-cluster (σ_j). This allows generating the correct standard errors and properly weighting the variation between and within to generate the estimated coefficients based on both σ_{ij} and σ_j. Thi method extends to settings with more than two levels in the data hierarchy.

Returning to our specific context, we employ a multilevel proportional-hazard model to allow for the estimation of both firm-specific and regional-level effects. Assuming a two-tiered nesting structure, the survival model is defined as:

$$h_{ij}(t) = h_0(t) exp(X_{ij}\beta + Z_j\delta) \tag{3}$$

where i and j refer to firms and NUTS2 areas, respectively and $h_{ij}(t)$ denotes the baseline hazard function. X_{ij} denotes the set of observable covariates at the firm-level, whereas Z_j represent a set of covariates at the NUTS2 level.

5 Results

We specify a multi-level model to evaluate the effect of *contextual* factors that potentially foster an environment conducive to attracting foreign businesses. As a start, we examine whether certain regional (NUTS2-level) characteristics help sustain the long-term presence of foreign-owned firms in the territory. In this regard, based on the existing literature on factors that enhance FDI activity (both in terms of quantity and performance), we look at the effect of high-quality institutions, a highly educated workforce, R&D investments, and the short-term economic growth. In order to account for the availability of qualified labour and a favorable environment for technological devel-

opment, we source from Eurostat NUTS2-level values for human resources employed in science and technology as a percentage of total labour force (HRSTO) and gross domestic expenditure on R&D in all economic sectors expressed as percentage of gross domestic product (GDP) (GERD).

In Table 2, we report the hazard ratios obtained from the mixed-effects Cox model, where we also control for an arrow of firm-level covariates. We have firm size measured by a time-invariant categorical directly provided by Orbis[10]. Labour productivity is calculated by dividing value added by the number of employees, while capital intensity is obtained as the ration between tangible fixed assets and number of employees. We then include the technological category of the sector in which the company operates leveraging the Eurostat classification, which divides NACE Rev.2 3-digit level sectors into High, Medium-high, Medium-low, and Low tech[11]. For comparison purposes, we show in Column (1) results from a simple Cox regression. A large variation is seen across regions starting from Column (2), amounting to 14.79 when considering the whole sample of firms, which could have biased results if left unaddressed.

As seen in each column of Table 2, firm-level controls diminish the risk of exit for foreign affiliates. Bigger and more productive firms are more likely to survive on the market, as well as capital-intensive firms. The greater advantage in terms of survival is found between high-tech firms and low-tech: firms operating in low tech industries have an exit probability more than two times bigger than firms in high-tech sectors. These results are in line with findings from the empirical literature on firm survival. Indeed, a negative relationship is systematically found between size and exit risk, most probably because larger companies are more likely to operate near the minimum efficient scale and benefit from easier access to capital markets and skilled labour (Jovanovic, 1982; Ericson and Pakes, 1995; Audretsch and Mahmood, 1995). Moreover, literature suggests lower exit rates for more productive firms (Javorcik, 2004; Hopenhayn, 1992) and firms with higher capital-labour ratios. The latter instance could be attributed to the fact that firms with elevated capital-to-labor ratios may experience a lower ratio

[10]This consists of four categories (namely *Very large companies, Large companies, Medium-sized companies, Small companies*) to which firms are assigned based on a list of criteria based on operating revenues, total assets, and number of employees.

[11]Further details on the High-tech classification of manufacturing industries can be found at https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:High-tech_classification_of_manufacturing_industries

between variable and fixed costs (Doms et al., 1995).

