

Business Survival in Portuguese Regions¹

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Abstract: This work addresses the post-entry performance of employer enterprises for seven regions in Portugal, at the NUT II level, by investigating the structural characteristics of survival, using non-parametric and semi-parametric methods, during the period 1985 to 2007. The last decades of the 20th century were characterized by a period of creative destruction in Portugal. In particular, regions such as Norte, Algarve and Madeira show the highest growth rates in enterprise births, deaths and firm churn. After 2000, firms' births and deaths are relatively less turbulent. In the non-parametric analysis, we identify statistically significant disparities among regions. Norte has the lowest survival rate and Centro holds the longest surviving firms. The survival gap between these two regions widens over time. Concerning the semi-parametric analysis, firm's current size dimension is a strong determinant for the probability of survival, particularly in the Norte and Açores. In industries characterized by high entry rates at the moment of a firm's birth, post-entry survival becomes harder, especially in the south and in the Portuguese archipelagos, the regions with the lowest number of active employer enterprises. A higher entry rate combined with fast growth rates for any given industry also generates a shorter duration of firms. Manufacturing is the sector where more firms are more likely to abandon the market, particularly in Madeira and Norte. But it is turbulence, given by the sum of firms' entry and exit rates that exhibits the most significant effect on survival. For every region, except for the Açores, where there is no statistical significance, those that have the highest record of firm turbulence, also display the lowest business survival probabilities. Turbulence decreases severely the survival probabilities of firms located in Madeira and Norte and to a lesser extent in the Algarve.

1. Introduction

Regional development has been a source of interest among academics and policymakers, especially in the context of endogenous growth theories and the new economic geography framework. Regional growth theory has become over the years an important branch of modern economic growth analysis. The knowledge society has brought about features such as innovation and creativity as the basis of regional dynamics and competitiveness. Business performance and the renewal of enterprises, which have been considered as engines of regional innovation, employment creation and growth, have thus aroused great interest.

The phenomena of enterprise birth, growth, contraction and death has become an important field of research in the so-called firm demographics (Bartelsman et al., 2005a and 2005b; Caves, 1998; Colantone and Sleuwaegen, 2008; Geroski, 1995; Masso et al., 2004; Robinson et al., 2006; Sharpe and Currie, 2008). The demography of firms approach is already a rather well established field of study for economic geographers and regional economists (Van Dijk and Pellenburg, 1999; Pellenburg and van Steen, 2003; Baptista et al., 2008; Baptista and Carias, 2007). It has developed into a research field that has close links to industrial organisation and organisational ecology but also to the evolutionary approach of spatial-economic development (Nelson and Winter 1982; Hannan and Freeman 1989; Boschma and Frenken, 2002 and 2006).

This study addresses the post-entry performance of new Portuguese firms by investigating the regional structural characteristics of the hazard and survival functions, by applying non-parametric and semi-parametric survival analysis to the active employer enterprises of Quadros de Pessoal (Employment Administrative Records). It has been subject to the application of the entrepreneurship definitions and

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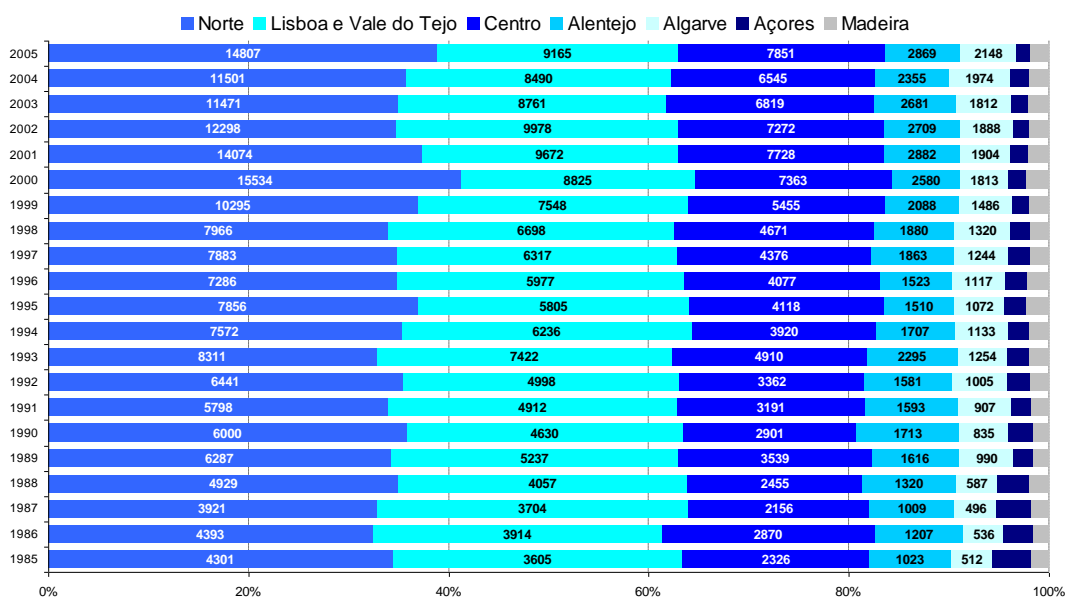
methodology of the “Manual on Business Demography Statistics” (Eurostat/OCDE, 2007), from where a specific entrepreneurship database was derived. This database consists of an annual average of 215.903 active employer enterprises over the period 1985 to 2007, with an annual average of 36.803 births and 23.743 deaths.