Table 2: Two-level Cox model - Hazard ratios

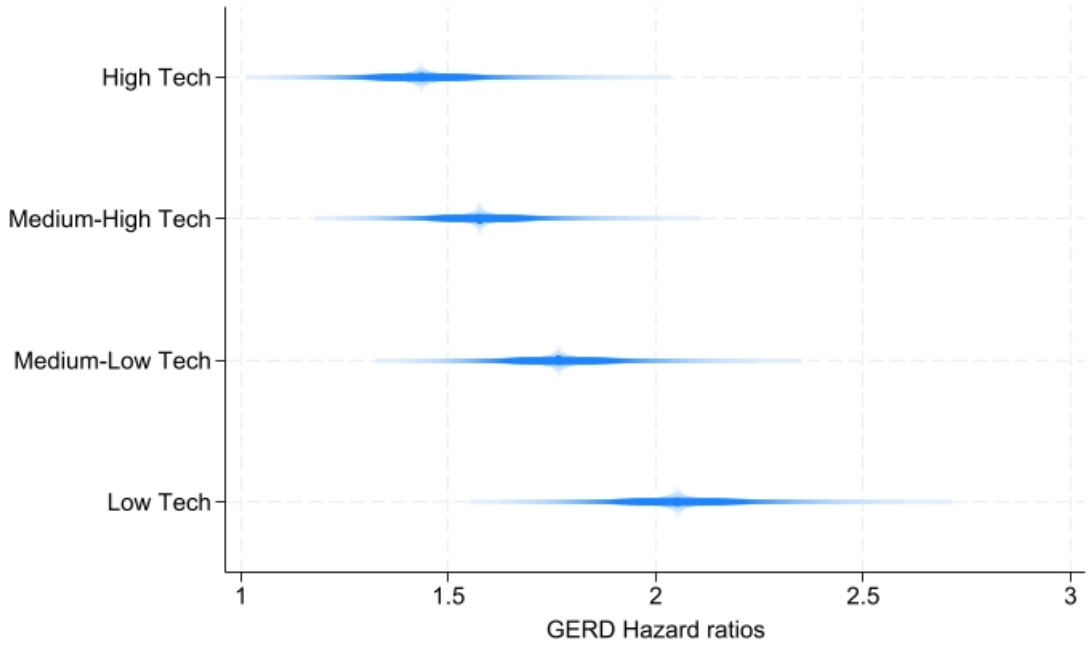
Model:	**Cox**	**Multi-level Cox**		
Sample:	All	All	High EQI	Low EQI
	(1)	(2)	(3)	(4)
Firm-level Covariates:				
Size Category	0.783***	0.662***	0.854**	0.411***
	(0.0340)	(0.0339)	(0.0537)	(0.0374)
LP_{t-1}	0.678***	0.733***	0.738***	0.740***
	(0.0137)	(0.0169)	(0.0209)	(0.0296)
Capital Intensity$_{t-1}$	0.811***	0.855***	0.825***	0.942**
	(0.0120)	(0.0131)	(0.0144)	(0.0282)
Low Tech	2.229***	2.352***	2.385***	2.052**
	(0.452)	(0.483)	(0.625)	(0.683)
Medium-low Tech	1.251	1.590**	1.572*	1.488
	(0.261)	(0.331)	(0.417)	(0.502)
Medium-high Tech	1.093	1.210	1.178	1.244
	(0.232)	(0.258)	(0.318)	(0.432)
NUTS2-level Covariates:				
GVA Growth	0.941***	0.966***	0.957***	0.978*
	(0.00583)	(0.00699)	(0.00886)	(0.0114)
GERD	1.249***	1.810***	1.745***	2.164***
	(0.0589)	(0.196)	(0.223)	(0.542)
HRSTO	1.031***	1.109***	1.113***	1.087***
	(0.00487)	(0.00853)	(0.00967)	(0.0215)
EQI	0.881**	0.564***		
	(0.0442)	(0.0910)		
Variance of the frailty term				
NUTS2-level		14.79***	42.70***	4.702***
		(6.823)	(36.80)	(2.053)
Observations	737,520	737,520	421,903	315,617
Number of groups	No	207	124	83

Note: Standard errors are reported in parentheses (*** p<0.01, ** p<0.05, * p<0.1). Firm-level variables are in log-levels. LP_{t-1} stands for the first lag of firm-level labour productivity. *Size category* is measured by a time-invariant categorical dividing firms into *Very large companies, Large companies, Medium-sized companies* or *Small companies*. The technological category of the sector in which the company operates is included with *High tech* firms being the omitted category. *GVA Growth* stands for the annual percentual variation of gross value added in the region. *EQI* stands for European Quality of Government Index. *GERD* stands for gross domestic expenditure on R&D in all economic sectors expressed as percentage of gross domestic product.