The paper is structured as follows. The next section provides an overview of business dynamics at the regional level. Section three presents the non-parametric survival analysis while section four proceeds with complementary semi-parametric survival methods. Finally, the last section concludes.

2. Regional Business Characteristics and Dynamics

As the creation of enterprises is considered a primary indicator of the level of entrepreneurship at the regional level, its closing can also be considered a primary indicator of local firms’ survival abilities. In Portugal, the regional distribution of deaths is relatively uneven across the seven NUT II regions (Figures 1 and 2). Norte is the region where more enterprise deaths occur (39% of total enterprises died in 2005 and 34% in 1985), a higher proportion than the region’s share of total active enterprises.

Figure 1. Deaths of active employer enterprises by NUT II regions



Source: Own calculations based on Quadros de Pessoal, GEP, MTSS.

The last 25 years of the 20th century may be seen as a period of creative destruction, where the development of information and communication technologies and globalisation shaped the behaviour of firms. Carree et al. (2002) argue that at least in modern economies, the secular trend of decreasing business ownership rate and its rise during this period is an indication of development changes in the level of entrepreneurship. After the 1970s, industries such as textiles, machinery and automobiles have lost comparative advantage and have been confronted by a rise of new ventures in service and knowledge-intensive sectors.

But globalisation is bringing an increasing level of risk, tougher competitive pressure and increasing barriers to entry the market for potential entrepreneurs (Colantone and Sleuwaegen, 2008). These phenomena might have had a considerable impact in Portugal, particularly from the start of the new century, causing a smoothing of the rhythm of enterprise creation and bringing tougher survival for incumbent firms. Death rates are highly correlated with birth rates and have thus accompanied this trend (Sarmiento and Nunes, 2010b).

Table 1 sheds additional light onto the rhythm of growth of enterprises, its births and deaths, which has been clearly slowing down since the 2000 “peak”. Most NUT II regions follow the country’s general trend of decreasing birth and death rates (Sarmiento and Nunes, 2010b). The Algarve is the only region that

manages to dispute this tendency and maintain a positive annual growth rate of enterprise births after 2000 (1.0%), as it also has the highest growth in active enterprises throughout the whole period. On the other hand, it also shows the highest annual average growth in enterprise closures (3.4%).

Norte has the greatest proportion of active firms in the country and the second greatest increase in active employer enterprises in the country between 2000 and 2007 (Table 1). It is also in the north of the country where the greatest share of business entries and closures occurred between 1985 and 2007, causing this region to exhibit a high level and turbulence (Table 2 and Figure 2) and volatility. Despite having the greatest share of active enterprises and the greatest amount of small enterprises in the country, the weight of small and medium firms is the highest in Algarve (mainly due to services and construction firms from 2000) and Alentejo (mainly in services, agriculture and fishing sectors) (Sarmiento and Nunes, 2010b).

Table 1. Annual average growth rate of employer enterprises, births and deaths by NUT II

NUTII Regions	Active employer enterprises			Births		Deaths	
	1985-2007	1995-2000	2000-2007	1987-2007	2000-2007	1985-2005	2000-2005
Norte	6.2	7.1	4.4	4.3	-1.5	6.4	-1.0
Algarve	9.2	7.9	6.7	6.2	1.0	7.4	3.4
Centro	6.6	8.6	4.0	4.6	-5.3	6.3	1.3
Lisboa e Vale do Tejo	4.5	5.1	3.4	4.3	-1.1	4.8	0.8
Alentejo	5.8	8.3	3.1	3.1	-4.2	5.3	2.1
Açores	3.7	3.9	3.1	1.1	-1.0	0.4	-4.9
Madeira	6.4	7.1	4.4	4.9	-1.1	6.3	-3.3
Portugal	5.8	6.9	4.1	4.3	-2.3	5.7	0.2

Source: Own calculations based on Quadros de Pessoal GEP, MTSS.

From 1985 to 2005, Algarve (32.5%), Alentejo and Norte (29.9%) are the regions with the greatest amount of births and deaths in the country. In the second sub-period, from 2001, Norte and Algarve (29.4%) maintain high levels of business turbulence, though below the previous period turbulence rates (1987-2000).

Table 2. Average churn rates of Portuguese NUT II regions

	1987-2005	1987-2000	2001-2005
Norte	29,9%	30,1%	29,4%
Algarve	32,5%	34,7%	29,4%
Centro	27,3%	28,8%	25,1%
Lisboa	26,8%	27,1%	26,2%
Alentejo	29,9%	31,8%	26,6%
Açores	27,1%	28,0%	25,5%
Madeira	28,6%	29,4%	27,3%
Portugal	28,5%	29,3%	27,3%

Source: Own calculations based on Quadros de Pessoal, GEP, MTSS.

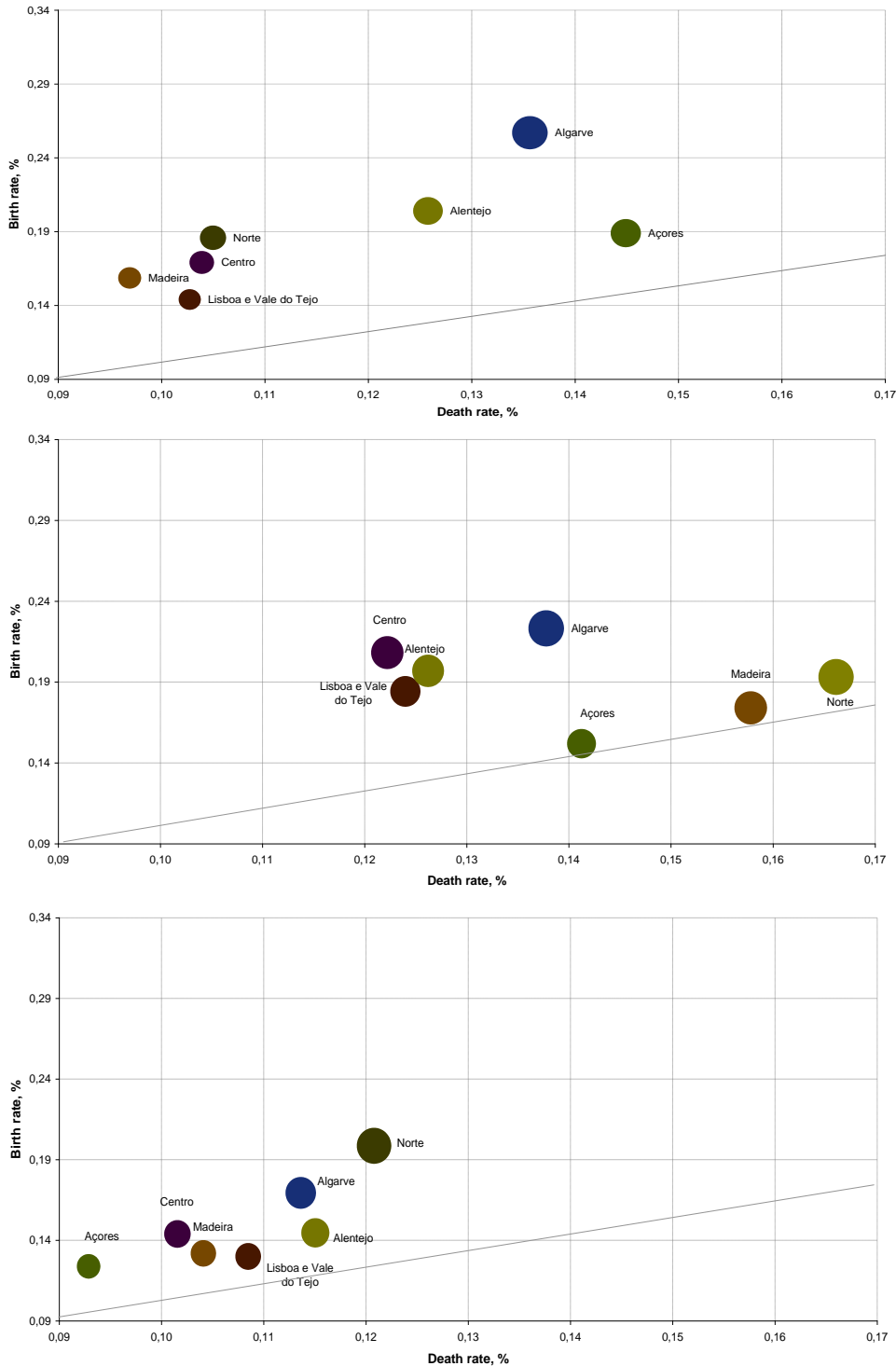
In Figure 2, birth, death and churn rates for each NUT II region are portrayed for three selected years, the first for which we are able to calculate both death and birth rates (1987), one of the most significant “peak” year in terms of turbulence (2000) and the most recent year for which we are also able to compute births and deaths (2005). In the years following 2000, Portuguese regions have been moving towards the first quadrant, to the bottom left side, closer to the dividing 45° degree line.