We now focus on the effect of regional characteristics. In column (2) we estimate the effect of NUTS2-level characteristics based on our full sample of foreign affiliates. The hazard ratio for the yearly growth rate of gross value added is lower than one, indicating that foreign-owned companies have a higher probability of surviving in a market that experienced economic growth with respect to the previous year. The same is observed

for the quality of government index, which plays a prominent role. Indeed, a one-unit rise in the EQI index leads to a decrease in the exit risk of 0.564 times. Foreign affiliates stay longer in regions with a higher quality of institutions. We find, however, that both expenditures on R&D and the share of human resources absorbed by highly technological sectors increase the risk of exit from the market for foreign affiliates. A possible explanation for this is that in regions where larger resources are allocated to research activities and high-tech sectors are larger, there is a heightened level of competition. In other words, domestic companies are more competitive. Another factor that could help explain why investments in research do not represent a positive element for long-term presence might stem from an intrinsic problem with European investments in R&D. Indeed, not all R&D investments have the same potential to lead to strategic innovations, which are crucial for attracting and retaining foreign capital. A recent report from the European Policy Analysis Group (Fuest et al., 2024) strongly questions the quality of European efforts to promote innovation, drawing a comparison with the American model. First, R&D spending appears to be concentrated in the wrong sectors, namely mid-tech industries, rather than high-tech sectors, where investment has the potential to achieve a strategic advantage. It is also highlighted that while public sector R&D spending is currently at the same level as a key competitor like the USA, private sector spending is around the half of the American benchmark. Public spending from European programs is also considered problematic, as only a marginal share is allocated to breakthrough innovation. Instead, priority is given to projects with immediate commercial applications, often at the expense of their potential to drive disruptive innovation. Consequently, the focus remains largely on incremental improvements to existing technologies, rather than on industries with greater potential for radical innovation.

Figure 3: The effect of R&D investments according to technological classification of sectors



Note: The figure shows the hazard ratios of the GERD variable estimated using the specification reported in column 2 of Table 2. In the same model, an interaction between the GERD variable and a categorical variable indicating the technological classification of the sector to which the firm belongs is introduced.

Using the same specification as in column 2 of Table 2, we assess whether the effect of the GERD variable varies according to the technological classification of the sector to which the firm belongs. To do this, we introduce an interaction between the GERD variable and a categorical variable indicating whether the firm operates in a high tech, medium-high tech, medium-low tech or low tech sector. The hazard ratios of GERD by technological sector are shown in Figure 3.

Regional governance is an important factor that deserves further investigations. In particular, we are interested in how the behaviour of other variables is conditioned by deficient institutions. We thus proceed splitting the sample into two set of NUTS2 areas defined according to the EQI index. This also allows gathering some additional insights into the duality observed in Figure 2 between regions with good and bad institutions. Column (3) and (4) report the same specification run on the subsample of firms located in NUTS2 areas lying above and below the median value, respectively. By comparing

the two columns, we note that firm size has a greater relevance in preventing the risk of exit in regions with a low quality of institutions. Another interesting element is that the positive effect of the growth rate of regional value added is less significant. Note that *GVA Growth* is the only other regional variable, besides *EQI*, that has a positive effect on survival, albeit slightly below unity and, therefore, mild. Thus, the only regional variable that helps increasing foreign affiliates longevity loses significance in poor governance NUTS2 areas. This might imply the positive effect to unfold fully when coupled with an efficient institutional framework, thereby reinforcing the argument that quality of institutions plays a leading role on survival.

So far, we ignored the variability in firms' behavior across countries. While we find variance between NUTS2 areas to most certainly play a role in the survival model in Tab. 2, it is important to recognize that, in specific aspects, regions within the same country demonstrate a certain level of homogeneity. We address this by adding a higher hierarchical level in the multilevel analysis to assess the distinct roles of regional and national geographic components. This allows to evaluate the heterogeneity in survival estimates across national economies and across regions within countries. In column (1) of Table 3, we run the baseline model considering firms to be nested into NUTS2 and NUTS2 to be nested into countries. In this case EQI is not significant. This might imply that the effect of institutional quality on survival needs to be evaluated at a more aggregated geographical scale. We thus proceed by introducing the country-level Governance Indicators (GI) created by Kaufmann et al. (1999). The latter provide a set of measures capturing different factors concurring to national institutions quality. In particular, we employ GIs to disentangle the effects on survival of political stability, regulatory quality, government efficiency and accountability.