The first three quarters of the 20th century are often characterized as a period of declining small firm presence in most industries (Carree et al., 2002). But in more recent decades, this has stabilized or has even been reversed, with the revival of small businesses in many industries of the industrialized world (Eurostat, 2009; OECD/Eurostat, 2009; Bartelsman et al., 2005a; Cabral, 2007; Núñez, 2004; Thurik, 1999; Storey, 1994; Acs, 1996; Acs and Audretsch, 1993; Loveman and Sengenberger 1991). After the 1970s, older and larger enterprises especially located in manufacturing sectors have lost ground to new smaller, more entrepreneurial and innovative counterparts. The increasing weight of services in most developed economies, which are characterized by smaller average sizes, contributed sharply to the decreasing average size of firms. In Portugal, the growing importance of services cannot be overlooked (Sarmiento and Nunes, 2010b), influencing the already small sized entrepreneurial fabric and the creation

of new enterprises. Over a period of more than 20 years, Sarmento and Nunes (2010a) find an overall decreasing average size for employer enterprises in Portugal, which is extended to all broad sectors, NUT II regions, entrants and exiters in the market.

By combining the geographical with the size class dimension, Sarmento and Nunes (2010b) observe the predominance of small firms births in most regions, in particular in Algarve (above 98,1% of enterprises are born with fewer than 20 employees throughout the period), Alentejo (97.7%), Centro (97.2%) and the Açores. Over the period, Norte is the region where relatively fewer firms are born with less than 20 employees.

Figure 2. Birth, death and churn rates in 1987, 2000 and 2005 respectively



Source: Own calculations based on Quadros de Pessoal, GEP, MTSS.

Moreover, the average firm size of entrants, which is considered to influence growth and survival has been decreasing throughout the country's regions, except for size class of 20-49 employees. Lisbon has the biggest sized enterprises in the country in the size class of over 250 employees, although average firm size has been decreasing considerably in recent years (1.645 employees on average in 1989, 2.628 in 2000 and 624 in 2007), followed by Centro and Norte.

In higher birth rate years in Portugal, we observe an overall increase in firm dimension, with some heterogeneity throughout the Portuguese regions, in particular during the "peak" years of enterprise creation of 2000 to 2002. The year of 1994, also characterised by a sharp increase in birth rates, shows a more homogenous regional impact on average enterprises' size (except for Centro and the Açores), compared to the "peak" of 2000 to 2002, which had a more localised impact in respect to firm size increase in Lisbon, Açores and Madeira.

3. Non-Parametric Survival Analysis

We shall make use of survival functions¹, which show the probability of survival, considering that the firm has been active during a certain period and hazard functions, which portray the probability of "death" throughout a given period of time.

In Portugal, during the period from 1987 to 2005, approximately 86% of all the employer enterprise births remain active after one year of activity, 75% after two years and 46% after seven years. After 18 years of activity, only 22% of employer enterprise start-ups were still alive or equivalently, almost 78% had already exited the market.

Table 3 presents the results for the non-parametric estimation, for each of the seven Portuguese NUTII regions. This framework explores the relationship between age and the regional hazard of exit.

Table 3. Survival table for employer enterprise births by NUTII region, 1987-2005

Years	Norte	Centro	Lisboa e Vale do Tejo	Alentejo	Algarve	Açores	Madeira
1	85.6%	87.4%	85.5%	85.8%	85.6%	85.1%	86.1%
2	75.1%	77.7%	75.1%	75.5%	75.5%	74.2%	76.0%
3	66.5%	70.1%	67.0%	67.0%	67.7%	67.0%	68.3%
4	59.8%	64.0%	60.5%	60.4%	61.2%	59.9%	61.3%
5	54.1%	58.9%	55.0%	54.9%	55.8%	54.5%	56.2%
6	49.4%	54.5%	50.4%	50.7%	51.1%	50.5%	51.6%
7	45.3%	50.7%	46.6%	46.9%	47.2%	46.7%	47.5%
8	41.7%	47.5%	43.2%	43.4%	44.2%	43.7%	44.6%
9	38.7%	44.5%	40.2%	40.5%	41.1%	41.2%	41.7%
10	35.8%	41.9%	37.6%	37.7%	38.5%	38.9%	38.6%
11	33.0%	39.5%	35.1%	35.2%	36.2%	36.3%	36.6%
12	30.5%	37.4%	32.8%	33.0%	34.0%	33.9%	34.3%
13	28.1%	35.3%	30.8%	31.0%	32.0%	31.3%	31.7%
14	26.4%	33.4%	29.0%	29.3%	30.2%	29.4%	29.9%
15	24.8%	31.8%	27.4%	27.8%	29.0%	28.2%	28.2%
16	23.2%	30.4%	26.1%	26.2%	27.8%	26.4%	26.9%
17	21.9%	28.9%	24.6%	24.9%	25.4%	25.4%	26.6%
18	20.7%	27.4%	22.9%	23.2%	23.9%	23.8%	25.4%

Source: Own calculations based on Quadros de Pessoal, GEP, MTSS.

Over 85% of newly born employer enterprises remain active during their first year of activity in all regions. The one-year survival rate varies from a low of 85% in the Açores to a high of 87.5% in the Centro region, meaning that the new born enterprises died relatively more prematurely in Açores archipelago than in other Portuguese regions.

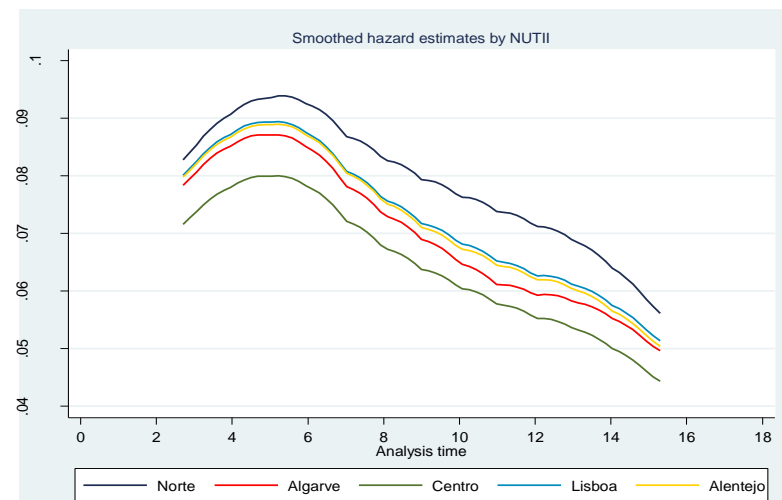
¹ The methodology used in this section is described in greater detail in Nunes and Sarmiento (2010b).

After three years, Norte presents the lowest survival rate, which is maintained throughout the period, while Centro has the best survival performance. In fact, Centro has a higher survival rate than the economy's average, it is where firms manage to survive longer during the period considered. After 6 years of firm activity, Norte is the only region with less than 50% of survival probability, lagging behind all other regions in terms of enterprise survival. Table 2 also reveals that the survival gap between these two regions grows systematically with time. At the end of the period, Norte is the region that presents the lowest survival rate, with only 20.7% of the firms' population managing to survive throughout eighteen years of activity. Centro, in turn, has 27.4% of its 1987 start-ups still active after 18 years.

There are also clear disparities between regions, in particular between Norte and Centro, in terms of median duration survival (Figure 3). The median duration of firms at the regional level is below seven years for most regions, except for Centro (around the eight year).

The disparities among the Portuguese regions are confirmed by equality tests. Both Log-rank and Wilcoxon (Breslow) tests allow for the rejection of the hypothesis of survival equality among regions.

Figure 3. Smoothed hazard estimate by NUTII, 1987-2005



Source: Own calculations based on Quadros de Pessoal, GEP, MTSS.

4. A Semi-Parametric Survival Analysis

For the semi-parametric approach, there are seven explanatory variables, beyond sector and year dummies (Table 4).

Table 4. Explanatory variables considered in the model

Variable	Definition	Measurement
Start-up Size	Number of employees at the birth year of the firm.	Logarithm of the number of employees.
Current Size	Number of employees at the current year.	Logarithm of the number of employees.
Industry Entry Rate	Industry entry rate calculated for sectors defined at a 2-digit CAE level.	Logarithm of the industry entry rate, defined as the number of entrants divided by the total number of firms in industry.
Concentration (HHI)	Herfindhal-Hirschman Index (HHI) calculated for industries at a 2-digit CAE level.	Logarithm of the HHI.
Growth	Logarithmic difference of industry employment in two consecutive periods.	Logarithm of the number of employees at year t minus the logarithm of the number of employees at year $t-1$.
Entry Rate x Growth	Interaction variable, defined as the product of entry and growth.	Product of logarithms.
Turbulence	Sum of entry and exit rates calculated for sectors defined at a 2-digit CAE level.	Sum of logarithms of the industry entry rate with the industry exit rate.
Sector Dummies	Dummies for 4 broad sectors: Agriculture, Construction, Manufacturing and Services.	
Regional Dummies	Dummies for 7 NUTII regions: Norte, Centro, Lisboa e Vale do tejo, Alentejo, Algarve, Açores and Madeira	
Year Dummies	Dummies for each current year.	

Source: Own calculations based on Quadros de Pessoal, GEP, MTSS.

Note: * The literature has shown that there is a non linear effect of the start-up size on survival, which is normally accounted for via a log transformation. The specification is reasonable given that the value of the likelihood increases.