Table 3: Three-level Cox model

Model:	(1)	(2)
NUTS2-level Covariates:		
GVA growth	0.959***	0.961***
	(0.00697)	(0.00736)
GERD	1.228***	1.138*
	(0.0920)	(0.0770)
HRSTO	1.108***	1.093***
	(0.00766)	(0.0100)
EQI	0.809	
	(0.156)	
Country-level Indicators:		
Stability		0.972***
		(0.00566)
Regulatory Quality		0.960***
		(0.0128)
Government efficiency		1.078***
		(0.0123)
Accountability		0.963***
		(0.0124)
Financial Development		0.010***
		(0.00917)
Compensation of employees (logs)		1.054***
		(0.0179)
Variance of the frailty term:		
Country-level	5.776***	12.35***
	(3.762)	(11.57)
NUTS2-level	1.407***	1.257***
	(0.134)	(0.0927)
Observations	737,520	737,608
Number of groups	21	21
Firm-level controls	YES	YES

Note: Standard errors are reported in parentheses (*** p<0.01, ** p<0.05, * p<0.1). All the WorldBank Governance Indicators (GIs) (namely *Stability*, *Regulatory Quality*, *Government efficiency* and *Accountability*) are expressed as percentile ranks. Larger values of GIs indicate better institutions. Financial development is measured using the Financial Development Index, which ranks countries globally and is normalized between 0 and 1. Compensation of employees is provided by the World Bank in local currency units (in our case in Euros).

We also include two important national-level controls: the compensation of employees, to evaluate the impact of labor costs on survival, and the IMF's financial development index. Previous research has demonstrated that greater financial development in the host country positively impacts both the intensive and extensive margins of inbound FDI. This occurs because companies may source part of the external financing for their FDI activities locally, making them more likely to choose investment locations with favorable financing conditions (Desai et al., 2004; Harrison et al., 2004). We might

expect that the positive impact of easy access to local external financing would also extend to the duration of the foreign-owned company's presence in the host market. The results of the three-level model, which includes national-level variables, are presented in the second column of Table 3. All four national governance indicators are statistically significant: three of them reduce the risk of market exit, while government efficiency has the opposite effect, increasing the risk of exit. In countries with higher employee compensation, the survival probability of foreign-owned firms is lower. National level of financial development turns out to have an outstanding positive impact on survival, playing a crucial role in reducing the risk of exit. The hazard ratio is observed to be 0.010, indicating that a one-unit increase in the financial development index leads to an approximate 99% reduction in the risk of market exit $(1 - 0.010)$.

6 Conclusions

In this work, we aimed to gather insights into the characteristics of local economies that promote a longer stay on the market for foreign-owned businesses. We employ a multilevel survival model that simultaneously assesses the impact of regional and national contextual features. This allows us to pinpoint the geographical scale at which the effects of certain characteristics unfold. Some contextual factors may be crucial to survival but might not emerge when examined at either too granular or at too aggregated a level. Indeed, this holds for the quality of institutions, a pivotal element for extending market presence that is significant primarily at the country-level. Conversely, we find that the effects of local GVA growth and of the propensity to innovation activities can be adequately evaluated at the regional level. Our analysis reveals opposite signs for these two variables. Specifically, in a local economy where innovation is encouraged, foreign-owned enterprises have a lower survival rate. This is likely due to more innovative environments also being much more competitive.

Above all, we find that government quality inside national boundaries plays a leading role, not only in attracting foreign capital, but also in promoting a long-term presence. Foreign-owned enterprises have a longer lifespan in locations where institutions function well and are stable. Venturing an interpretation, when multinational corporations evaluate long-term foreign investments, they hinge their decisions on how reliable is a central government. Therefore, when a region performs exceptionally well compared to

others within the same country, it does not influence long-term strategic decisions.

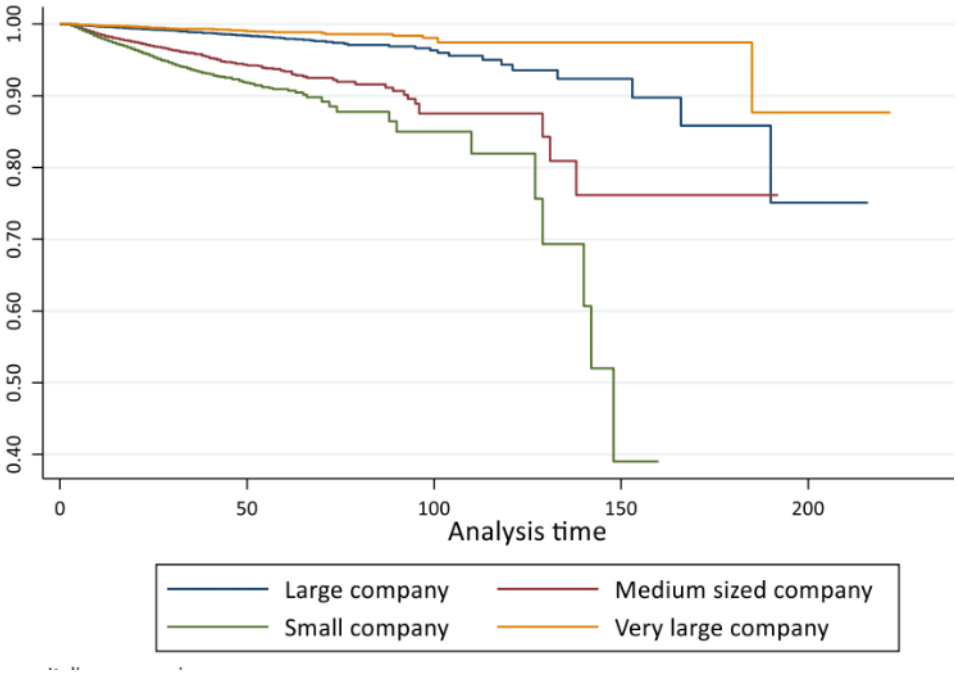
7 Appendix

7.1 Data Validation

As outlined in the data Section, the Orbis sample has a limitation: the proportion of firms exiting the market is significantly lower compared to those that remain active. This is further emphasized by our sample selection process. Unlike most survival studies, which typically track a cohort of firms entering the market in a specific year, we also include firms that entered in prior years (incumbents) and those entering in subsequent years. This approach increases the number of active firms in the sample. To show that our survival estimates remain consistent despite this limitation, we provide some descriptive evidence to test our sample's ability to reproduce well-established stylized facts from the firm survival literature.

Figures 4 and 5 display the Kaplan-Meier survival curves for foreign-owned companies, grouped by size class and technological category, respectively. The Kaplan-Meier method is a non-parametric approach used to estimate and visualize survival functions, which take the form of a declining step function, reflecting the decreasing probability of a firm's survival as its time in the market increases.

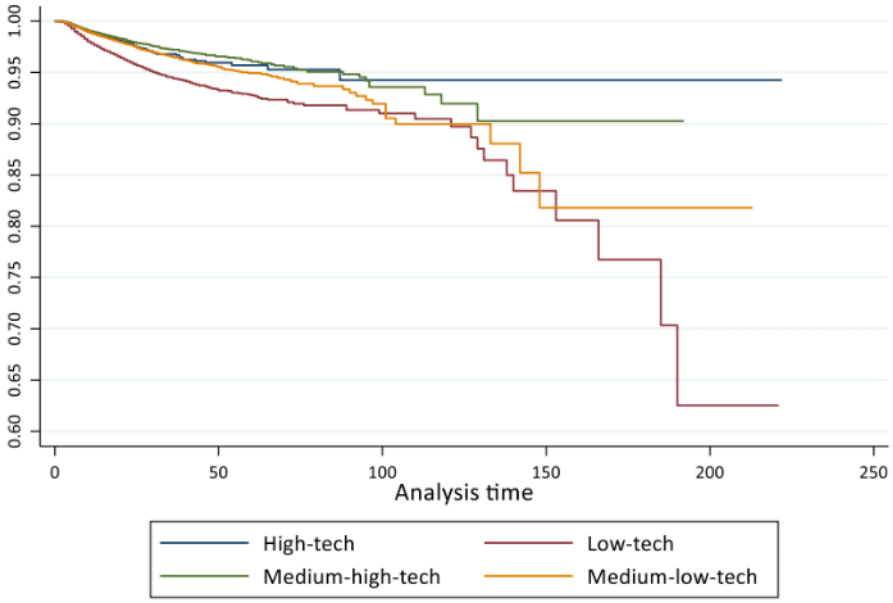
Figure 4: Non-parametric survival estimates by size category



Note: Figure shows the Kaplan-Meier survival curves for foreign-owned firms active between 2005 and 2021, categorized by size class. The horizontal axis represents time measured in years, while the vertical axis shows the probability of surviving up to a specific point in time, conditional on having survived in the previous periods.

In both graphs, the curves are positioned one above the other. Those lying in the higher (lower) areas of the graph indicate higher (lower) conditional survival probabilities for each given value of years spent in the market. In our sample, larger firms and firms operating in high-tech sectors show a higher probability of survival compared to others. The ranking of categories derived from our survival function estimates is fully consistent with the findings in the existing literature on the topic.