A cloglog regression estimation process¹ was conducted for Portugal and for its seven NUT II regions, for the period 1995 to 2005². All the models control for structural effects, through industry dummies and for macroeconomic effects, through year dummies³.

The values presented in Table 5 correspond to the hazard ratios, that is, the ratio of hazard rate when the variable increases by the one unit. A hazard ratio over one implies that an increase in the given explanatory variable increases the probability of exit and, correspondingly, a hazard ratio below one means that an increase in the variable decreases the hazard.

Since the number of firms in each region is quite diverse, ranging from 164.599 firms in the Norte to 7.523 firms in Açores, the conclusions are not straightforward when we take into consideration the absolute values of the coefficients. Therefore, the analysis must rely more on the overall results than on the absolute values of the hazard coefficients.

As argued in the literature and mentioned previously, the start-up size of a firm improves the chances of survival. However, this is not apparent from Table 5. These results show hazard ratios which are greater than one, not only for the total economy but also for each region, as the model does not isolate the effects of initial firm size from the effects of current firm size. When the hazard ratios for the variable that proxies

¹ For further methodology details please see Nunes and Sarmiento (2010a).

² The regional disaggregation is only provided after 1995 due to the introduction of the System of European Accounts in 1995 and up to 2006 due to the problems of compatibility with the Portuguese Classification of Economic Activities (CAE Rev. 3) after 2007. We only estimate until 2005 given that the Eurostat/OECD methodology requires checking for reactivations in the two following years before an enterprise is actually considered to be "dead".

³ The year dummies values have been introduced but the values are not shown, as no clear pattern is discernible from the estimated coefficients, as is usually the case (Mata et al., 1995).

current size are considered, the effect of a firms' current size seems to be predominant. This effect cannot be observed in the table, since it does not detail the common cloglog estimators, but only the hazard ratios. However, when introducing the sum of the start-up and the current size (by denoting S_0 and S_t the initial and current size, respectively, and α and β the correspondent coefficients, the effect of size is expressed by $\alpha S_0 + \beta S_t$), it becomes evident that the current size improves the chances of survival and that the initial size does not. This effect is observed for all Portuguese regions and is consistent with the results of Mata, Portugal and Guimarães (1995). According to the previous authors, firms that have started smaller and have experienced faster post-entry growth do face a higher probability of survival.

International studies also indicate that in industries characterized by high entry rates at the moment of birth, post-entry survival becomes harder. Firms that experience more competition from entrants, have a higher probability of failure. This is also observed for Portugal and for the country's NUT II regions. However, this is particularly enhanced in regions where the entrepreneurial background is not as developed as those of other regions¹ (Açores) and in those dominated by sectors which do not pose high entry barriers to new firms, such as services (Madeira, Algarve and Lisboa). From 2000 to 2007, Algarve (6.7%) and Madeira (4.4%) displayed the greatest annual average growth rates in active employer enterprises (Table 1). Algarve is also systematically the region with the highest birth rates in Portugal and Madeira is within the three regions with the highest birth rates throughout the period. Moreover, Madeira, Algarve and Lisboa are regions where service firms are relatively more predominant.

A high entry rate combined with fast growth rates for any given industry generates, in general, a shorter duration of firms (Mata, et al., 1995; Gort and Klepper, 1982). This conclusion can also be drawn from these results, even if statistical significant estimators are not obtained for some of regions (Algarve, Alentejo and Madeira). It might seem easier to enter the market in earlier stages of the product life-cycle, when markets are expanding, but it becomes particularly difficult to survive. It is particularly so in the Açores archipelago, in Centro, Lisboa and Norte.

Herfindhal-Hirschman Index estimation results for concentration influence on survival probabilities do not provide very disparate conclusions at the regional level, except for the Açores, where the small entrepreneurial fabric in terms of number and firm average size, might be relatively more susceptible to firm concentration.

These results have stressed the literature's conclusions so far. However, the effect of industry growth is at odds with the mainstream results in the literature. One would expect that firms operating in industries with faster growth would suffer from a smaller probability of failure, since they can penetrate the market without harming the competitors, but the estimation results show otherwise. In order to help shedding light over this result, it should be pointed out that industries in the early stages of their life-cycles usually register high rates of entry and exit (Agarwal and Gort, 1996; Baptista and Karaoz, 2007). In general, industries with higher than average entry rates also exhibit higher than average exit rates (Cabral, 2007), due to birth and death rates being highly correlated across industries, corroborating the idea that "entry barriers are exit barriers" (Mata et al., 1995). The combined effect of entry and growth can explain this unexpected effect of industry growth on survival probabilities. Industries experiencing higher growth rates are also more turbulent, registering high rates of entry and also of exit (the "revolving door" at work), thus decreasing the likelihood of survival.