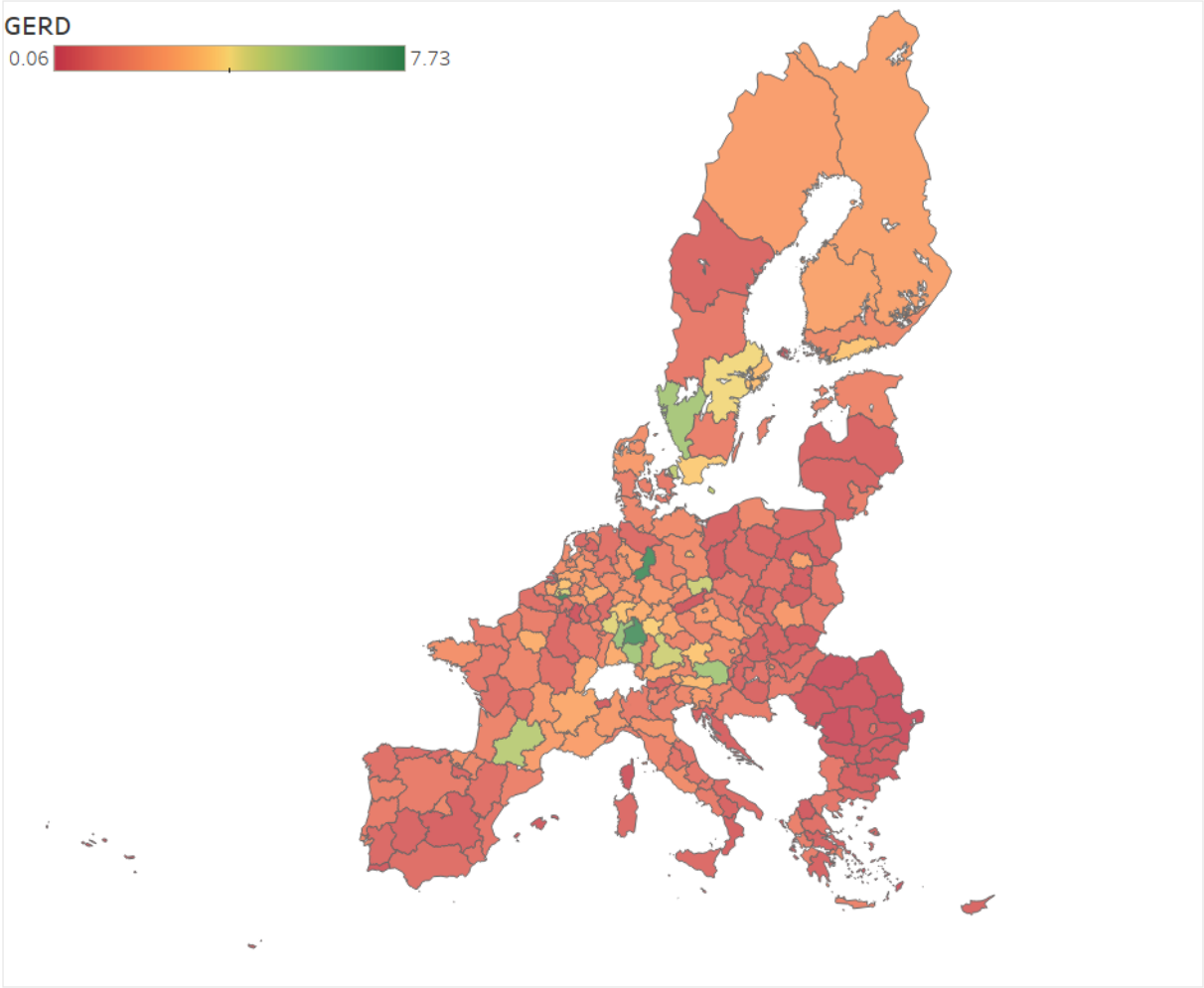
Figure 5: Non-parametric survival estimates by technology



Note: Figure shows the Kaplan-Meier survival curves for foreign-owned firms active between 2005 and 2021, categorized by the technological category they belong to. The horizontal axis represents time measured in years, while the vertical axis shows the probability of surviving up to a specific point in time, conditional on having survived in the previous periods.