Sarmento and Nunes (2010b) show that the correlation between turbulence (sum of the entry and exit rates) and growth rate is positive (58%) and statistically significant at 5% confidence level, corroborating the previous argument. These results can be extended to the Portuguese regions, underlining that turbulence is indeed a major driver of Portuguese firms' survival chances.

¹ It is a widely held belief that urban settings and metropolitan areas offer more favourable incubator conditions for the emergence of creative entrepreneurs, as there are more favourable conditions for human resource training and management and better labour recruitment (Davelaar, 1991).

Table 5. Estimation results for the total economy and for each one of the seven Portuguese NUT II regions

Variables	Portugal	Regions						
		Norte	Centro	Lisboa	Alentejo	Algarve	Açores	Madeira
Log of start-up size	1.334*** (0.007)	1.310*** (0.011)	1.342*** (0.016)	1.414*** (0.014)	1.250*** (0.023)	1.286*** (0.028)	1.139*** (0.041)	1.267*** (0.044)
Log of current size	0.459*** (0.002)	0.479*** (0.004)	0.418*** (0.005)	0.463*** (0.004)	0.451*** (0.008)	0.444*** (0.009)	0.501*** (0.018)	0.440*** (0.014)
Industry (2 digit) start-up entry rate	1.24*** (0.018)	1.233*** (0.028)	1.181*** (0.038)	1.160*** (0.032)	1.515*** (0.077)	1.290*** (0.08)	1.429*** (0.152)	1.613*** (0.164)
Start-up industry HHI (2 digit)	0.988*** (0.001)	0.986*** (0.002)	0.986*** (0.003)	0.992*** (0.003)	0.988*** (0.005)	0.997 (0.006)	1004,0 (0.011)	0.975*** (0.009)
Turbulence rate	5.29*** (0.222)	11.444*** (0.791)	3.664*** (0.344)	3.406*** (0.336)	1.698*** (0.22)	3.574*** (0.699)	1.285 (0.341)	14.441*** (4.792)
Industry Growth (log)	1.122*** (0.018)	1.087*** (0.029)	1.140*** (0.044)	1.159*** (0.036)	1.144** (0.065)	1.113* (0.07)	1.326** (0.146)	1.036 (0.104)
Growth x Entry rate	1.082*** (0.017)	1.069** (0.028)	1.116*** (0.042)	1.091*** (0.033)	1.083 (0.061)	1.015 (0.065)	1.272** (0.141)	1.033 (0.109)
Sector dummies								
Agriculture	0.612*** (0.01)	0.443*** (0.016)	0.706*** (0.024)	0.643*** (0.033)	0.795*** (0.034)	0.823* (0.069)	1.178* (0.11)	0.841 (0.156)
Construction	0.895*** (0.009)	0.858*** (0.012)	0.931*** (0.021)	0.919*** (0.023)	1.155*** (0.049)	1.013 (0.616)	1.742*** (0.18)	1.343*** (0.116)
Manufacturing	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Services	0.705*** (0.006)	0.631*** (0.007)	0.770*** (0.015)	0.799*** (0.017)	0.884*** (0.032)	0.869** (0.048)	0.905 (0.077)	0.792*** (0.062)
Regional dummies								
Norte	(a)	----	----	----	----	----	----	----
Centro	0.847*** (0.006)	----	----	----	----	----	----	----
Lisboa	1.027*** (0.007)	----	----	----	----	----	----	----
Alentejo	0.926*** (0.01)	----	----	----	----	----	----	----
Algarve	0.939*** (0.011)	----	----	----	----	----	----	----
Açores	0.942*** (0.02)	----	----	----	----	----	----	----
Madeira	1.014 (0.019)	----	----	----	----	----	----	----
Year dummies								
	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of firms	447772	164599	97606	109405	33692	25802	7523	9140
LR X2 (34) / LRX2 (28) for regions	47329.9***	17871.03***	10705.95***	11192.01***	3695.93***	2698.05***	860.98***	1421.47***
Log likelihood	-422915.7	-152494.34	-91424.886	-106768.52	-33112.584	-23204.949	-6.744.716	-8283.6

Source: Own calculations based on Quadros de Pessoal, GEP, MTSS. Notes: (a) refers to the reference sector; The year dummies "yes" means that they have been included in the estimation; Standard deviation is shown in brackets and *, **, *** means, respectively, 10, 5 and 1% level of significance.

From Table 5, it is also possible to conclude that the turbulence rate exhibits the most significant effect when considering other determinants in the model, such as firm and market characteristics. For all the regions, with the exception the Açores¹, where there is no statistical significance, those that have the highest record of firm turbulence, also display the lowest business survival probabilities. Turbulence decreases severely the survival probabilities of firms located in Madeira and Norte and to a lesser extent in the Algarve. The hazard ratios obtained range from around 14.5 % in Madeira to 1,2% in Açores. The Açores display a lower entrepreneurial turbulence than the country's average for most of the years up to 2005 (GEE, 2010b) and the lowest regional churn rates, factors accruing to explaining the lowest regional hazard ratio. From 1987 to 2005, the Algarve shows the greatest churn rate (32.5%) in the country, followed by Norte (29.9%).