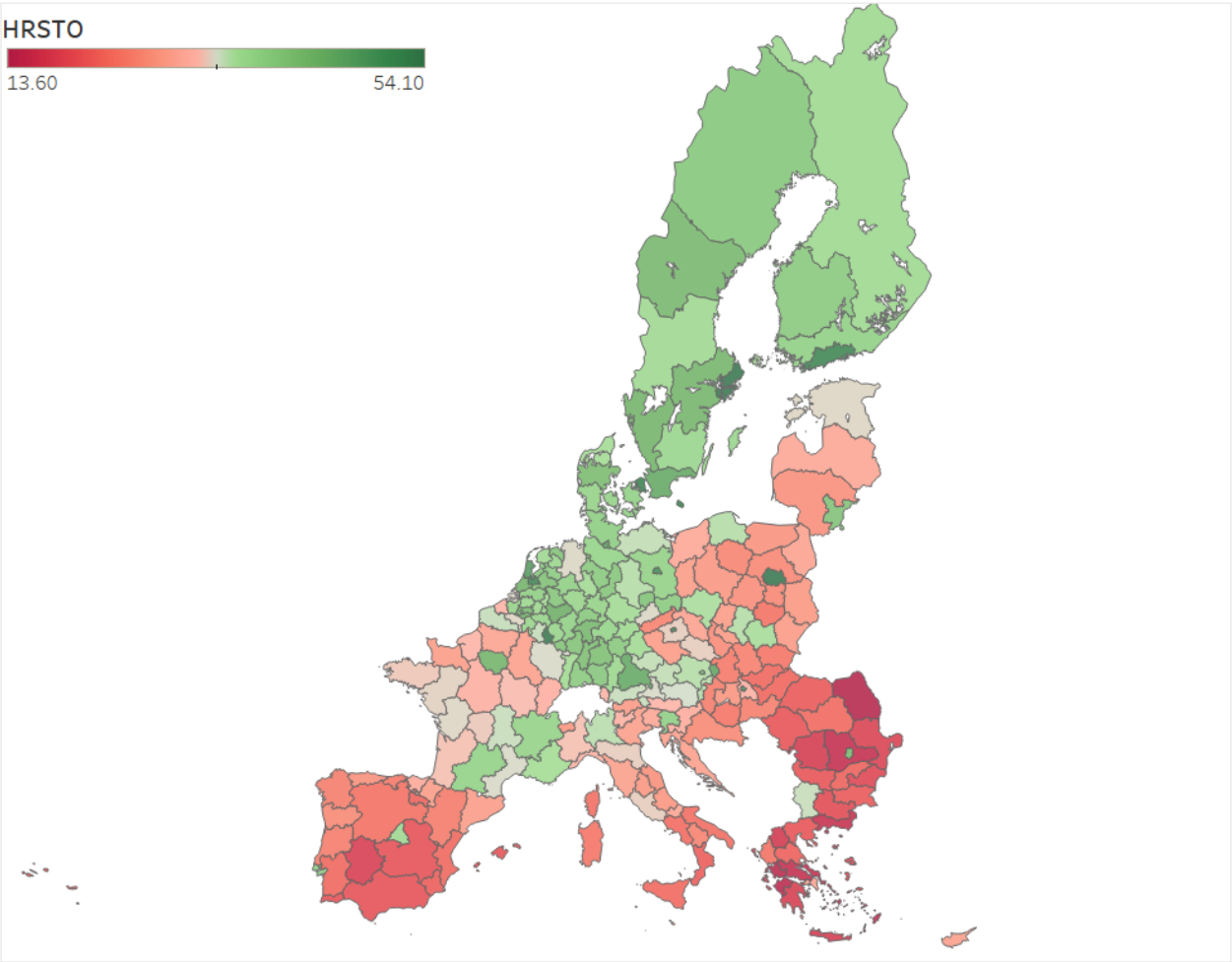
7.2 Statistics

Figure 6: Gross domestic expenditure on R&D, 2019



Note: The map displays the gross domestic expenditure on R&D (GERD) across NUTS2 regions for the year 2019. GERD is expressed as a percentage of domestic GDP, with the lowest value of 0.06% observed in Ciudad de Ceuta, Spain, and the highest at 7.73% in the Arrondissement of Nivelles, Belgium.

Figure 7: Human resources employed in science and technology, 2019



Note: The map shows the percentage of the labor force employed in science and technology across NUTS2 regions in 2019. The lowest value, 13.60%, is recorded in Nord-Est, Macroregiunea Doi, Romania, while the highest, 54.10%, is observed in Stockholm.

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