Norte has the highest hazard rate within the continental regions (11.5%) and possesses clear regional specificities (INE, 2009; Nunes and Sarmento, 2010c), showing one of the highest regional rates of turbulence (Table 2). Madeira in turn, has 28.6% for firm churn in the 1987-2005 period, but has the

¹ As regiões autónomas apresentam resultados sensivelmente distintos das regiões de Portugal continental, pois apresentam características na demografia empresarial distintas das restantes regiões do país (GEEa and b, 2010; Sarmento e Nunes, 2010).

second greatest from 2001. Turbulence is in fact the most significant determinant in the survival probabilities of Portuguese firms in all regions, notably in the Norte.

A known stylized fact is that turbulence is usually higher in services than in the manufacturing sector (Bartelsman et al., 2005a). For the period 2005 and 2006, the Eurostat/OECD (2009) observes that birth (and death) rates are significantly higher in the service sector for the vast majority of countries. This is also the case in Portugal (Sarmiento and Nunes, 2010b). Despite this fact, manufacturing is the sector whose firms have the biggest probability of exiting from the market. Concerning the model's sector dummies, all regions, with the exception of the archipelagoes of Madeira and Açores, show similar results. Norte shows a lower hazard probability rate relatively to manufacturing, when compared to the remaining regions, indicating lower survival chances for industrial firms, already diagnosed by the non-parametric analysis and by the firm demography analysis (GEE, 2010c; Sarmiento e Nunes, 2010c). Manufacturing is in fact, the sector where firms are more likely to abandon the market in general, but in particular in the north of the country.

In the estimation of the regional components for the total economy, we can observe disparities among regions. When compared to firms in the Norte, only firms located in Lisbon show a higher probability of exiting the market.

5. Final Remarks

Entrepreneurship has acquired a greater level of importance among the critical success factors that shape regional economic change. Regional growth is very much a product of its human capital, R&D, knowledge-spillovers, networks, industrial culture and last but not least, smart public policy. But it is no less a product of entrepreneurial activity and firm ability, in which the entry of newly created firms results in increased innovation, competition and job creation and the growth of surviving of firms assures a stable pool of employment and value added generation.

Regions face two main imperatives in a globalised and market-driven society, the increase of social welfare through job creation and economic development, brought about by structural change and productivity improvements. As there are usually large sectoral and geographical variations among the success and survival rates of new firms, entrepreneurial adjustment as a consequence of the cycles of enterprise birth, growth and survival is of decisive importance to structural change and for the triggering of converging or diverging patterns in regional ecosystems.

The last decades of the 20th century were characterized by a period of creative destruction in Portugal. In particular, regions such as Norte, Algarve and Madeira show the highest growth rates in enterprise births and deaths and naturally firm churn. After 2000, a new tendency seems to emerge, where both births and deaths of employer enterprises are relatively less turbulent.

The decreasing average size of entrants and exiters in the market occurring during this two decades, can also be considered a major factor hindering firm survival in Portugal, especially in sectors more exposed to international competition.

In the non-parametric analysis for Portugal, we find that around 25% of enterprises entering the market fail within the first 2 years of activity and that more than 50% fail within a period of six years. Breaking down the analysis, we identify statistically significant disparities among regions. Norte has the lowest survival rate and Centro is where firms manage to survive longer. The survival gap between these two regions gets amplified over time.

In line with the literature, we also find that firms that start small and experience faster post-entry growth, face a higher probability of survival. Firm's current size dimension is extremely important in determining the probability of survival, particularly in the Norte and Açores.

In industries characterized by high entry rates at the moment of a firm's birth, post-entry survival becomes harder. This happens mostly in the south and in the Portuguese archipelagos, the regions with the lowest number of active employer enterprises. A higher entry rate combined with fast growth rates for any given

industry also generates a shorter duration of firms. It might seem easier to enter the market in earlier stages of the product life-cycle, when markets are expanding, but it becomes particularly hard to survive. Firms that experience more competition from entrants, also face higher probabilities of failure.

However, we observe a different result from the literature, for the effect of industry growth in survival rates. Firms operating in industries which are growing faster seem to suffer from a higher probability of failure. The combined effect of entry and growth helps clarifying this unexpected effect of industry growth on survival probabilities. It is related to turbulence and the high rates of entry and exit verified in most the Portuguese regions throughout this period. Turbulence is in fact the most significant determinant of survival probabilities of Portuguese employer enterprises, particularly in the north of the country. Manufacturing is the sector where more firms are more likely to abandon the market, particularly in the regions of Madeira and Norte.

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